

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.

The Mouth of the Bay Our Members' Support Makes All the Difference



Executive Director
Bob Rheault

I am often humbled by the generosity and outpouring of support from our members. Although one of my jobs as executive director is to help with fundraising, I freely admit that I suck at this particular task. I never like it when people call me to solicit donations, so I am reluctant to be on the other side of that.

A few weeks ago the ECSGA board was struggling with the question of whether to extend the contract with our lobbyist, Matt Mullin. Although he has been very effective in presenting our issues in the halls of Congress, our bank balance was cratering.

Nevertheless, we realized we still needed his help to get the Jones Act bill submitted in the Senate and to carry this effort across the goal line.

After much discussion, the board voted to extend Matt's contract for another three months in the hopes that we might turn a record profit at the Milford Oyster Festival and that our members would step up again to help fund the political action campaign. I sent an e-mail to the ListServ explaining our predicament, and within a few weeks members both large and small had stepped up and donated over \$17,000, while dozens renewed their memberships. I am encouraged that so many in the industry recognize the value of our efforts and support the association as they are able.

Meanwhile, many of our initiatives are finally beginning to bear fruit. We are cautiously optimistic that our efforts to restore trade with the EU will soon pay off, and we have language in the Farm Bill to improve crop insurance options for the industry.

— Continued on page 5

Commentary

The Microplastics and Shellfish Media Frenzy: Stop The Train, We Want To Get Off!

by Sandra E. Shumway, J. Evan Ward, and Kayla Mladinich,
Dept. of Marine Sciences, University of Connecticut

It has been well documented that plastics are pervasive, persistent and perpetual components of the marine environment. The impacts of macroplastics (large items like plastic bags, bottles, etc.) are obvious as general pollution — the ubiquitous plastic bags smothering coral reefs and choking sea turtles, the bottle caps and other plastic detritus causing sea birds to starve. Recently though, microplastics have become a major focal point. These are the tiny bits (smaller than 5 mm) formed by the breakdown of macroplastics and synthetic fibers, and also include the tiny plastic beads added to personal care products, detergents and other household items.

While microplastics have plagued the marine environment for decades, recent publicity and campaign efforts have brought the blight to the forefront. Microplastics pollution is now the latest scientific bandwagon — driven unfortunately, by some scientists' desire to establish their territory in the quest for research funding and fame. Scientific research

takes time, careful experimentation and expertise. Far too often, in the rush to publish and stake claims within the field, researchers litter the scientific literature with unreliable, dubious and incorrect information.

It is entirely irresponsible for scientists and scientific journals to publish questionable data derived from questionable methods. Once published it is difficult, if not impossible, for the general reader to distinguish between what is reliable and true vs. what is mere hyperbole. And it cannot be unpublished. Much of the currently available research on microplastics has not been carefully peer-reviewed or vetted, and has done nothing but sow confusion. Indeed, one recent purported "review paper" actually included the statement, "The literature review process did not include assessment of the reliability of each report." The authors simply listed some of the published literature.

The methodologies used in identifying and characterizing micro-



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Microplastics are smaller than 5 mm and come from the breakdown of larger plastic items and synthetic fibers, and from microbeads added to a variety of household products.

plastics are difficult and expensive. Most of the published studies rely on simple microscopic examination, which is not sufficient. Furthermore, experimental protocols used for animal uptake and depuration studies are severely lacking in scientific rigor and even acceptable methods of animal husbandry.

To make matters worse, microplastic sampling and extraction protocols are inconsistent across studies. To ensure field-collection quality control, it's important to use metal equipment, glassware that has been heated in a muffle furnace, and filtered liquid

— Continued on page 4

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Cultured Shellfish Shine in Environmental Impact Study of Food Production

In a recent study published in *Frontiers in Ecology and the Environment*, (phys.org/news/2018-06-choice-environmental-meat-seafood.html#jCp) researchers compared various food-production systems in terms of their impact on the environment. They examined how farmed livestock, farmed fish and shellfish, and wild-capture fisheries performed against four metrics of environmental impact (energy use, greenhouse-gas emissions, release of excess nutrients such as fertilizer, and contribution to acid rain).

“From the consumer’s standpoint, choice matters,” said lead author Ray Hilborn, a University of Washington professor in the School of Aquatic and Fishery Sciences. “If you’re an environmentalist, what you eat makes a difference. We found there are obvious good choices, and really obvious bad choices.”

The study was based on nearly a decade of analysis, in which the co-authors reviewed hundreds of published life-cycle assessments for various types of animal-protein production. Also called a “cradle-to-grave” analysis, these assessments look at environmental impacts associated with all stages of a product’s life. Of the more than 300 such assessments that

exist for animal food production, the authors selected 148 that were comprehensive and not considered too “boutique,” or specialized, to inform their new study. The researchers compared environmental impacts across food types by using a standard amount of 40 grams of protein — the daily recommended protein serving and roughly the size of a hamburger patty. For example, they calculated how much greenhouse gas was produced per 40 grams of protein across all food types, where data were available. “This method gives us a really consistent measurement people can relate to,” Hilborn said.



The study concluded that farmed shellfish such as clams, mussels, and oysters had among the lowest environmental impacts across almost every metric, since they don’t require feeds and they actually help clean the water by consuming excess nutrients. Small pelagic fish, such as anchovies, sardines, herring and mackerel,

also ranked low in terms of impact. Not surprisingly, beef turned out to be one of the worst environmental offenders. But in a couple of unexpected twists, farmed salmon were found to be relatively environmentally friendly, due to increasing efficiencies in the industry, while catfish and tilapia, once considered sustainable options, earned low marks since many are farmed in Asia, where the energy used to power recirculating systems comes from coal-fired power plants.

“The key policy takeaway is that there’s a real imbalance in regulatory and policy frameworks for different food productions,” Hilborn said. For example, he noted, **even though farmed shellfish clearly come out on top as ecologically friendly food sources, growers often face a strict permitting process that limits expansion**, whereas beef farmers generally don’t face this sort of barrier. Because damage to the environment depends on so many factors, making effective policy changes remains a daunting challenge.

Here’s another positive news story mentioning cultured shellfish: Paul Greenberg, author of *Four Fish* and *American Catch*, has written a new book titled, *The Omega Principle*, about the history, science and business behind omega-3 fatty acids. As part of his research, he ate fish at every meal for a year to see if it would improve his health, chronicling his experiment in a Frontline Special, *The Fish on My Plate*. (www.pbs.org/wgbh/frontline/article/qa-why-paul-greenberg-spent-a-year-of-his-life-eating-fish) In a recent appearance on NPR’s *Fresh Air* (www.npr.org/2018/07/09/627229213/the-science-and-environmental-hazards-behind-fish-oil-supplements), Greenberg said, “The other thing that I’ve ... incorporated into my diet are farmed bivalves. That is mussels, clams, oysters ... super high in omega-3 fatty acids but also all kinds of other nutrients. And actually, [they] ... improve the marine environment even as we grow them. They filter the water. They make the water cleaner [and] provide structure for all sorts of other animals to exist.”



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— Continued from page 1
Microplastics & Shellfish

reagents (such as Milli-Q® purified water and ethanol), but these are not always used. Studies need to report relevant quality-control efforts and must eliminate extraneous plastics such as collection bottles and ropes. Preservation methods and microplastic recovery rates should be reported to determine the validity of the extraction methods used.

To extract microplastics efficiently, samples are first digested (preferably in hydrogen peroxide), then undergo a density separation. Alternative digestions using acid, enzymes and alkaline solutions have been used, but little is known about the effect of enzymatic and alkaline digestions on polymer composition. It has been established, however, that acids can melt plastics in the sample and therefore should be avoided. Hypersaline sodium-chloride solutions or denser salts, like sodium iodide or zinc bromide, are recommended for density separations. Methanol or ethanol can be added secondarily to extract any microplastics remaining in the sample.

The most important step, and often the most neglected, is the proper identification of microplastics with Fourier-transform infrared spectroscopy (FT-IR) or Raman spectroscopy. Visual sorting with a dissecting microscope can be used for imaging and characterizing the particles' physical properties, but FT-IR or Raman spectroscopy is needed to validate polymer composition, particularly for particles smaller than 500 µm. Many studies claim to have identified microplastics visually, but without a spectroscopic analysis the results are likely biased. In short, microplastics are hard to iden-

tify and quantify, and the current literature on the presence and impacts of microplastics on marine organisms is seriously flawed.

Many studies have used incorrect identification methodologies, as well as poor animal husbandry in their experiments with shellfish — some investigators lack any understanding of the feeding processes in bivalve molluscs. Microplastics is a sweeping term, as it includes particles smaller than 5 mm (5,000 µm). This is a very wide spectrum, and bivalve molluscs only consume particles in the 1 – 500 µm range, more commonly in the 5 – 150 µm range.

It is well established that filter-feeding shellfish consume microplastics; nothing newsworthy there. Indeed, because filter-feeding bivalves consume the particles readily and excrete them just as readily, they make ideal test particles and markers; we have been using microplastic beads in our research for over 30 years.

There is no question that microplastics can be found within marine animals. These particles are ubiquitous and can be found almost everywhere you look, but every discovery does not warrant a new publication. **What is in question is the extent of the impacts (if any) on marine animals.** Identifying detrimental impacts quickly garners the attention of both funding agencies and the public. Just as important are findings that demonstrate no impacts, but these results rarely make the news.

Recent efforts to frighten the public by noting that humans may be consuming microplastics are both premature and irresponsible. One (or even five or 10) microparticles cannot be extracted reliably from an entire mussel or oyster with any degree of confidence. And even if it could be, is that really of any consequence for



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Microplastics are ubiquitous in the marine environment, but very few studies clearly and reliably demonstrate their negative impacts on bivalve shellfish, much less on the humans who eat them.

the shellfish or, as some have suggested, human health? The answer is most likely *No* on both points, but experiments are currently underway in our laboratory to address this question.

Very few studies clearly and reliably demonstrate any negative impacts of microplastics on bivalve molluscs, and none has demonstrated any adverse impacts of eating shellfish purportedly contaminated with microplastics. While there are conflicting reports on the actual *vs.* potential role of microplastics as vectors for the transfer of drugs and pollutants that adhere to the particles, currently there is no clear evidence that accumulated microplastics pose a hazard in this regard in bivalve molluscs.

A recent article realistically noted that people are exposed to more plastic fiber during a typical meal via household dust fallout (adding up to 13,000 – 68,000 particles per person every year) than from the shellfish on their plates (perhaps 1–10 particles per shellfish). Although more data are needed to confirm potential impacts, the current media hype and scare tactics with regard to “potential” impacts is irresponsible, unwarranted and dangerous.

All of this is not to say that no well-executed studies have been conducted, but they are difficult to find among the myriad of mediocre or simply flawed efforts. As in other fields, such as global warming and ocean acidification, as the field matures, the best works will distinguish themselves, but this will take time. Meanwhile, researchers need to step back, take a breath, design and carry out experiments using proper and accepted methodologies, read the past literature, and refrain from rushing to publish prematurely — either in scientific journals, in the popular press or on the internet. Sloppy efforts will inevitably cause more harm than good, and overcoming bad publicity and stigma is never easy or even possible.

The plastic will still be there!



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— Continued from page 1
Mouth of the Bay

Our bill to exempt aquaculture workers from the Jones Act is gathering momentum, while our continued engagement with NOAA and the ISSC ensures that we are now consulted whenever they propose changes. Secretary of Commerce Wilbur Ross is very pro-aquaculture, and our allies in Congress have made sure that the key programs we depend on get funded, despite the president's repeated attempts to zero them out. Meanwhile, a bevy of new, temporary employees is being interviewed for positions at the Milford Lab. Much of this progress would not be possible without a strong growers' association. We are truly a member-driven organization, and wouldn't be able to achieve anything without the support of a robust membership.

But much remains to be done. I am constantly working with states trying to ensure a workable regulatory environment, and pushing back on the inevitable regulatory overreach by the FDA and NOAA. No matter what we do, the media seems to remain fixated on the perils of "flesh-eating" bacteria; and we could really use some help advancing the permitting of mussel farms in federal waters and selecting lines of fast-growing, disease-resistant shellfish. I spend my days going to meetings, talking on the phone and typing emails — trying to keep the world safe for shellfish.

Rest assured that you have a passionate and committed executive director on your side. It is your support that keeps me engaged and motivated to continue to fight for this industry.



If you sell shellfish at farmers markets or other retail outlets, consider stocking custom-imprinted, six-pack-sized, soft-sided, insulated lunch boxes (along with a gel pac) so customers can keep their shellfish purchases cool on the ride home. MarcoPromotionalProducts.com sells them for as little as \$2.66 each.

Sneak Preview: Results of New Study on Aquaculture Gear Coatings Slated for December Newsletter

Don't miss our next newsletter for in-depth coverage on the results of a soon-to-be-published study that looked at developing coatings designed to inhibit bio-fouling on aquaculture gear.

Testing is still ongoing in Florida and Connecticut, as well as in Australia, New Zealand, Portugal and Prince Edward Island.

As the photos show, some of these coatings show real promise in controlling nuisance fouling, which could save growers time and money wasted on dealing with this problem. All panels were deployed in early June and photographed a month later in early July.

The studies were funded by grants from the National Oceanic and Atmospheric Administration (NOAA), the Saltonstall-Kennedy grant program and the Northeastern Regional Aquaculture Center (NRAC).



SANDRA SHUMWAY/UCONN

Experimental test panels with several iterations of test coatings. Black panel is commercially available copper-based coating, control panel (no coating) is to its left. Panels were deployed in early June and photographed in early July.



SANDRA SHUMWAY/UCONN

Oyster bag with no coating (control) after one month of exposure.



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Oyster bag with experimental coating after one month of exposure.



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Space, Neighbors and Shellfish

by Chip Terry and the Oyster Tracker Team, Castine, Me.

As the demand for healthy, sustainable seafood continues to grow, we seem to be entering a new Golden Age of shellfish farming, or at least we hope so. (www.seafoodsource.com/news/supply-trade/oysters-remain-king-as-growers-race-to-meet-consumer-demand) Secretary of Commerce Wilbur Ross is pushing aquaculture as a solution for reducing the U.S. seafood trade deficit. (www.nationalfisherman.com/national-international/stuck-on-imports-u-s-seafood-trade-deficit-increased-in-2017)

And on a more local level, a recent analysis released by leaders of New Bedford, Mass., concluded that shellfish aquaculture “presents the greatest opportunity for growth in the immediate future.” (ripr.org/post/new-report-new-bedford-shows-promise-growth-aquaculture#stream/0)

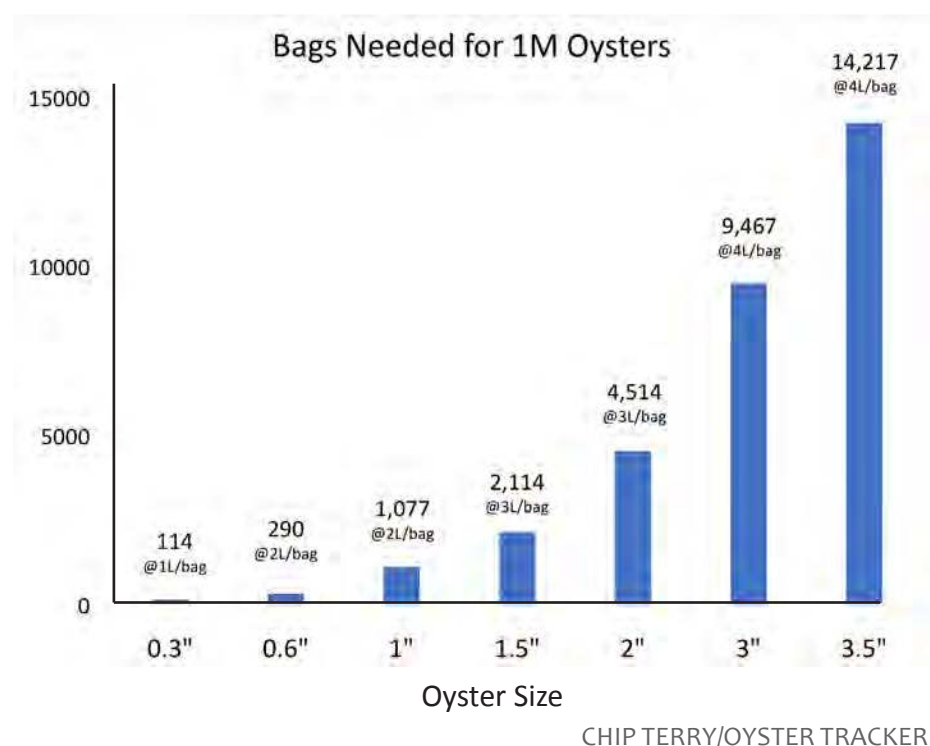
New equipment, improved seed stocks, innovative organizations and universities are making farming more accessible than ever before, while cleaner waterways have dramatically expanded the areas where shellfish can be grown.

Nevertheless, our industry continues to face huge challenges. In visiting farms from South Carolina to Maine and out on the West Coast in Washington, we hear a constant refrain about problems with neighbors. A proposal to start a new farm will almost inevitably face backlash and lawsuits from neighbors. One wealthy landowner with an expensive lawyer can often derail a new lease request or threaten existing leases. Even when shellfish farmers are beloved by neighbors, there is often a vocal contingent that opposes expanding leases. One New York resident who summers in Rhode Island sums up this sentiment well: “We want aquaculture, but not here.” (www.rimonthly.com/the-fight-for-aquaculture-in-rhode-island)

Although the visual impact may be small, and the environmental and social impacts positive, modern shellfish aquaculture is still a relatively new industry. NIMBY-ism may not be rational, but it’s something farmers have to deal with every day.

So how do we solve this?

Many answers come to mind: education, political leadership (support ECSGA, they do great work), good-neighbor policies, science and patience are all incredibly important. Accepting new things takes time, and modern shellfish



The number of bags required to hold 1 million oysters increases exponentially with oyster size. Growers should experiment with stocking densities, since growth and condition can suffer if high densities impede flow and lead to a decrease in the amount of food needed to thrive.

aquaculture is just emerging from its infancy. Having worked with growers from a number of farms, one thing that strikes us at Oyster Tracker is that many of them could be using space more efficiently. State rules, like those in Rhode Island that restrict aquaculture to no more than 5 percent of the acreage of the salt ponds, are one way to force farmers to be more efficient.

A million ¼-inch oysters will fit in 40 typical bags (stocked at 2 liters per bag). Those same animals will require 12,623 bags when the oysters reach 3 inches (stocked at 3 liters per bag). Whether you farm with trays, cages, Seapa baskets or other equipment, the same rule applies. Oysters grow rapidly and need space. Aquaculture Extension Specialist Dale Leavitt of Roger Williams University colorfully describes it as the “jiffy pop” challenge. And the ECSGA’s own Executive Director, Bob Rheault, brags that he once recorded a 10-fold volume increase in his floating upweller system (FLUPSY) in just eight days.

It’s clear that husbandry strategies, equipment types, lease locations, and most importantly, flow rates and food concentrations, will affect how space-efficient a farm can be before the animals start to experience negative impacts on growth and condition. Our work with farmers shows a huge variation in how they use the space they lease.

We have seen examples of farmers with a 4-acre lease growing around 5 million oysters, while others with leases well over 10 acres are growing fewer than a million animals. As this industry matures, the efficient use of space will play an increasingly important role. An efficient footprint is good for farmers, good for the neighbors and good for the industry as a whole.

— Continued on page 7

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By floating bags on their sides, the grower at this Maine farm uses his space efficiently. This strategy allows him to grow millions of oysters on a 4-acre lease, and has the added bonus of allowing him to easily flip and defoul the bags.

We see four main efficiency strategies that farmers are taking advantage of:

1. Stocking density;
2. Equipment type and spacing;
3. Staggered crops; and
4. Vertical farming.

Let's explore each of these.

Stocking density

To be clear, you can't just increase your stocking density. Shellfish need phytoplankton to live, and an overstocked bag will lead to slower growth and higher mortality. You are better off experimenting with a number of strategies in this category. Ones we have seen include:

❑ **Test stocking density.** Try stocking a few bags with higher (and lower) stocking densities than you typically use. After a few weeks look at how initial density impacts growth, mortality and meat quality. Repeat the experiment at different sizes. The optimal density for 1/4-inch oysters is going to be much less than for 2-inch oysters. Be careful, most folks seem to overstock their gear, which can lead to slower growth and watery meats.

❑ **Increase stocking density as you near or reach market size.** Especially for restaurants that don't want large oysters, increasing density and slowing the growth of larger oysters is a common strategy. You can often put 4–6 liters of near-market size animals in a bag. Doing this you can cut the number of bags required by half — saving you money and labor while reducing your footprint. You might even use the extra bags to reduce the density at smaller

sizes. Just be sure to check that the oysters are still healthy and the meats are still full.

❑ **Create a bank.** A number of our farmers pull all their market-size oysters off their leases and into floating bins/totes/bags. Some growers are sinking these cages of market-sized animals to deeper, cooler waters to reduce *Vibrio* risks in summer, while many are experimenting with wet-storage systems. Although land-based wet-storage systems have significant permitting and monitoring requirements, they can sometimes allow you to maintain sales during rain closures. Storing animals on your own lease can decrease a farmer's space needs while making it easy to harvest oysters to meet demand. But again, only do this if you are able to maintain adequate flow to your animals, or quality will suffer and you could get mortalities.

❑ **Switch techniques.** A number of our farmers start with a floating system for oysters up to around 1 inch, and then move to bottom trays or suspended systems for the final growout. Others use Seapa baskets or flip bags at the smaller sizes and then move to other systems later on. A smart use of techniques can reduce your space needs, cut your equipment costs and often create a unique flavor profile.

Equipment type and spacing

As with stocking density, there is probably an optimal spacing for your location and husbandry technique. The t-shirt logo from Ketcham Traps is right on: *More Flow, More Grow, More Dough.*

The math is pretty compelling. If you can reduce the spacing by 25 percent, you could increase your yield per acre by a similar amount, taking care to stay within the constraints of maintaining good flow. To that end, you can test a few things:

❑ **Align bags for optimal flow.** One farmer we know aligns his bottom cages so the long side of the cages is perpendicular to the water flow, thus maximizing the amount of feed flowing to the oysters. Another makes sure to stagger all his equipment such that flow that misses the first row can hit the second. I haven't seen any studies on this, but it makes sense.

❑ **Defoul more frequently.** Although fouling growth can be tough to keep up with, it is critical to maintain enough flow through the gear so the animals inside are not food-limited.

❑ **Increase the number of bags per line.** Again, test!

❑ **Increase the mesh size as the animals grow.** This will lead to increased flow.

❑ **Increase the size of your equipment.** We've met a few farmers who have huge equipment — often requiring specialized boats and davits to lift. Although the initial costs are high, they often improve productivity per acre dramatically, while mechanization cuts back on chiropractic visits.

Vertical farming

We've seen a number of locations with floating bags/OysterGros on the surface and bottom trays underneath. Others are using stacked trays to great effect. A million oysters will fit on a single acre if you can get 23 oysters per square foot of surface area. If you can grow them in several levels you can greatly increase your productivity per square foot of surface area. Depending on your location, some combination of floating, suspended and bottom-culture could be a highly productive and efficient use of your space.

Staggered crops

A number of our farmers get seed three-to-five times a year, especially in southern areas with longer growing seasons. This allows them to have seed at all different stages. Staggering crops makes it easier to manage inventory and allows for efficient use of space.

Bottom line

There is no one-size-fits-all answer. Test what will work in your unique location. A clear test this year on a couple of hypotheses can pay huge dividends next year.

There are surely other techniques we haven't seen, so we would love to hear your thoughts.

— Chip Terry and the Oyster Tracker Team
chip@oystertracker.com

Ed. note: I'm often asked by beginning farmers, *What is the optimum stocking density*, for a certain gear type. My answer is sure to frustrate: *there is no one magic number.* Your stocking density (liters per bag) will vary. Sites with plentiful food and good flow can support high densities.

Smaller animals need more space because they require lots of food and the flow through fine-mesh bags is impeded more than through larger-mesh bags. As animals grow and you switch to larger meshes you can increase the density of each bag. Conditions of food concentration and tidal flow will determine the optimal stocking density for your site. Most leases have spots with faster or slower flow, and the bags in the faster flow can be more densely stocked.

But if you don't clean the fouling from your gear regularly your animals will surely suffer. I was surprised to learn that 90 percent of the ambient flow goes around (not through) a typical, clean, 1/2-inch-mesh bag. Water seeks the path of least resistance and that is around your gear. Flow brings new food to your crop and that is why flow is so important.

— RBR

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Eating Fish May Prolong Life

A study published in July in the *Journal of Internal Medicine* found that both men and women who ate more fish experienced significant reductions in mortality. The study sought to associate consuming fish and long-chain omega-3 polyunsaturated acids with decreased total and cause-specific mortality.

In all, roughly 241,000 men and 181,000 women from a National Institutes of Health (NIH) – AARP Diet and Health Study were followed for 16 years, and their dietary intakes were assessed using a validated NIH Diet History questionnaire.

Around 54,000 of the men and



junku/Getty

31,000 of the women died during the 6 million person-years of follow-up. **Higher fish and omega-3 consumption were significantly associated with lower mortality in both sexes.**

Comparing the highest and lowest quintiles of fish intake, men experienced 9 percent lower mortality from all causes, 10 percent lower

mortality from cardiovascular disease, 6 percent lower cancer mortality, 20 percent lower respiratory disease mortality and 37 percent lower chronic liver disease mortality.

Women experienced 8 percent lower mortality from all causes, 10 percent lower mortality from cardiovascular disease and 38 percent lower mortality from Alzheimer's disease.

Consuming fried fish was not related to mortality in men, whereas it was associated with increased risks of mortality from all causes, cardiovascular disease, and respiratory disease in women. Long-chain omega-3 fatty acid intake was associated with 15 percent and 18 percent lower cardiovascular disease mortality in men and women, respectively.

Is Shellfish Healthy?

An article just posted to time.com (time.com/5341293/is-shellfish-healthy) quotes Faye Dong, of the University of Illinois saying, "Shellfish are high-quality protein sources — just like land animals — meaning they have all the essential amino acids" as well as healthy minerals like zinc, copper and iron.

Professor Dong published a seminal paper on the nutritional value of shellfish back in 2001 (wsg.washington.edu/aquaculture/pdfs/Nutritional-Value-of-Shellfish.pdf).

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UN FAO State of the World Fisheries and Aquaculture 2018

The Food and Agriculture Organization (FAO) of the United Nations has released its 2018 status report on global fisheries and aquaculture (www.fao.org/state-of-fisheries-aquaculture), analyzing global trends and making recommendations on governance and policy designed to improve sustainability. The following highlights were lifted almost verbatim from the report.

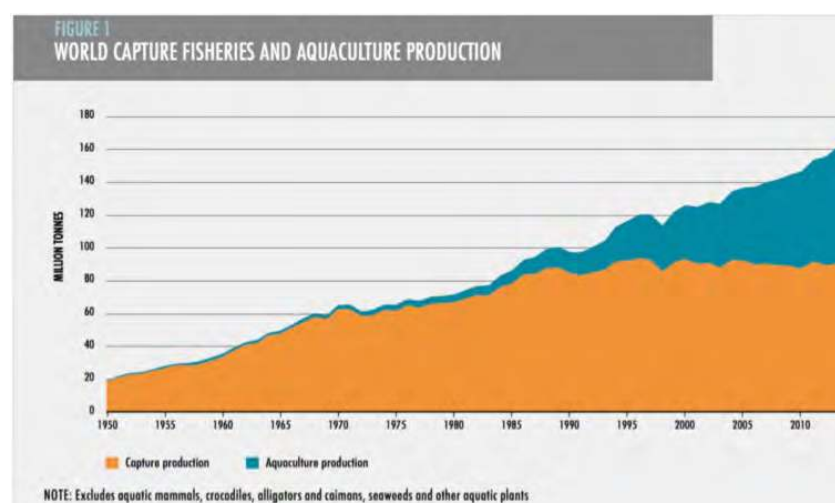
Consumption

Since 1961 the annual increase in world food-fish consumption has averaged around 3.2 percent, which is double the annual rate of population growth. This increase is being driven not only by popula-

tion growth, but also by improved distribution, reduced waste, rising incomes and increasing demand tied to perceived health benefits. In per-capita terms, food-fish consumption has gone from 9 kg in 1961 to 20 kg in 2015, growing at an average rate of about 1.5 percent per year. Preliminary estimates for 2016 and 2017 point to further growth.

Production

Since 1980 capture-fisheries production has remained level, at about 80 million metric tons, with aquaculture production of food fish now exceeding the wild harvest. Total fish production in 2016 reached an all-time high of 171 million metric tons, 88 percent of which was used for direct human



UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION

Challenges

The FAO report notes that overfishing continues to be a significant challenge globally, with a third of fish stocks classified as overfished, even while the U.S. continues to make great progress in reducing the number of overfished stocks. The report also highlights projected impacts from climate change to illustrate potential vulnerabilities of fisheries.

Predictions

The report includes the following projections out to the year 2030:

- ❑ World fish production, consumption and trade are expected to increase, but the growth rates will slow over time;
- ❑ In real terms, adjusted for inflation, all prices will decline slightly over the projection period but will remain high;
- ❑ World food-fish consumption in 2030 is projected to be 20 percent higher than in 2016, even though the average annual growth rate will slow down;

— Continued on page 11

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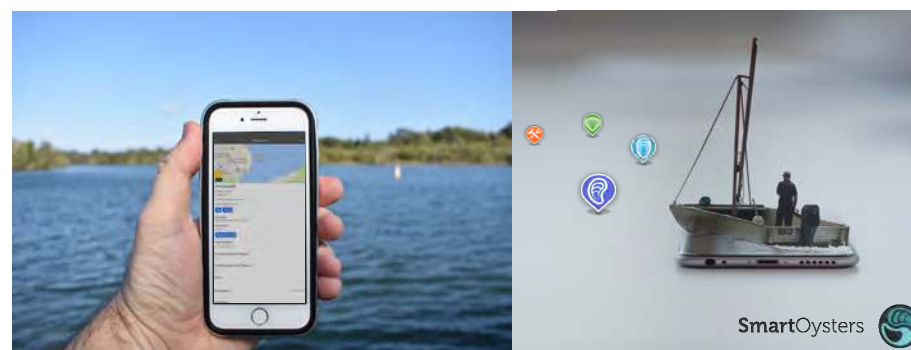
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New Report Evaluates U.S. Shellfish Aquaculture Permitting Systems

by Robert Rheault,
ECSGA Executive Director

A new report prepared for the National Marine Fisheries Service by Tom O'Connell of Earth Resource Technology Inc., is now available for download at www.fisheries.noaa.gov/webdam/download/76696584. Based on a 2016 review of 22 shellfish aquaculture permitting systems covering all the coastal states in the continental U.S., the report lists 15 recommendations that the author believes could improve permitting efficiencies and advance aquaculture development. The report acknowledges the wide variation in the development of shellfish aquaculture among the various states, as well as a huge diversity in permitting schemes. I would take that further and say that often the state of aquaculture development (or lack thereof) is a direct result of the permitting process in that particular state.

The report includes a tool that I would characterize as solid gold: a spreadsheet in Microsoft Excel format (www.fisheries.noaa.gov/webdam/download/75332515) detailing all the specific regulations, contacts, information sources and production estimates for each of the 22 coastal states. But be aware that this is a moving target, as states regularly change their regulations, links get updated, and the Army Corps districts revise their general permits every five years. It also appears as if not all states were forthcoming with information.

In my role at ECSGA working with 14 states on the East Coast, I often hear about permitting woes and have been asked many times by industry members and permitting authorities alike how to craft workable regulations that could facilitate the growth of the industry. This led me to put together a PowerPoint presentation titled, *BMPs for Regulators*, describing what I view as key elements of permitting processes that will ensure a healthy industry. These include: "one-stop" permits, permit bonds to ensure equipment is removed, hefty penalties for thieves, uniform lease marking and *Vibrio* training, just to name a few.

The report echoes many of my recommendations on how to improve the permitting process, such as making enhanced communication among state aquaculture coordinators and between state and federal regulators a top priority. As you might expect, those states with advanced industries and a lot of permitting experience can be very helpful to states that are just starting to work these issues out. The report also advocates delegating Army

Corps shellfish-permitting authority to state agencies whenever possible, something that has worked well in New England states for decades. Setting up one-stop permit applications, hiring state aquaculture coordinators and hosting websites with permitting guides illustrating all of the various federal and state requirements also make the list of recommendations. The report notes that:

"The United States stands at a unique point in time to facilitate aquaculture development. **The public's historical view of aquaculture is improving as a result of industry's use of safe and sustainable farming practices.** There is a public with a growing interest to purchase local, sustainable seafood. Capital and financing assistance programs are more readily available now than ever. And, this is all motivating government agencies to work more closely together to implement more effective and efficient permitting systems while still ensuring protection of natural resources and balance with other interests."

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— Continued from page 10
State of Fisheries and Aquaculture

- ❑ Aquaculture growth will slow to about 2 percent annually, but the increased production is expected to fill the supply-demand gap; and
- ❑ Per-capita global food-fish consumption is expected to rise slightly, from 20.3 kg/person annually in 2016 to 21.5 kg/person in 2030, although the rate of growth is projected to slow.

The report makes dozens of recommendations to ensure sustainability, primarily in the fisheries sectors, and recommends reducing ocean pollution and adhering to the Paris Climate Agreement emissions targets.

Ed. Note: The World Bank projects a less rosy picture out to 2030: a global shortfall of seafood supply on the order of 50 million metric tons, and price increases of 30 percent or more, will lead to U.S. consumers' switching to cheaper forms of proteins, causing skyrocketing heart disease (documents.worldbank.org/curated/en/458631468152376668/Fish-to-2030-prospects-for-fisheries-and-aquaculture).

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Two Steps Forward... Permitting Challenges on Steroids

by Robert Rheault,
ECSCGA Executive Director

In recent years shellfish aquaculture grow-out technology has undergone rapid evolution. Although the industry has always relied on a mix of floating, suspended and bottom-resting gear, now growers can choose from floating OysterGro® cages, Taylor floats, Australian longline Seapa baskets, Hexcyl cages and many other types of suspended trays, as well as a wide variety of custom flip-bag designs and bottom-resting oyster condos.

Each of these approaches has applications in different environments. It's clear that holding the animals up in the water column using floating and hanging gear has a lot of advantages: it can result in a higher-quality product with better survival rates, faster growth, fuller meats and firmer, more uniform shells than the traditional rack-and-bag or bottom-cage designs. If you can jostle your gear with wave action or tidal tumbling and expose it to the sun periodically, you can even control most of your fouling issues and get the rounder shape and firmer shell that customers prefer.

Unfortunately, these floating- and suspended-culture methods come with unique permitting challenges. At low tide some of the gear is visible to boaters and homeowners, while stakes, poles and horizontal wires can restrict navigation during all but the very highest tides. Of course, floating gear is visible during every tidal cycle, and navigation through these leases is not really practical. In areas where boaters can safely go around leases, the Army Corps doesn't consider them to be navigation hazards, but boaters often resent any restrictions on where they are allowed to go. And many

waterfront homeowners chafe at anything that alters their viewscape.

In my home state of Rhode Island we had been enjoying double-digit annual growth of aquaculture for almost two decades, until growers discovered the many advantages of floating gear. Most new lease applications seek to use floating gear, and as a result permitting has just about ground to a halt. One affluent waterfront homeowner has actually sued the permitting agency, forcing it to propose a list of highly restrictive site considerations targeted to floating gear in order to mollify objecting homeowners.



ROBERT RHEAULT

Rack-and-bag shellfish gear right up on the beach in front of expensive waterfront homes in Arcachon, France — a common site in many parts of Europe.

And resistance to floating gear is not unique to Rhode Island. I am hearing about contentious application hearings, lawsuits and even proposed legislative restrictions in some states. The controversy has even spread to Canada, where local groups have forced the Department of Fisheries and Oceans to review the ecological impacts of proposed new floating oyster farms off Prince Edward Island. In Virginia a local lawyer is pitching his services to homeowner associations to help them "protect riparian rights" by contesting lease proposals and initiating legislative measures designed to block shellfish farms. This lawyer claims (without evidence) that off-bottom farms lower property

values, and that "industrial-scale oyster farming operations" will ruin homeowners' pristine waterfront views with scores of unsightly poles.

I must confess that years ago I never dreamed anyone would be able to get permits for floating gear in Rhode Island. I tried to make my farm invisible, using bottom cages and bottom plants, and still almost couldn't get a permit. When I learned about the survival rates in OysterGro® cages and saw the shell and meat quality in flip-bags I was quite jealous.

So what should new growers do? The first suggestion is to seek spots where homeowners are either supportive of the idea of shellfish farming, or where they can't see you. One grower sited his OysterGro® cages next to some black boulders that camouflage his gear nicely. To help with the visibility problem, OysterGro® now makes a gray "stealth float" that is harder to see from a distance than the original black. Some growers have sought out remote coves where they can effectively hide their farms from view. Unfortunately, these remote sites are few and far between, and getting even harder to find as more people build homes along the coast. Another idea is to apply for leases off industrial sites where the waterfront is already unsightly.

But if you are dead-set on placing an off-bottom farm in front of a bunch of waterfront McMansions be prepared to do battle. Many growers advise working with homeowners to break down barriers before submitting an application. But be aware that this approach could backfire, providing homeowner associations with time to gear up for a fight well before the request for a permit is heard.

Any grower with visible gear should at the very least take pains to keep the lease neat and tidy. Being in the spotlight and working in the commons, it is incumbent on growers not to be an eyesore or a bad neighbor, or the next farm will never get a permit.

I'd like to think that over time social carrying capacity for aquaculture will increase and people will get used to seeing shellfish farms. A field of corn is not a pristine wilderness, but few people complain about land-based farms because they're used to seeing them. And in Europe it is common to see acres of rack-and-bag farming right up on the beaches in front of multi-million-dollar homes. Society may adjust over time, but it will take patience and fortitude on the part of growers.

In the meantime, choose your site carefully or prepare for conflict. I spent two years fighting for my first lease, but that was never the toughest part of being an oyster farmer. If you don't make a mess and try your best to be a good neighbor, hopefully things will work out. But change is difficult — many folks would make change illegal if they could.

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The shucking contest is always a horse race. We typically get around 25 –30 professional shuckers coming from as far away as Toronto and New Orleans (and everywhere in between) to shuck at the festival, and most of them compete.

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Help Still Needed for Milford Oyster Festival on Fri.–Sat., August 17–18

It's that time of year again! Please join us as we serve more than 42,000 oysters and clams to an eager crowd at the 44th annual Milford Oyster Festival on Friday and Saturday, Aug. 17–18. The festival is our biggest fundraising effort of the year, with the proceeds fueling almost 40 percent of our annual operating expenses, but we can't pull this off without the help of about 100 volunteers.

You might think you live too far away, but we have members from Maryland, Maine, Virginia and Florida who travel to Connecticut almost every year. We know that weekends are precious, but if you have never attended, please step up and lend a hand. Many of our stalwart festival regulars have to attend weddings this year, so we are relying on some new folks to make the trip.

If you can't make it yourself, you could still help by sending one or two of your employees for the day. We work hard, but we also have a lot of fun. We have jobs for all levels of ability, and even if you cannot commit to a full day, we would really appreciate any time you can give us.

The festival is a great opportunity to connect with other growers, gear suppliers and scientists from the Milford Lab. We have a great team of about 30 paid professional shuckers who come from as far away as North Carolina, New Orleans and Canada each year to compete for \$1,750 in prize money

in our world-famous shucking contest. If you know someone who is handy with an oyster knife, we are always looking for new entrants.

If anyone needs a room for the night, let us know, as we have reserved a block of inexpensive rooms at a local hotel. If you would prefer to come by train to avoid the parking hassles, the Milford Metro North train station is only two blocks from our tent!

At our large booth located in the food court area we serve raw and cooked shellfish on Saturday. Across the harbor at Lisman Landing, we have raw-bar offerings at the pre-festival "Oyster Eve" on Friday evening and again all day Saturday.

The festival will be held, rain or shine, Friday, Aug. 17, from 6 to 9:30 pm; and Saturday, Aug. 18, from 10 am to 6 pm. Beer, wine, oysters and other great food will be available both days. Admission to the festival is free, with Eddie Money headlining at the festival main stage on Saturday. We hope to see you there — the Association is counting on your support!

For more information visit milfordoysterfestival.com

If you can help out for any part of the festival, please contact Trisha Kosloski, (203) 804-4263 or trisha.kozloski@yahoo.com

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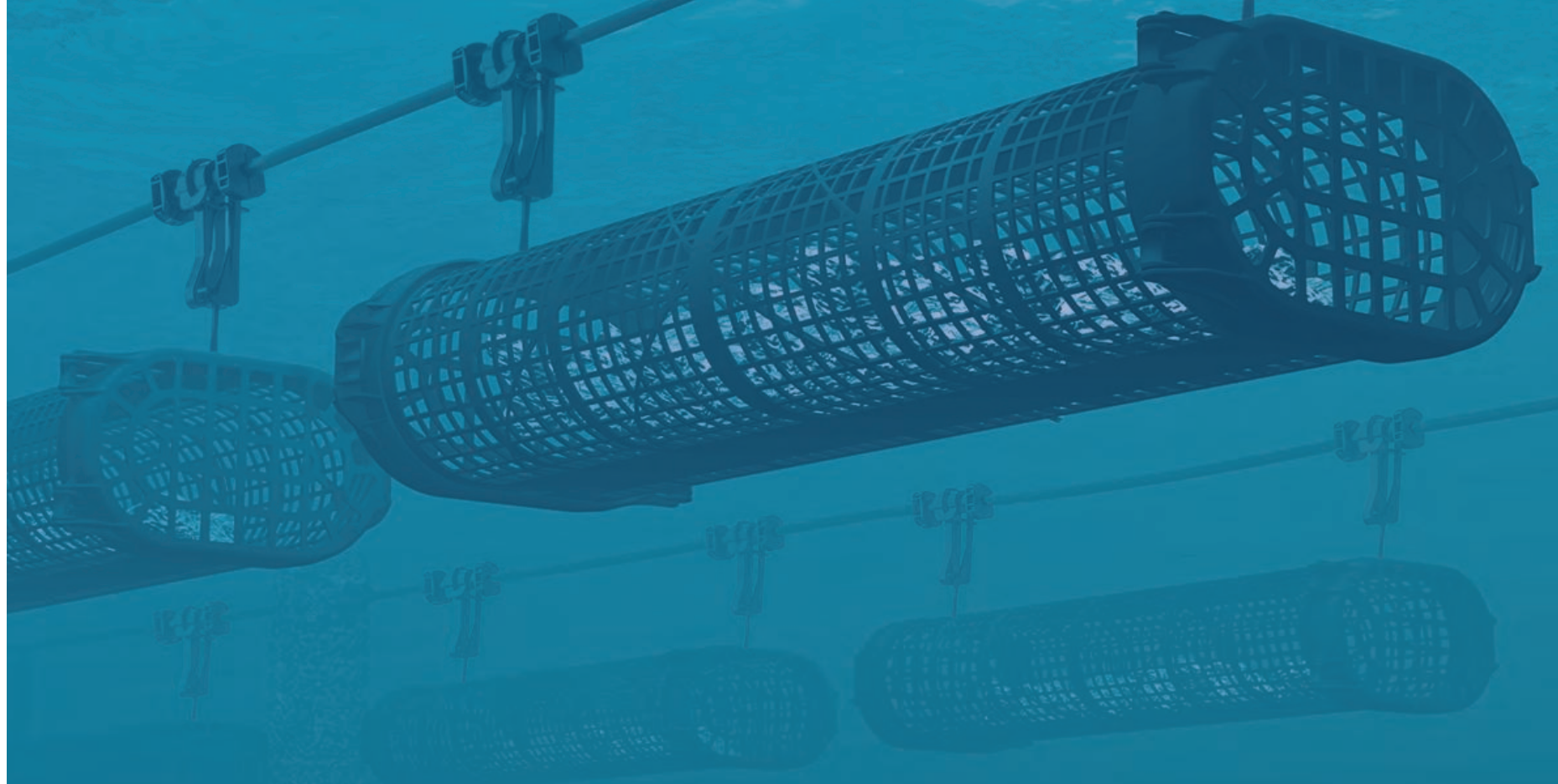
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