

LONGLINES

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Spring 2020



**Tidal Love in
this Virtual Time...**



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The PCSGA strives to ensure a healthy industry and environment for shellfish farming on the Pacific Coast.

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Comments and questions about *Longlines* are invited. Please email: outreach@pcsga.org

What the Tide Brought In

Notes from the Director

It's difficult to be the one in charge. Being the one "on watch" has more downs than ups as 2020 has taught us.

I will never forget my first Annual Shellfish Conference. It was the fall of 2010 in Tacoma, WA and I had joined PCSGA that August. Robin Downy attended the conference as the outgoing director and I basically shadowed her. It was all going fairly well until...

...Reg Breakwell's retirement party, sponsored by some of PCSGA's treasured Allied Members. I should have known something was up that night in the Hospitality Suite with all the whispering, chuckling, and the saccharine sweet ways in which some people said "I'm so glad you're here tonight, Margaret!" and "You're going to love this! Please stick around!" A hush came upon the packed suite as a woman entered, who was not wearing typical shellfish grower attire. She was carrying a stereo and asked to see the guest of honor. Robin turned to me and said "this is on YOUR watch!"

There it was, my first PCSGA event and a spirited entertainer showed up under MY watch. I didn't know what to do, but I did think for a moment, "so this is what makes private sector different." I rolled with it.

Fast forward nearly 10 years to last month. This horrendous COVID-19 crisis has been extremely difficult for all of us. Within the first week, a grower reached out the PCSGA office indicating that the thing she worried about most was growers not maintaining adequate human interaction. That inspired us to host a virtual meeting for our members.

March 26th we hosted PCSGA's first Virtual Growers Network through Zoom. It was 9 am and I figured my offspring Peter (20) and Annie (17) were long from waking. Thinking I was safe, I logged into the meeting seated at my kitchen table. One by one, growers appeared on my screen. Each one joined with smiling faces and the giggles – perhaps excited at seeing their friends, but more likely they were amazed to successfully connect. We filled the time with sharing growers' experiences and encouraging words.

At one point during the meeting, Peter walked down the stairs into the kitchen. Seeing him, I put my hand over my headset microphone and said the words "you may want to put some clothes on." Peter nodded his head and continued to prepare breakfast. The meeting continued and was going great, until I began to notice activity behind me. It took me a minute to comprehend that Peter was behind me. He was in the scope of my computer's video camera and was half naked!

We received lots of compliments on the meeting. Thank goodness only one of which mentioned the naked man at Margaret's house and suggested that it might have been a bit distracting. There it is, another proud "on my watch" moment.

I hope you are all keeping your wits about you and staying healthy.

Margaret A. Pilaro



TEST YOUR KNOWLEDGE WITH PCSGA TRIVIA!

- 1 In what year did PCSGA change its name from Pacific Coast Oyster Growers Association to Pacific Coast Shellfish Growers Association?
- 2 In what year did PCSGA hire our first director?
- 3 What well-known movie star showed up at PCSGA's Congressional Reception in Washington DC?
- 4 What is the age of the oldest recorded geoduck?
- 5 We all know that a mussel's byssal thread is strong. Scientists are studying this with hopes of creating a mussel-based adhesive to be used in what type of surgery?
- 6 How long did it take for Japanese Pacific oyster seed to reach the US in the early 1920's, and by what mode of transportation?
- 7 What species (now commonly cultivated in the US) was accidentally introduced by tagging along with the Japanese Pacific oyster seed?

Answers: 1. 1999 2. 1988, Tim Smith 3. Former Governor of California Arnold Schwarzenegger 4. 168 5. To be used as an adhesive in eye surgery 6. Japanese Pacific oyster seed took approximately 16 days to reach the US and were transported by boat - the oysters were stored in wood boxes, stacked and covered with matting that was kept wet by pumping sea water over the boxes 7. Manila clams

Cover Photo: Past Ecosystem Service Photo Contest submission by Scott Ruf. Scott wrote "My kids and I have enjoyed watching these sea cucumbers grow and thrive in our oyster tumblers over the past year. We first noticed them when they were smaller than the tip of our finger, now they are nearly the size of a hand!"

Submit your photo and caption by the 15th of each month and you could win \$100 or your photo could be featured on a future cover of *Longlines*!

Monthly Winners of Ecosystem Services Photo Contest!

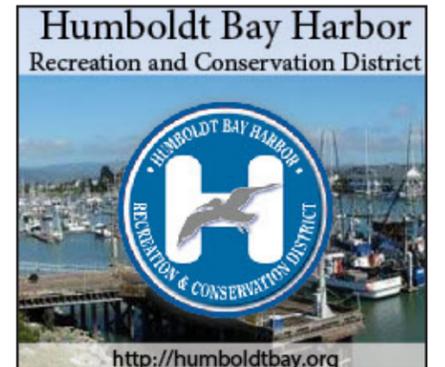


February: Katie Houle photographs brilliant green penpoint gunnels as they guard their eggs in PSI's trays growing rock scallops in Sequim Bay. Gunnels are one of the many colorful species that find these trays a safe haven for feeding and breeding!

SNAP A PHOTO, WIN \$100!

Contest rules at www.pcsga.org

Photo and caption are due on the 15th of every month!



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NOAA Office of Aquaculture appoints Danielle Blacklock as new director

by: Sam Hill, Seafood Source
Date: March 16, 2020

Danielle Blacklock is starting her new role as director of NOAA Fisheries' Office of Aquaculture on Monday, 16 March.

Blacklock will oversee the aquaculture component of NOAA's sustainable seafood portfolio and provide the strategic vision for developing a stronger aquaculture industry in the United States, according to NOAA. Specifically, Blacklock will lead the office's work on several distinct priority areas including regulation and policy, science, outreach, and international activities in support of U.S. aquaculture.

Over the past decade, Blacklock has served in multiple positions at NOAA, most recently as a senior policy advisor for aquaculture. In that role, Blacklock completed a six-month assignment at the Food and Agriculture Organization of the United Nations, focused on aquaculture sustainability globally. She served as the acting deputy in the office for several months.

Prior to working in aquaculture, Blacklock served at the senior advisor for operations at NOAA Fisheries, where her responsibilities included budget management, facilities, human resources, strategic communications, international affairs, and equal employment opportunities. She has also worked as a recreational fisheries specialist, a fisheries management specialist, and a congressional liaison for the agency.

Blacklock received her master's degree in marine affairs from the University of Washington and her bachelor's degree in marine science from the University of Maine.



Danielle Blacklock

Blacklock said her vision for the office is "to help the United States move even more decisively toward becoming a global leader in sustainable seafood production."

"Wild-capture fisheries and farmed seafood are intertwined and both are critical to our nation's future food supply," she said. "I plan to work inclusively and transparently to guide the development of sustainable farms in federal waters, while supporting additional development in state waters and associated land-based facilities."

Blacklock succeeds Michael Rubino, who was appointed the agency's first director of the Office of Aquaculture. Rubino transitioned into a new role as the agency's first senior advisor

for seafood strategy in April 2019. David O'Brien has served as the acting office director in the interim and will return to his duties as the deputy for the office.

"I am thrilled about Danielle's vision for the office and our role as catalysts for the expansion of marine aquaculture in the United States. Building a strong domestic aquaculture industry is a win-win. It's good for the economy and good for

the planet," Paul N. Doremus, deputy assistant administrator for operations at NOAA Fisheries, said in a press release. "Writ large, U.S. marine aquaculture provides a complement to our world-class wild-capture fisheries and will be vital for supporting our nation's seafood production, year-round jobs, rebuilding protected species and habitats, and enhancing coastal resilience."

Cantwell secures \$300 million for fishermen hurt by impact of COVID-19

Source: (e) The Daily World
Date: March 27, 2020

The COVID-19 economic stimulus package passed by the U.S. Senate will include \$300 million to provide economic relief for the fishing industry, according to a statement from the office of U.S. Senator Maria Cantwell, D-WA, ranking member of the Senate Committee on Commerce, Science, and Transportation.

"The thousands of fishermen in the Pacific Northwest, and across the nation, will now have access to grants and other forms of financial relief from NOAA," said Cantwell. "We have already seen layoffs and fishing season closures, and it's crucial that we support fishermen and ensure they have access to emergency grants and other assistance as they face the unprecedented challenges of this pandemic."

The provision was authored by Cantwell to support tribes, shellfish farmers, and commercial and charter fishermen in Washington state and around the country. It would direct the

Secretary of Commerce to distribute \$300 million in financial assistance in the form of direct payments such as grants, as well as other forms of investments in the fishing industry and shellfish farms.

According to Cantwell's statement, fishermen are experiencing significant economic losses due to the novel coronavirus. In March, there were reports of layoffs in the shellfish industry. Tribal fishermen have reported serious economic losses in the geoduck, Dungeness crab, and halibut fisheries. Charter fishermen have already reported fewer bookings for upcoming fishing trips. While some fishing businesses may qualify for small business assistance or unemployment assistance, many fishermen do not. This new financial assistance will help all fishermen, including fishermen who may not qualify for other forms of aid because many fishermen are self-employed.

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Oyster hugs all around! Stay tuned for how we do some home cooking with these beauties...and maybe some inspiration for your very own kitchen

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Western Washington Shellfish Project Will Evaluate Grays Harbor and Willapa Bay Estuaries

by: David Haviland, KBKW (The Talk of Grays Harbor)
Date: February 10, 2020

A new study will show what impacts we are having on the state's shellfish industry, and investigate the industry's decline. Stantec, a global engineering, architecture, and consulting firm—in partnership with National Fisheries Conservation Center— will be supporting the Grays Harbor Conservation District (GHCD) with the Twin Harbors Sediment Study. This critical project focuses on protecting and enhancing the local shellfish industry located in Pacific and Grays Harbor Counties in Washington State. The firm will be developing and running a coastal model of the Grays Harbor and Willapa Bay estuaries to estimate and predict scour and sediment deposition as it impacts the oyster industry, a critical economic driver for this rural and economically depressed region of Western Washington.

Grays Harbor and neighboring Willapa Bay have long been one of the most productive shellfish aquaculture areas in the US, cultivating 25% of the country's oysters. Shellfish aquaculture and related jobs are key components of the local and regional economy, and shellfish themselves provide ecological benefits to the estuary—facilitating water filtration, juvenile fish and crustacean habitat, and healthy benthic fauna.

Shellfish aquaculture has been suffering from excessive sediment movement resulting from nearby river flow, coupled with changes associated with human activity—including dredging +and bulkheading— as well as changing ocean conditions, and variations in the tides and winds. This problem has been reported since 1990 and has been deteriorating, which has caused continuous degradation in local commercial shellfish cultivation.

Additionally, an infestation of burrowing shrimp is degrading the overall ecology of the Bay, while liquifying the sediment, swallowing shellfish, and ultimately suffocating them, further exacerbating the situation.

GHCD initiated a three-phased process in 2015 to investigate the growing impacts. Phase I included a literature review and general analysis to identify Phase II next steps. During Phase II, Stantec will strive to obtain a better understanding of the sedimentation and erosion dynamics in Grays Harbor and Willapa Bay, identify areas of impact and potential new sites for shellfish aquaculture, and define mitigation measures in greater detail to offset impacts to shellfish growing beds. In addition to leading coastal model development, the global firm will be capturing ultra-high-resolution imagery of the estuaries and performing an in-depth analysis of where the most active sediment is, while identifying stable areas of sediment where oysters can grow safely.

“Farming shellfish — and protecting the beautiful waterways necessary for shellfish to live— is a way of life that has existed since before statehood in rural Western Washington,” said Wayne Wright, Stantec Principal Scientist and Project Manager, based in Bellevue. “We are humbled to be leading efforts to help support the rapidly deteriorating shellfish industry, a major economic resource for the entire state of Washington and look forward to getting underway.”

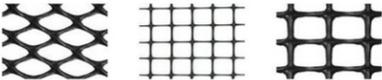
The modeling and site analysis are expected to be complete at the end of 2020.



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Meet NOAA's National Marine Fisheries Service Regional Aquaculture Coordinators

ALASKA - Alicia Bishop



It is exciting to see the NMFS Alaska Region investing resources in aquaculture by hiring the first Regional Aquaculture Coordinator. The Alaska Mariculture Task Force identified the Alaska Regional Aquaculture Coordinator as a key position in its 2018 Development Plan to enable the growth of the industry. This position marks the seventh regional aquaculture coordinator NMFS designated across the country: two in the Greater Atlantic Regional Fisheries, one in the Southeast Regional Office, two in the West Coast Regional Office, one in Pacific Islands Regional Office, and one in Alaska Regional Office- all working together to support cutting-edge research, and policy and regulatory efficiencies to sustainably grow aquaculture nationally.

Alicia has over 11 years of federal regulatory experience with NMFS. Before becoming the Alaska Regional Aquaculture Coordinator, she worked at two science centers (Alaska Fisheries Science Center, and Hatfield Marine Science Center), two regional offices (Northwest Region, and Alaska Region), and headquarters (Office of Habitat Conservation). For the last eight years she worked at the Alaska Regional Office in the Protected Resources Division. She served as the Endangered Species Act Section 7 Coordinator ensuring consistency among consultations, improving consultation efficiencies, standardizing mitigation measures, and partnering with stakeholders to find creative approaches to endangered species conservation.

Before coming to the Alaska Region, Alicia served as the Washington State Ocean Energy Coordinator for the Northwest Region, and as a technician at the Hatfield Marine Science Center in the Shellfish Genetics Laboratory.

Ms. Bishop received her master's degree in marine policy with a focus on endangered species management at the University of Washington's School of Marine Affairs in 2006, and served as a Coastal Society Fellow for NMFS at the Office of Habitat Conservation.

Shortly after starting as the Alaska Regional Aquaculture Coordinator, Alicia helped organize and execute the Alaska Mariculture Workshop. This two-day workshop brought together more than 60 participants including - industry, tribes, communities, hatcheries, non-governmental organizations, policy makers, regulators, researchers, and members from the Pacific Coast Shellfish Growers Association - to advance the following objectives:

- Discuss and identify needs related to research, policy and permitting, and access to capital
- Explore key elements of the Alaska Mariculture Development Plan to map out and facilitate critical next steps
- Lay a foundation for achieving the statewide goal of building a \$100 million mariculture industry in 20 years

The workshop was designed to share NMFS's commitment to promoting aquaculture, listen to the needs of Alaskans, identify opportunities, and promote future partnerships. Alicia and her team are working on finalizing the workshop report and creating a strategic roadmap to identify critical next steps in advancing aquaculture development in Alaska.

Alicia is interested in increasing collaboration with PCSGA and its members particularly during the COVID-19 crisis to better understand the impacts to industry and identify areas where NMFS can be of assistance. You can reach Alicia at alicia.bishop@noaa.gov or 907-586-7724. Additional information can be found on her contact card- <https://www.fisheries.noaa.gov/contact/alicia-bishop-ms>

WASHINGTON/OREGON - Dan Tonnes



Dan Tonnes has worked for the West Coast Region of National Marine Fisheries Service since 1999 in the Lacey, Portland, and Seattle offices. As a biologist for the region, Dan has worked on diverse issues ranging from the development of long-term Habitat Conservation Plans (HCPs) for Pacific salmon and rockfish in the Puget Sound/Georgia Basin, to providing Endangered Species Act programmatic consultations related to watershed restoration, oil spill response, integrated pest management and forestry actions.

In the aquaculture realm, Dan has worked on kelp research and conservation issues for the past several years in

partnership with the Northwest Straits Commission, the Washington Department of Natural Resources, and the Puget Sound Restoration Fund. He worked with Laura Hoberecht (former Aquaculture Coordinator for NMFS WCR) to support the development of a new kelp lab at the Northwest Fisheries Science Center Manchester lab, which is used to support kelp seed propagation and research.

He started his career operating fishing boats in Puget Sound and Alaska, and passenger ferries and oil spill response vessels in Washington. He received a B.S. in Environmental Planning from Seattle Pacific University and a Master's in Marine Affairs from the University of Washington (UW) and was a Kinship Conservation Fellow. At the UW he studied intertidal environments in the North Puget Sound, including how environmental conditions affect invertebrate abundance and diversity.

Dan is interested in developing a variety of pilot projects to help build an understanding of different aquaculture techniques that could be utilized in Oregon and Washington, and supporting the continued implementation of the National and Washington State Shellfish Initiatives and supporting the finalization of the Oregon Shellfish Initiative. Dan looks forward to working with PCSGA and its members, and can be reached at dan.tonnes@noaa.gov and 206-526-4643.

CALIFORNIA - Diane Windham



Diane Windham is the Southwest Regional Aquaculture Coordinator for the Aquaculture Office. She works out of the Sacramento office of NOAA Fisheries Southwest Regional Office in California.

Diane has over 24 years of federal regulatory experience, including 17 years with NOAA Fisheries. Before becoming the Southwest Regional Coordinator, she worked as a Supervisory Fish and Wildlife Biologist at the NOAA Fisheries Sacramento office, working on recovery planning and other Endangered Species Act issues. She has an extensive background in the federal ESA regulatory program, including Section 7 and 10 activities, as well as with NOAA Fisheries Marine Mammal Stranding Network. Diane holds a B.A. degree in Environmental Studies from the University of California, Santa Barbara.

Diane can be reached at diane.windham@noaa.gov or 562-980-3238.

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Ecology reissues permit for ‘low toxicity’ Japanese eelgrass herbicide

by: Mallory Gruben, The Daily News
Date: March 7, 2020

Commercial shellfish farmers in Willapa Bay can continue using permits to spray a “low toxicity” herbicide to fight off invasive Japanese eelgrass, pending a 30-day appeal period.

The State Department of Ecology Wednesday reissued a general permit that allows shellfish growers to use the imazamox herbicide to control *Zostera japonica*, or Japanese eelgrass, a non-native species listed as a class C noxious weed.

Under the permit, farmers could apply the herbicide to commercial clam beds once a year per bed during

daylight hours between April 15 and June 30. Ecology has identified about 1,200 acres of clam beds eligible for treatment but only about 220 acres are treated annually on average, according to the agency.

Japanese eelgrass destroys commercial clam beds by smothering clams, slowing growth rate, reducing juvenile clam recruitment and increasing sediment in the beds, according to the Willapa-Grays Harbor Oyster Growers Association.

“Not only does this alter the natural ecology of the tidal area and raise sediment temperatures, it reduces prey

availability for shorebirds and fish,” WGHOGA wrote in a statement Friday.

Shellfish farmers can use mechanical pest management practices such as harrowing or chain dragging to control the invasive seagrass. But those methods can harm creatures living in the sediment or send the eelgrass to reroot elsewhere in the bay.

“The use of imazamox is targeted, has buffers and safeguards in a place around native seagrass, and ensures that we don’t spread invasive species further into other estuaries along Washington’s Coast,” WGHOGA said.

Ecology approved a permit for imazamox use in 2014 after an environmental impact statement reviewing potential methods for managing the invasive seagrass. The permit was modified in 2017 to set a 10-meter “buffer” to better protect offsite native eelgrasses from the herbicide.

The agency reviewed the permit again last year and on Wednesday reissued the permit without any “significant changes,” said spokeswoman Colleen Keltz.

“It seems to be working effectively and still protective of water quality,” Keltz said.

The U.S. Environmental Protection Agency categorizes imazamox as a “reduced risk pesticide,” the federal agency’s lowest toxicity category. The herbicide is only toxic to plants and is not considered a human health risk if it is found in or on food products, according to Ecology.

Imazamox also degrades quickly, so there is a low risk it will persist in an environment or move off-site to affect other plants, according to Ecology.

The five-year general permit will take effect April 3 after a 30-day appeal period. Once it is effective, commercial shellfish farmers can apply to be covered under the permit to use imazamox, Keltz said.

“Our understanding of the permit, what we’ve seen is that it’s effective for controlling that (Japanese) eelgrass on the clam beds and it’s a good option for the growers,” Keltz said. “We haven’t had any enforcement issues with the permit. ... and it’s very targeted for the area.”

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Ventura Shellfish Enterprise deploys lines for data collection, works on regulatory challenges

by: Lindsey Glasgow, The Log
Date: March 5, 2020

VENTURA—Ventura Shellfish Enterprise (VSE) volunteer partners Coastal Marine Biolabs (CMB) and The Cultured Abalone (TCA) have obtained permits from the U.S. Coast Guard to deploy mussel sentinel lines in the Santa Barbara Channel to test for sanitation requirements.

The step is required for VSE's project to move forward. The project involves growing Mediterranean mussels via submerged long lines in twenty, 100-acre plots in federal waters near Ventura Harbor.

Ventura Port District General Manager Brian Pendleton said a total of five sentinel lines will be deployed in the proposed growing area, the first of which happened on Feb. 8. After all five are deployed, juvenile mussels will be attached for data collection and monthly lab testing at CMB to meet newly adopted federal data requirements aimed at ensuring the safety of shellfish grown and harvested for human consumption.

Meanwhile, the Ventura Port District, another partner in the project, has been working to get everything in order for the U.S. Army Corps of Engineers to review their permit application.

VSE submitted permit and project applications in October 2018 to the Corps and California Coastal Commission. Pendleton said the Corps needs two things to happen before they will process the application: a navigational risk assessment required by the U.S. Coast Guard and resolution to a jurisdictional boundary issue raised by the Ventura Local Agency Formation Commission (LAFCo). The boundary issue revolves around the district's ability to get permits in federal waters.

"The District is working cooperatively with the LAFCo and is pursuing state legislation to resolve the matter," Pendleton said.

Assembly member Monique Limón introduced Assembly Bill 2370 on Feb.

18 to resolve the dilemma. If passed, the bill would "authorize the Ventura Port District, to the extent permitted by federal law, to construct, maintain, operate, lease, and grant permits to others for the installation, maintenance, and operation of aquaculture plots in federal waters off the coast of California in order to aid in the development or improvement of navigation or commerce to the port district."

Meanwhile, a staff report released on Feb. 28, recommended a firm to complete the navigational risk assessment required by the U.S. Coast Guard. The assessment will evaluate the level of potential risk of the proposed aquaculture project on commercial and recreational shipping; impact to vessel traffic patterns and traffic constraints; and identify potential mitigation measures that, if required, will reduce navigation risk associated with the

aquaculture project. Pendleton estimated the assessment would be completed by the end of June.

Efforts to bring aquaculture to the Ventura Harbor area have been afoot since 2015 with hopes of bringing safe, sustainably produced, and locally grown shellfish while also boosting the local economy. A report from VSE in July 2019 was hopeful the project could begin sub-permitting agreements and initial project implementation in the winter of this year or early 2021. Pendleton said depending on when AB 2370 is voted on, project implementation in the winter of this year or early 2021 could still be possible.

To read more about VSE and their proposal visit thelog.com/local/ventura-harbor-navigates-waters-of-offshore-aquaculture-shellfish-farming/

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Can shellfish growers cash in with nutrient trading?

by: Jen A. Miller, Global Aquaculture Alliance
Date: March 2, 2020

Like many folks new to aquaculture, Johnny Shockley is a former commercial fisherman who wanted to continue working on the water. And, like many newcomers to oyster farming, he sees his new vocation not just as a job, but as a way to keep the waters he works on healthy and clean.

Even if some of the oysters he grows aren't intended for restaurants.

Shockley and his filter-feeding bivalves are on the forefront of new nutrient-credit trading programs in Virginia and Maryland that proponents say will clean up waterways, particularly the once-oyster-rich Chesapeake Bay. In short it works like this: Property developers seeking a way to offset assumed runoffs from new projects pay oyster farmers like Shockley to stock the waters with oysters that fulfill the water-cleansing tasks. It's an idea that's worked in wastewater management and energy.

Shockley is a founding partner at Hooper Island Oyster Co. and sees "nutrient credit trading as a market-

based approach to clean water and develop a scaled-up oyster industry that provides an enormous amount of protein," he said. "The model is intended to be able to satisfy everyone's vision of what the oyster is meant to be."

Chesapeake Bay, where the company operates, was once akin to oyster heaven (Chesapeake means "great shellfish bay" in Algonquin). But the bay has lost more than 98 percent of its oysters, according to the Chesapeake Bay Foundation, and the seafood industry in Maryland and Virginia has lost \$4 billion in income in the last 30 years as a result.

The decline of the oyster population has worsened the bay's pollution problems. As the levels of phosphorous and nitrogen from runoff and waste grew, algae blooms took over, sucking the oxygen out of the water. The Environmental Protection Agency estimates that 15,000 bodies of water have been impacted in this way.

States like Virginia and Maryland have multiple ways to mitigate the damage, including new sewage treatment

plants, putting limits on waterfront development and paying farmers to leave fields fallow.

They can also encourage the repopulation of oysters because oysters filter particulates out of the water column, said Jessica Moss Small, Ph.D., assistant director at the Virginia Institute of Marine Science. Oysters eat algae (and phytoplankton) before they can bloom and kill the waterway.

"When you plant oysters in an area, the water quality often improves because of that filtering capacity," she said. It lets light shine through the water, which brings back seagrass "that weren't there before because the water was too turbid."

According to research from the Virginia Institute of Marine Science, an acre of restored oyster reef can remove nearly 500 pounds of nitrogen from the water a year. The Nature Conservancy estimates that restoring 1,300 acres of oyster reef would have the same effect as building a new wastewater treatment plant.

But who's going to pay for it?

That's where the Virginia and Maryland's nutrient trading programs come in. Under laws passed in both

states, developers can buy credits from oyster farmers to offset their assumed environmental impact. For example, a residential project developer puts in a lawn to be maintained with fertilizer. For every pound of nutrient they plan to put into the lawn, they must buy two pounds of offsetting credit, according to the EPA. How many credits they get depends on the size of the oysters harvested.

Shockley said that the credit trading company he also owns, Blue Oyster Environmental, has started to aggregate credits produced by the existing aquaculture industry and plans to act as a credit broker.

"We can use it as a municipal tool to turn the degradation of the bay around and use economic incentives to reverse the environmental tragedy that we've experienced over the last 150 years and revitalize the communities up and down the bay that were built upon the economy of the oyster," said Shockley.

Read the full article here - <https://www.aquaculturealliance.org/advocate/can-shellfish-growers-cash-in-with-nutrient-trading/>

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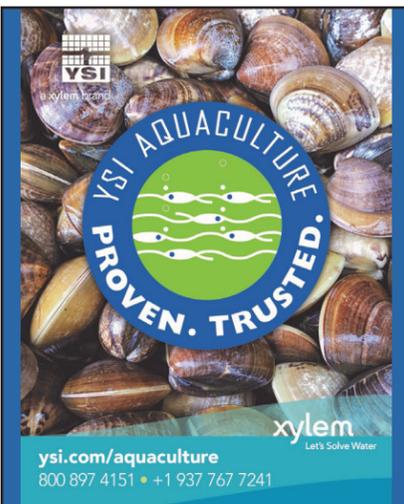
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Ocean acidification impacts oysters' memory of environmental stress

Source: UW News (excerpt)
Date: March 12, 2020

As oceans absorb more carbon dioxide, they are becoming increasingly acidic and shifting the delicate balance that supports marine life. How species will cope with ocean acidification and the other consequences of global climate change is still very much unknown and could have sweeping consequences.

Researchers from the University of Washington School of Aquatic and Fishery Sciences have discovered that ocean acidification impacts the ability of some oysters to pass down “memories” of environmental trauma to their offspring.

The two papers were published in December in Ecological Applications and the Journal of Shellfish Research.

“Warming and acidifying oceans negatively influence many marine species. However, some species that live in extreme environments, such as the intertidal, may be more resilient than others to these changes,” said Laura Spencer, one of the two lead authors and a graduate student in aquatic and fishery sciences. “Some species may

even be able to pass on memories of harsh conditions to their offspring, making them more capable of surviving in similarly harsh environments.”

Researchers studied two species of ecologically and commercially valuable oysters found throughout Puget Sound: the Olympia oyster and the Pacific oyster. Although oyster larvae are sensitive to acidifying oceans, adult oysters commonly occur in intertidal areas and estuaries where they must endure constantly fluctuating water conditions.

It is this hardiness that has researchers hopeful that oysters can withstand an increasingly acidic ocean. If their resilience to stressors can be passed down to their offspring, it could promote an increased tolerance among the future population.

In Spencer’s study, Olympia oysters were exposed to a combination of elevated temperatures and acidified conditions during winter months, mimicking what might happen under climate change. The higher water

temperatures caused the oysters to spawn earlier; however, these effects were canceled out when combined with acidified conditions. Researchers then reared and transplanted the exposed oysters’ offspring to four estuaries in Puget Sound. They observed that the offspring whose parents were exposed to acidified conditions in the lab had higher survival rates in two of the four bays.

“We found that Olympia oyster adults were relatively resilient to acidification and warming when exposed during the winter,” said Spencer. “Most interestingly, we found evidence that adult exposure to acidified conditions can benefit offspring by improving survival.”

This carryover effect demonstrates that the experiences of oyster parents have a direct impact on how their offspring perform, and juvenile oysters may be more resilient in certain environments when their parents have been pre-conditioned by similar stressors.

In the other study, adult Pacific oysters were similarly exposed to acidified conditions in the lab. The oysters were then placed back in ambient water to recover before spawning. Researchers observed that the embryonic and larval offspring of female oysters exposed to these experimental conditions

experienced poorer survival than a similar control group.

“The conditions one generation of Pacific oysters experience can affect how their children perform,” said lead author Yaamini Venkataraman, a graduate student in aquatic and fishery sciences. “Even if oysters are not in stressful conditions when they reproduce, their previous stressful experiences can impact their offspring.”

These two contrasting results are both encouraging and concerning to Washington’s shellfish industry, which generates nearly \$150 million a year and provides over 2,700 jobs. While one study revealed that juvenile Olympia oysters benefited and experienced a survival advantage due to parental exposure to acidified conditions, the other study showed the embryonic and larval survival of Pacific oysters decreased with parental exposure. The authors believe these differing results could be species-specific or because the experiments focused on different life stages of oysters.

Read the full article here - <https://www.washington.edu/news/2020/03/12/ocean-acidification-impacts-oysters-memory-of-environmental-stress/>

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Due to the COVID-19 pandemic, many events have been postponed or cancelled. Please check our online calendar for updates.

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