

National Shellfisheries Association Quarterly Newsletter



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2024(2)

President's Message



Our 116th Annual Meeting, held in March in Charlotte, N.C., highlighted the impact and reach of the National Shellfisheries Association. We welcomed 365 attendees, including 110 students, from 14 countries, to the Queen City for compelling presentations, fun events, and high-quality connections. Your enthusiasm made this event truly memorable.

I want to extend a heartfelt thank you to our dedicated EXCOM members for their efforts, especially Sandy Shumway (University of Connecticut), who served as our conference manager, and Maureen Krause (Hofstra University), who just rotated off the Committee, for her service. Congratulations to Sandy, who recently received the prestigious USAS Distinguished Lifetime Achievement Award at the USAS Aquaculture 2024 meeting in San Antonio, Texas. This recognition is a testament to her outstanding contributions to our field.

I am also thrilled to announce a new scholarship for students. With generous support from Dr. William Fisher, the NSA is pleased to establish an endowed student scholarship in honor of Dr. Susan Ford, a renowned shellfish pathologist and an immunologist. Each year, a student conducting research in shellfish immunology, including shellfish defense mechanisms, will be awarded a scholarship to defray research costs.

While we concluded this meeting, preparations for the next NSA meeting are underway. The next meeting is a Triennial meeting (Aquaculture 2025: March 5-9, 2025, New Orleans, Louisiana, USA). If you are interested in organizing a session or have ideas for new sessions, please contact program chairs, Sandra Shumway, Jay Parsons, or Steve Allen. Let's work together to keep the energy and excitement of the conference going throughout the year. Use this *Newsletter* as a resource to connect you to information, insights, and individuals in the world of shellfish research and development. Please also remember to use BioOne for accessing the *Journal of Shellfish Research* articles. Best wishes for a relaxing summer.

Yours in service,
Aswani K. Volety, President
UNCW Chancellor

New Student Research Grant Award Announced

With the most generous support of Dr. William Fisher, a new student research award has been established. The **Susan E. Ford Student Research Grant** will support student research in the areas of bivalve or crustacean



mechanisms of defense against microbial and parasitic infection, including serum, mucus, and cellular processes for recognition, mitigation, or destruction of infective agents. As with the other student research awards, this is a competitive grant program to which NSA student members can apply for a \$1,250 grant for non-travel-related expenses associated with undertaking research for a Master or Ph.D. degree. The award is granted annually with applications due November 1st each year and students can apply or receive the award more than one time. To find out more or to apply:

<https://shellfish.memberclicks.net/grants-and-awards>

In this issue:

- **116th Annual Meeting Recap**
- **Student Research Grant & Presentation Awards**
- **The Molluscan Broodstock Program**
- **Two Book Reviews - *The World of Sea Cucumbers & Mya arenaria: Biology, Fisheries, and Mariculture***
- **Aquaculture Information Exchange**

2023 George R. Abbe Student Research Grant Update

Awardee: Greg Rothman
College of Charleston

*“Investigating non-native crayfish, *Procambarus clarkii*, as a potential vector of white spot disease to native crustaceans in South Carolina, USA”*

The red swamp crayfish, *Procambarus clarkii*, has established itself as a non-native species on every continent besides Antarctica and Oceania, bringing with it a suite of ecological impacts including out-competing native crayfish counterparts and serving as vectors for several disease-causing agents. The red swamp crayfish is commonly shipped around the world as a food source and was once cultured in South Carolina (SC). This species has spread rapidly throughout SC, especially in the coastal plain, inhabiting freshwater creeks, streams, wetlands, and even saline environments. While these crayfish are more commonly considered a freshwater decapod, they have proven to be highly adaptive and tolerant to salinities upwards of 35. Due to their wide range of habitat usage, the impacts of how these organisms interact with the coastal ecosystems they inhabit are still unknown.

One virus of concern in SC is white spot syndrome virus (WSSV). WSSV is the causative agent of white spot disease (WSD), originally described from penaeid shrimp that can cause total mortality of an infected shrimp population in aquaculture conditions in 3 to 5 days. Since the first reports of occurrence in China and Taiwan between 1991 and 1992, WSSV has been associated with large economic loss estimated to be USD 1 billion per year. This virus has been documented in >100 species of arthropods and from both wild and farmed organisms. Within the last decade, crayfish farms of Louisiana have been devastated by WSD outbreaks. Live crayfish continue to be imported into SC, some of which carry WSSV. This is cause for concern in SC, as estuarine crustaceans including both white shrimp, *Penaeus setiferus*, and blue crab, *Callinectes sapidus*, make up two of the three largest commercial fisheries in the state. It is important to understand how these crayfish may act as a vector of WSD to wild crustacean populations, particularly under the environmental conditions present in the estuarine environments of South Carolina.

The objectives of my master’s thesis project were to (1) identify specific pathways for the potential transmission of WSSV between non-native *P. clarkii* and native *P. setiferus*, and (2) understand the influence of salinity on transmission. In order to accomplish this, trials were conducted to compare the modes of transmission between species including via oral ingestion of previously infected tissue (i.e. feeding shrimp previously infected crayfish tissue), water-borne transmission through indirect contact (sharing a tank with dividers) and via direct contact. These trials showed that the most consistent form of transmission between these species was through oral ingestion of previously-infected tissue.

Two replicate trials were then conducted during the summer of 2023 to understand the influence of salinity on

transmission through oral ingestion of previously-infected tissue. Each trial consisted of 24 experimental tanks with six controls at two varying salinities, a high (25) and a low (5). Shrimp were collected from the wild prior to the trial and a subset of the population collected was screened for the presence of WSSV. Shrimp were slowly acclimated both to temperature within the experimental room as well as their respective salinities at no greater than 2 psu per day. Once acclimated, shrimp were assigned at random to individual 3-gallon aquaria spaced throughout the room and allowed to acclimate to their experimental tanks for one day. Each trial lasted for 10 days, where shrimp were fed previously-infected tissue at a rate of 5% body mass for the first six days, followed by a commercial pellet feed for the last 4 days. Throughout the trials, shrimp were observed twice daily and moribund shrimp were removed and recorded. At the end of each trial, all shrimp were removed, and gill tissue was taken for screening for the presence of WSSV using qPCR assays.

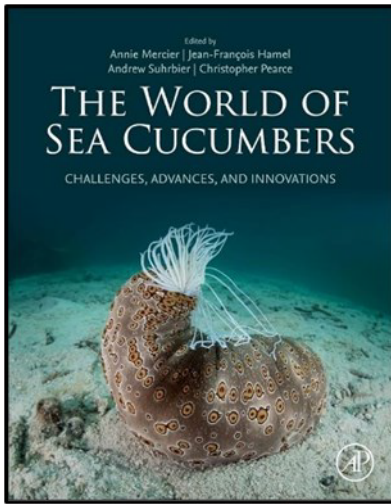


Photo credit: South Carolina Department of Natural Resources

There were no significant differences between salinity treatments for transmission of WSSV or mortality due to WSSV in these trials. Although the conditions in this trial were based on environmentally-relevant salinities and temperatures, understanding how this transmission can vary under a multitude of conditions is critical to understanding the potential threats to SC’s wild crustacean populations, as well as arthropods around the globe.

I would like to thank the National Shellfisheries Association for awarding me this research grant and greatly helping me towards the completion of my master’s thesis at the College of Charleston. In addition, I’d like to thank all those that I have been lucky enough to collaborate with on this project, as their help has been invaluable to my betterment as a scientist within the field. This project has led me to ask more questions than find answers and because of that, I look forward to continuing this research in the future.

Book Review: The World of Sea Cucumbers



Mercier, A., Hamel, J.F., Suhrbier, A., and Pearce, C. (Eds.). 2023. *The World of Sea Cucumbers: Challenges, Advances, and Innovations*. Academic Press, Elsevier, 854 p.

Currently harvested in more than 90 countries, sea cucumbers have attracted attention worldwide for their value in Asian markets and for cosmetics and pharmaceuticals. In the wake of plundered fisheries, and with new prospects of aquaculture, this book is a timely consolidation of knowledge and progress on everything holothuroid.

The editors have marshalled 51 new works from more than 100 contributors to delve deep into the uses, biology, ecology, mariculture and exploitation of these enigmatic invertebrates. Some of these chapters present a synthesis of published knowledge while many others offer new research and insights, making this tome a “must-have” for generalists and specialists alike. The format of each chapter is akin to that of a journal article, with their own abstract, introduction, discussion sections and reference list.

The price tag is now discounted to USD250 for the hardback and eBook. With 800+ pages, the superb binding, printing illustration and indexing of this colossal book pair with the scholarly content to soothe the aching purse strings.

One of the highlights of this book is its emphasis on natural history and quirks of sea cucumbers. The *Sociology* section give fresh perspectives on the importance and uses of sea cucumbers in Asia and in indigenous communities elsewhere as well as their cultural significance to human societies. A chapter on sea cucumbers in popular culture unearths the offbeat ways in which these animals are appreciated. From folklore to video games, Pokémon characters and dildos, these weird creatures have inspired more than just traditional tastebuds!

A noteworthy chapter on *Sea Cucumber Crime* presents a comprehensive review of the dark side of sea cucumber fishing and trade, touching on aspects of forgery, fraud, corruption, extortion, violence, smuggling and laundering. Such issues in wildlife crime are germane to the effectiveness of conservation efforts, which oddly receive little attention in this book.

Readers will find fascinating insights into their sexual and asexual reproductive biology, locomotion, larval development and biology, chemical ecology, symbionts and feeding. There are chapters on bioluminescence in holothuroids, swimming sea cucumbers, and even cheese making with sea cucumbers that depart from the expected contributions to such a book. A chapter by two of the editors that compiles beaching events involving sea cucumbers is a first on this topic, to my knowledge, and examines potential causes and ecological significance of such strandings.



Chirotida discolor. Erin McKittrick, CC BY 4.0

Sea cucumbers are often conspicuous on the sea floor—a trait facilitating their over-harvesting. A dedicated chapter on wild juvenile sea cucumbers, which includes a compendium on reported observations, explores the perennial questions about the early life stages that are seldom observed. The biology and ecology of juveniles in the wild remains a critical knowledge gap.

Several chapters review the impact of changing oceans on sea cucumbers. In addition to the expected topics of ocean acidification and warming, the influence of microplastic pollution is examined.

The *Research and Development* section offers an eclectic collection of topics, including morphometrics, physiological and molecular regulation of colour morphs, hormones and signaling systems, mutable collagenous tissues and bio-derivatives of sea cucumbers.

Sea cucumber fisheries have spread far beyond the traditional regions surrounding Southeast Asia. A valuable chapter presents an update on sea cucumber fisheries in Northern Europe, with a focus on deep-water species harvested by dredge and trawl fishing gears in Iceland and Norway. An accompanying chapter about Mediterranean sea cucumbers gives substantial coverage of the fisheries in this region and the issues facing fishery sustainability. Fishery management is explored in further chapters focussing on the fisheries in Russia, British Columbia, west coast of the United States and Mexico. These case studies present contrasting approaches and outcomes.

Several chapters on aquaculture, including one on the role of women in these industries, delve into case studies from the Caribbean, Indian Ocean, the tropical Pacific Islands and temperate Pacific. It is somewhat fitting that the book finishes with the aquaculture prospects, which offer some hope to replacing production from the imperilled wild-capture fisheries to meet global demand and potentially helping to rebuild native stocks.

The *World of Sea Cucumbers* presents a momentous collection of papers about holothuroids that will be a treasure for echinoderm specialists. Reviews on many key topics also make this book a key source of updated information for non-specialists.

Steven W. Purcell

What Can Rotary Do For You?

Rotary International (www.rotary.org) is an organization that connects people through a global network of clubs and provides funding for social and environmental projects. At the 116th Annual Meeting, Dr. Chris Puttock hosted two sessions that discussed Rotary International and how to write effective grants for Rotary funding. There are many funding opportunities for shellfish-related projects.

- There are Rotary clubs in every US State and in countries around the world. Reach out and become a member.
- 18.4 million dollars (US) in global grant funding has been allocated to environment-related causes.
- Connect with Rotary members and friends of Rotary who are experts in a particular field by joining a Rotary Action Group. Group members share their expertise by collaborating with clubs and districts on service projects.
- Rotary Fellowships are international groups that share a common passion. Being part of a fellowship is a fun way to make friends around the world, explore a hobby or profession, and enhance your Rotary experience.



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Past Presidents Were Well-Represented in Charlotte



From left to right: Aswani Voley (current President), Lewis Deaton, Vic Kennedy, Louis D'Abramo, Dave Bushek, Sandy Shumway, John Kraeuter, Karolyn Hansen, Bill Fisher, Evan Ward, and Jay Parsons.

2024 NSA Student Research Awards

The Association has a number of competitive grants for students that provide \$1250 in support student research projects as well as for the Outstanding Student Paper published in the *JSR*.



The **George R. Abbe Award** for student research devoted to the areas of crustacean biology and fisheries management was awarded to Nihal Guennouni, Virginia Institute of Marine Science, for her proposal “Quantifying the response of blue crabs: How natural and fishing mortality affect the transmission and incidence of *Hepatodinium perezii*”.

The **Melbourne R. Carriker Award** for student research in shellfisheries was awarded to Madeline Eppley, Northeastern University, for her proposal “Revealing 25 years of genomic evolution in the eastern oyster using preserved histology samples”.



The **Michael Castagna Award** for student research devoted to applied shellfish studies shellfisheries was awarded to Hollis Jones, University of California - Davis, for her proposal “Air priming as a management tool for transitioning hatchery produced oysters to the intertidal zone”.



The **R. LeRoy Creswell Award for Outreach and Education** for students who have shown exceptional merit in outreach activities was awarded to Hannah Collins, University of Connecticut, for her outreach efforts regarding her dissertation research, “Exploring methods to control plastic pollution: suspension-feeding bivalves as co-concentrators of microplastics and bacteria”.



The **Sandra E. Shumway Award for Outstanding Student Paper** published in the *Journal of Shellfish Research* has specific selection and evaluation criteria: (1) The lead author must have been a student when the work was completed, (2) the paper must present the student’s work, not that of a co-author, (3) it will be evaluated on the quality of science and writing, and the importance of the work to the field of shellfish research. A panel of judges evaluated 14 papers, and the award was presented to Maritza Garcia-Flores, Instituto Polytecnico Nacional in La Paz, Mexico, for her manuscript:



[Garcia-Flores, M., Ceballos-Vazquez, B.P., and Rosales-Velazquez, M.O. Embryonic development and fecundity of the Pacific pygmy octopus, *Paroctopus digueti*. *Journal of Shellfish Research*, 41\(1\): 125-134.](#)

Thank you, again, to all the students for submitting their proposals and for the reviewers for evaluating each of these proposals and student papers so thoughtfully.

Application deadline is **November 1, 2024**. Start planning now! Details are available at www.shellfish.org.

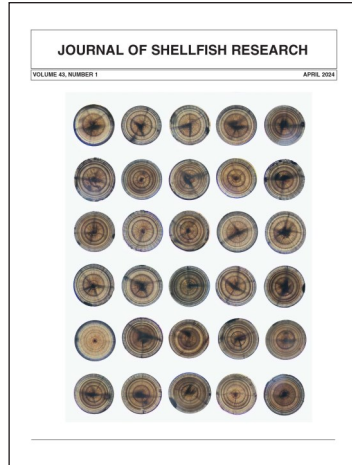
Lewis Deaton
Past-President

The *Journal of Shellfish Research* is your Societal Journal

There were over 300 relevant presentations at the Charlotte meeting.

Please consider submitting to the *JSR*!

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Ship-eating Worm Could Soon be Sold by Supermarkets as Sustainable Fish Alternative



Known as the shipworm, teredo worm, or tamilok in the Philippines - where people eat it raw dipped in coconut vinegar with salt and chilli - it is different from many other molluscs in that it does not have a shell.

Researchers David Willer, from Cambridge, and his colleague Reuben Shipway, from Plymouth, who prefer the nickname the “naked clam”, believe the creatures will provide a sustainable alternative to the “big five”. Cod, haddock, salmon, tuna and prawns make up 80 per cent of the seafood eaten in the country, yet they are fished through the harmful and often unsustainable method of trawling.

The scientists built the world’s first shipworm aquaculture in Plymouth last year - a wooden, brick-sized matrix in which the clams grow - with the hope the cultivation technique could be rolled out on land across the UK. Once they receive patents for their invention, the two-year scale-up plan is set to begin from May, involving farming off the Devon coast.

Willer said: “Naked clams don’t put much energy into growing shells, and they grow much faster than mussels and oysters, which can take two years to reach a harvestable size.”

Abstracted from *The Independent*

Octopus DNA May Reveal New Clues about Rising Sea Levels

Why did the octopus cross the West Antarctic Ice Sheet? Yes, it was to get to the other side.

New research using a panel of genome-wide, single-nucleotide polymorphisms of the Turquet’s octopus (*Pareledone turqueti*) show that persistent, historic signals of gene flow was only possible with a complete collapse of the West Antarctic Ice Sheet.



Turquet's octopus (*Pareledone turqueti*). Credit: British Antarctic Survey

Currently, populations of Turquet’s octopus in the Weddell, Amundsen, and Ross Seas are separated by the continent

-size West Antarctic ice shelves and cannot intermingle. In a recent publication in *Science* (December 2023), a team of 11 scientists — including biologists, geneticists, glaciologists, computer scientists and ice-sheet modellers — looked at the genetics of Turquet’s octopus — a species that has been living around the Antarctic continent for about four million years.

Genetic samples were taken from 96 octopuses collected over three decades from around the continent. Scientists wanted to understand whether different populations of Turquet’s octopuses had interbred and at what point that interbreeding had happened. The octopuses connectivity was tested against different hypothesised scenarios. These included no collapse, partial collapse and full collapse of the West Antarctic Ice Sheet. The team chose this species of octopus because the animals are relatively immobile — they can only crawl along the seafloor, which means they are more likely to breed within their genetically distinct local populations.

When they looked at the animals’ genetic material, researchers noticed octopuses living in the Ross Sea, tucked into the nook on one side of where the West Antarctic Ice Sheet meets the rest of Antarctica, shared genetic material with animals located around the coast of the mainland—but also with the octopuses on the opposite side of the ice sheet’s joining point with the continent in the South Weddell Sea. Dr. Sally Lau from James Cook University and lead author, explains these octopuses could only be related if the West Antarctic Ice Sheet completely collapsed and opened a seaway connecting the two basins and allowing the octopuses to travel.

Dr. Lau explains, “Understanding that the West Antarctic Ice Sheet completely collapsed during the Last Interglacial period will help scientists to define the tipping point of its future collapse under climate change. This will also improve future global sea level rise projections under different climate scenarios.”

“Our findings demonstrate that through transdisciplinary efforts, big questions can be addressed through innovative ways that we couldn’t have imagined before.”

[Lau, S.C.Y., Wilson, N.G., Golledge, N.R., Naish, T.R., Watts, P.C., Silva, C.N.S., Cooke, I.R., Allcock, A.L., Mark, F.C., Linse, K., and Strugnelli, J.M. \(2023\) Genomic evidence for West Antarctic Ice Sheet collapse during the Last Interglacial. *Science*, 382\(6677\): 1384-1389.](#)

Abstracted from *The Guardian*

Advancing the Regional Shellfish Seed Biosecurity Program

The introduction of shellfish disease via shellfish aquaculture and restoration is a concern for shellfish farmers, fishers, and resource managers worldwide. At the center of the rapidly expanding shellfish culture footprint as well as the growing interest in employing aquaculture for shellfish restoration is the production of seed by hatcheries and nurseries that are often not located at the farm or restoration site. Interstate seed transfers are crucial for industry growth and, in many cases, shellfish restoration. Such transfers are regulated by the state authority receiving the seed, yet shellfish biosecurity expertise is not common knowledge, leading many resource agencies to risk-averse strategies. To help resolve this conundrum we created the Regional Shellfish Seed Biosecurity Program (RSSBP). At the 116th NSA Annual Meeting in Charlotte, North Carolina we held a workshop to promote the RSSBP that provided an overview, updates on progress and opportunities for feedback.



The RSSBP is a collaboration of industry members, scientists, regulators, and extension personnel working to minimize risks associated with interstate seed transfers of bivalve shellfish for aquaculture, enhancement, and restoration. The four core Program elements provide tools to reduce uncertainty regarding risk and facilitate the decision-making process for regulators while providing producers a mechanism to promote the quality of their product and bolster buyers' confidence in such products.

A basic premise of the program is that younger, smaller seed are less likely to present pathogen transfer risks. This is intuitively apparent because they have had less time to be exposed and develop infections than larger, older animals. To support this contention, Lucia Safi (Rutgers) presented data for the most ubiquitous pathogen of concern, *Perkinsus marinus* (Dermo disease), to investigate the biosafety of hatchery bivalve products. In 102 samples collected between 1998 and 2023 primarily from the Delaware and Chesapeake Bays, *P. marinus* was absent in all animals reared in treated water and not detected in any animals smaller than 5 mm even when exposed to untreated water. Overall, only 18 samples were positive (~17.6%), all from untreated water with the highest prevalence within a sample only 6.7% in a group with a size range of 6.0 to 15.7 mm. These results indicate that small animals, reared in sterilized water, should not be regarded as posing a serious biosecurity risk during transfers, particularly within endemic regions.

To help ensure the absence of pathogens in hatchery larvae and seed, Karen Hudson (VIMS) presented an overview of the RSSBP Hatchery Compliance Element (HCE) which has multiple participating hatcheries now recognized by several states to facilitate rapid permitting of biosecure products. Hatchery compliance is based on 12 best management practices that many hatcheries already conduct. Hatcheries can participate at various levels to meet their specific needs and use that participation to assist customers with meeting permit requirements. State and Federal regulatory agencies can use the HCE to help facilitate reviews of importation requests. Becoming compliant is merely a process of enrolling in the program by submitted a biosecurity plan, allowing an independent audit of your plan in action, and providing documentation of health examinations to validate biosecure seed. Karen provided data showing an increase in the participation of hatcheries over the past several years that now includes several large hatcheries in the mid-Atlantic region, one of the largest hatcheries in the northeast, and several research hatcheries (Figure 1).

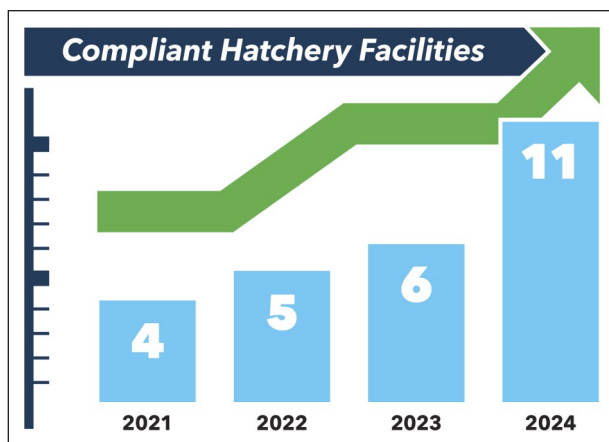


Figure 1: Number of compliant hatcheries since 2021.

understand customer needs regarding biosecurity of potential sales, and resource managers to evaluate transfer requests. Lucas Marxen (Rutgers) presented an overview of the database that is accessible through the RSSBP website: <https://rssbp.org>.

The RSSBP is regional by design because the species, both hosts and pathogens, and the environmental conditions in which they exist are regional by nature. As the Program continues to mature along the East Coast, we have expanded it along the Gulf Coast and now look to help implement a West Coast Program. Ongoing coordination and collaboration with the USDA Comprehensive Aquaculture Health Program Standards (CAHPS) and the NOAA Aquaculture Program, as well as Sea Grant Extension Agents provide opportunities for continued success. The NSA will continue to be an outlet for reporting annual progress and collecting feedback while more regional meetings provide opportunities for more focused efforts. We look forward to working with you and encourage you to visit the RSSBP website or reach out directly for more information.

Dave Bushek
bushek@hsrl.rutgers.edu

Charlotte Takes the Checkered Flag



Charlotte, North Carolina was a new and successful venue for the 116th Annual Meeting of the National Shellfisheries Association. There were 365 registrants (including 110 students) representing 14 countries and the Program was packed with 237 oral presentations and 76 posters.

Outstanding plenary lectures started each day, including a lively introduction to the importance of ‘Gastropods – the other shellfish’ by Dianna Padilla (Stony Brook University) and a discussion of the importance of opsins and light in molluscs by Jeanne Serb (Iowa State University), ‘Seeing the light, tasting the ocean: How bivalves sense their environment. Eileen Hofmann (Old Dominion University) made models more understandable with her presentation, ‘Models in shellfish biology – what can they tell us?’, and Greg Dietl (Cornell University) rounded out the week with a discussion of the importance of long-term data to habitat management and restoration with his presentation ‘Conservation paleobiology: putting the dead to work’. Thanks to all for their enthusiastic contributions and for starting each day with interesting and thought-provoking lectures.

The opening reception was the usual opportunity to catch up with old friends and make new ones. Chef Roberto did an outstanding job presenting the seafood donated by Taylor Shellfish, Treasure Coast Shellfish, Blue Stream Shellfish, Mook Sea Farm, Behan family Farms, Baywater Sweet Oysters, Pemaquid Mussel, Seawatch, Shellavator, Hollywood Oyster, Rhody Oysters, and BASE Seafood.

There were many special sessions and workshops that enhanced the program and presented future opportunities for participants including Art and Design of Effective Science Presentations and Science and Public Engagement. Chris Puttock presented a summary of how shellfish are integrated in Rotary International efforts, and followed with a workshop on how to become involved in Rotary activities and apply for research funding. The FUCOBI Foundation brought many new members to the conference, continuing their support of underrepresented students and the NSA. Several groups used the conference as a meeting point for their programs and workshops – do consider this for your own efforts in the future. The conference provides an easy venue for your group to meet before, during, or after. The full Program is posted at www.shellfish.org. REMEMBER: This is not a citable document!



Thanks to Eric Heupel for organizing ‘NSA at the Movies’ which seems now to be a permanent and popular fixture. This will also be a feature at the upcoming Triennial, so be thinking about contributions. Lewis Deaton got the Scallop Gallop off and running around Charlotte, some running, some walking, one limping.

Preparation of the conference and program and support for student participation was enhanced by generous sponsors including USDA/NIFA, University of North Carolina Wilmington, University of North Carolina Charlotte, Matunuck Oyster Farm, Xylem, FlowCam, The Nature Conservancy, Florida Sea Grant, Oyster Recovery Partnership, FUCOBI, North Carolina Sea Grant, Reed Mariculture, Rotary International, ESRAG, Atlantic Aqua Farms, Sysmex, Aquaculture North America, Industrial Plankton, Aquaculture Information Exchange, BioOne, Sheridan and KGL, and 5m Books.

The Auction was the usual fun evening, generous bidders paying outrageous prices for shellfish treasures (some to be returned next year for sure) and the SEF account increased by almost \$4000. The funds generated at the Auction were enhanced by a generous donation of equipment from Xylem Analytics which garnered an extra \$2000 in the silent bidding. An anonymous bidder purchased an oyster knife (NSA embossed) for \$500, and another anonymous donor contributed \$500 to the SEF. Great thanks to all for supporting the future of the NSA!

Conferences require a lot of work behind the scenes and thanks and kudos are owed to many, but especially Noreen Blaschik and Eric Heupel. This year, Noreen attended the conference so folks got to meet the ‘lady behind the curtain’ and put names to faces. Eric Heupel cleverly designed the program cover and handled all things A/V. This may sound like a straightforward task; however, it is anything but and his expertise has saved NSA a lot of money and turmoil both before and during conferences. The Recruits were indispensable and the meeting could not have functioned without their efforts. Thanks to Hannah Collins and Fiona Boardman for organizing the fleet and putting out fires during the conference – literally – one of the laptops burst into

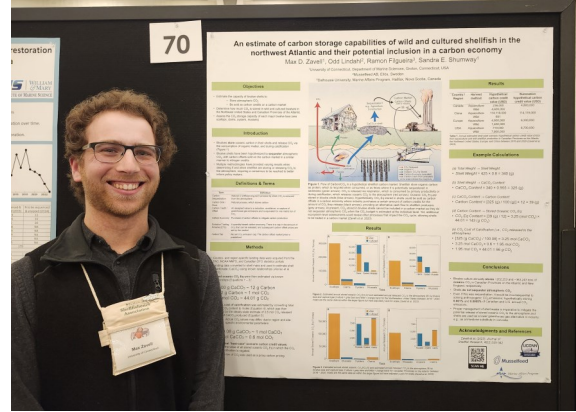
flames under the sales table! Keep that in mind when they tell you not to put lithium batteries in the baggage hold. The staff at the Charlotte Sheraton – Le Meridien Hotel Complex was outstanding from start to finish. Special thanks to Ashley Pasquini and her team, Chef Roberto Vasquez and the entire catering crew, and the Scott Brown Media Group led by Chris Roland.

The 117th Annual Meeting will take place at the Triennial in New Orleans March 6-10, 2025. Anyone interested in organizing or proposing a session, contributing a film, or making any suggestions, please contact Steve Allen (stevenmallen@gmail.com), Sandy Shumway (Sandra.shumway@uconn.edu), or Jay Parsons (jay.parsons007@gmail.com).

See you all in NOLA – *laissez les bon temps rouler!*

Sandy Shumway

THE 116th ANNUAL MEETING



The NSA Welcomes New Honored Life Member

The National Shellfisheries Association acknowledged Louis D’Abramo at the 116th Annual Meeting for his outstanding efforts toward aquaculture and industry collaboration, and decades-long contributions to student development, research, and the success of the NSA. A full biography will be published in a future issue of the *Journal of Shellfish Research*.



Left to right: Jay Parsons (Treasurer), Sandy Shumway (HLM), Louis D’Abramo, and Aswani Volety (President).

2024 Young Outstanding ONE HEALTH Researchers in Aquaculture and Fisheries Award

Members of the National Shellfisheries Association received the 2024 Young Outstanding ONE HEALTH Researchers in Aquaculture and Fisheries Award from the FUCOBI Foundation during the 116th Annual Meeting in Charlotte.



Left to right: Satoshi Kawato, Emily Lopez, MacKenna Hainey, Sandy Shumway, Acacia Alcivar-Warren (FUCOBI Foundation), Fiona Boardman, Max Zavell, Brittany Morgan, and Karin Tome (ESRAG).

2024 NSA Resolutions

Each year, the National Shellfisheries Association recognizes individuals for special contributions to the society in the form of Resolutions. Each begins with the same introduction:

Whereas, the National Shellfisheries Association, Inc. (NSA) is a Not-for Profit Corporation, and Whereas, members serve as officers and committee members on a voluntary basis, Be It Resolved that on the 21st of March, 2024, the National Shellfisheries Association formally recognizes and thanks:

This year, the following Resolutions were presented.

- **Carol Bormann-Begg and Meredith Pond from BioOne:** the non-profit publisher, which has been a major contributor to the expansion of the online reach and readership of the *Journal of Shellfish Research* over the last 18 years. Their continued enthusiastic support is gratefully acknowledged.
- **Ashley Pasquini, Wes Smyth, Sesley Larson, Daniela Lopez, Chris Foy, Alison Brown, Keyshawn Williams, Berthia Williams, Val Pauleon, Denfield Tonge, Karen Rivera Ubeda, Jacinto Rivero, Walter Mandujano, Chef Ricardo Vasquez and the extraordinary staff of the Sheraton Le Meridien Charlotte:** for their outstanding assistance in making the 116th annual meeting of the National Shellfisheries Association a great success. Everyone went ‘above and beyond’ and their professionalism, attention to details, and friendliness were instrumental in making the meeting memorable. WE THANK THEM ALL FOR THEIR OUTSTANDING EFFORTS!
- **Chris Roland, Tyler Cox, Mason Schwarz, Dan Graziano, Eugene Kyere, Chris McGuire, Anthony King, and Oscar Calvo of the Scott Brown Media Group:** for their outstanding assistance in making the 116th annual meeting of the National Shellfisheries Association a great success. Everyone went ‘above and beyond’ and their professionalism, attention to details, and friendliness were instrumental in making the meeting memorable. WE THANK THEM ALL FOR THEIR OUTSTANDING EFFORTS!
- **Sheridan Press:** for their 38th year of outstanding service and collaboration publishing the *Journal of Shellfish Research*. Joyce Coulter, Susan Parente, Cindy Fullerton, and Jeannie McKenney make production of the *Journal of Shellfish Research* almost effortless and their efforts are gratefully acknowledged and appreciated.



2024 NSA Student Presentation Awards

In advance of the 116th Annual Meeting of the National Shellfisheries Association held in Charlotte, NC, student members were encouraged to apply for registration and conference hotel accommodation waivers through the SEF travel award lottery system. A total of 30 applications were received. At the 2023 EXCOM meeting, the requirements for eligibility for the lottery were revised, such that students who had not renewed their membership by the lottery deadline were deemed ineligible. Following a cross-reference of the applicants with current membership rolls, five students were found to be ineligible. Of the 25 remaining students, all were offered aid. Three students declined the offer, leaving 22 total students that were offered aid in the form of either shared lodging or a registration waiver.

Eligible graduate students for the Nelson and Gunter Awards were identified based on cross-referencing the lists of graduate student presentation abstracts submitted and current NSA student members. This resulted in 58 oral presentations and 14 poster presentations being identified as eligible. The Committee Co-chairs are extremely grateful to Noreen Blaschik for her assistance in generating these lists. Meeting attendees indicated their willingness to judge student presentations during the registration process which yielded a cohort of 93 judges for the meeting, although there was significant attrition in terms of the number of judges that actually ended up contributing a meaningful number of scores for student presentations. The SEF Committee Co-Chairs would ask that in future years folks only indicate their willingness to judge presentations meeting if they actually have a high likelihood of active participation in the judging process. Nevertheless, the SEF committee wishes to thank everyone who contributed their time, energy, and expertise to both the presentation competitions and the judging process.



The **Thurlow C. Nelson Outstanding Oral Presentation Award** was awarded to two students this year: Arthur Mabaka (Stony Brook University) for his presentation, “Assessing short-term effects of marine heat waves and hypoxia on Jonah crab (*Cancer borealis*) feeding behavior and survival”, and to Kayla Mladinich Poole for her presentation, “Investigating suspension-feeding invertebrates as bioindicators of microplastics.”



The **Gordon Gunter Outstanding Poster Presentation Award** was awarded to Max Zavell (University of Connecticut) for his presentation, “An estimate of carbon storage capabilities of wild and cultured shellfish in the northwest Atlantic and their potential inclusion in a carbon economy.”

Many congratulations to Arthur, Kayla, and Max who will receive two years of membership to the NSA, a certificate of accomplishment, as well as a great résumé builder marking this achievement! We will be looking to recruit judges for the next meeting in New Orleans in February 2025, so be on the lookout for those calls, and please volunteer!

Peter Kingsley-Smith
Melissa Southworth
Student Endowment Fund Committee

MEMBERSHIP CONTEST WINNERS



The following NSA members recruited 5 new members each and received a free 2024 membership

Ed Catapane
Acacia Alcivar-Warren
Miriam Alcivar-Arteaga
Iris Hernandez
Jimmy Alcivar-Marcillo
Jorge Echevarria-Flores
Irina Yushenova
Caroline Warren
Emily Lopez

CONGRATULATIONS!

Consider asking a colleague, student, or anyone interested in shellfish to join. Be sure they credit you for joining so you can earn a free NSA membership. There were many entries stating they were recruited by ‘an NSA member’ or ‘advisor’, but never provided a name.

Questions, contact: secretariat@shellfish.org.

5th Annual Scallop Gallop



All participants enjoyed a nice run through the Dilworth neighborhood of Charlotte. There were lots of dogwood and redbud trees in bloom to enhance the course. Everyone who ran got a souvenir scallop (courtesy of Sheridan Press). Photo credit: Caitlin Randall.

Long-term Breeding of Pacific Oysters to Meet Future Challenges on the US Pacific Coast

The Pacific oyster, *Crassostrea gigas*, was introduced from Japan to the US Pacific coast in the early 1900s. Most of these Japanese shipments of seed were from Sendai in the Miyagi prefecture. These early introductions formed the foundation of an oyster industry with current annual harvests valued at more than \$90 million.

Unlike many domesticated farmed species, oysters are reared under highly variable conditions, often with limited availability of natural food. Many questioned whether it would be possible to improve traits, such as growth and survival, under these conditions. Despite these uncertainties, the first family-based selective breeding program for Pacific oysters (the Molluscan Broodstock Program; MBP) was established in 1996 at the Hatfield Marine Science Center (HMSC), Oregon State University (OSU), Newport, Oregon. After initially polling farmers and hatchery operators, it was decided to focus the breeding program on improving oyster yields through gains in both growth and survival. The founder (F_0) population consisted of broodstock oysters collected from Dabob and Willapa Bays, Washington, and Pipestem Inlet, British Columbia, Canada. Subsequently, two cohorts of about 100 families each, generated by crossing parents from selected families, were produced yearly, and planted at sites ranging from Alaska to California. After eight generations of breeding, 30 cohorts and 27 years of effort, realized yields of MBP families have been improved by about 65% compared to those of progeny from non-selected naturalized parents, with approximately equal contributions from improvements in growth (55%) and survival (45%) (Figure 1).

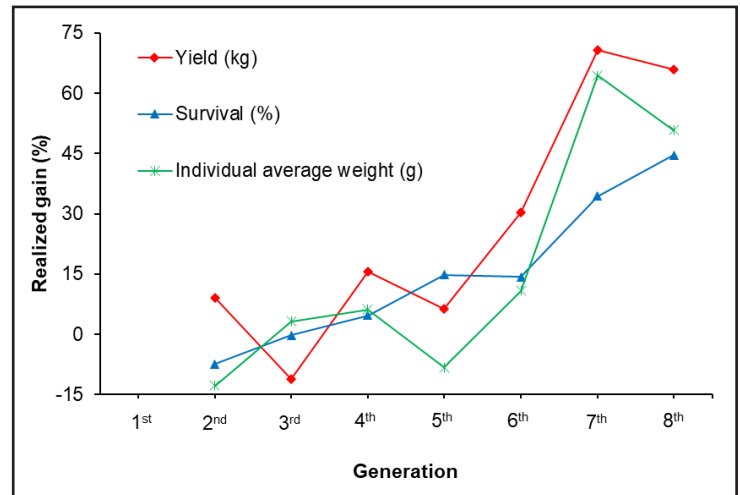


Figure 1. Realized gain for yield (kg), survival (%), and individual average weight (g) for eight generations of Pacific oysters selected as part of the Molluscan Broodstock Program (MBP), Oregon State University. Drawn by Claudio De Melo, University of Santa Catarina, Brazil.

In order to amplify and distribute improved seed to shellfish farmers, MBP partnered with commercial hatcheries to spawn groups of selected families (pods) to generate millions of seed. The seed from each pod were separately reared on farms until they were ready to be returned to hatcheries where they were used as broodstock for large-scale commercial seed production and distribution to farmers. The pods were designed to limit inbreeding when they were crossed.

Currently, US farmers largely depend on farming the Miyagi strain of the Pacific oyster; however, this strain originated from northern Japan where average seawater temperatures range from 5.5 °C in winter to 25 °C in summer. To better ensure the future of oyster farming on the US Pacific Coast, several new stocks of oysters were collected from the Ariake Sea, southern Japan, including the Midori strain of Pacific oysters (2004) and new Kumamoto (*Crassostrea sikamea*) broodstock (2006). The warm water temperatures of the Ariake Sea (ranging from 18°C in winter to 28 °C in summer) and endemic occurrence of the ostreid herpes virus OsHV-1 likely result in oysters that will be more tolerant of future higher Pacific coast seawater temperatures and possible outbreaks of the highly pathogenic microvariant strain of OsHV-1 that has decimated Pacific oysters throughout the world. The introduction of both these Japanese stocks involved extensive disease testing and maintenance of three generations under quarantine conditions at the HMSC until disease-free F_2 progeny could be released for field trials. Subsequently, two generations of the Midori strain and four generations of the new Kumamoto stock have been field tested and top-performing families distributed to industry partners. The Midori strain (Figure 2) has proven to be hardy and similar to Kumamoto oysters in its growth and deep-cupped morphology; consequently, it is very popular in the half-shell market.

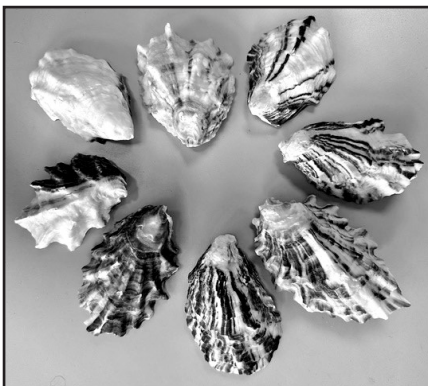
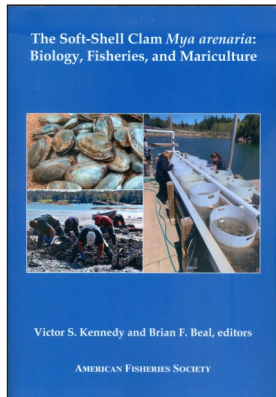


Figure 2: Midori strain of the Pacific oyster.
Photo credit: C. Langdon

Maintaining a breeding program is challenging for academic institutions due to difficulties in obtaining adequate long-term funding. In 2019, the Pacific Coast Shellfish Growers Association (PCSGA) and Oregon State University were successful in obtaining additional funding to establish the USDA ARS Pacific Shellfish Research Unit at the HMSC to ensure long-term support of Pacific oyster breeding and improvement. A new ARS breeding program (Pacific Oyster Genomic Selection Program; POGS) will initially focus on improving resistance of Pacific oysters to the OsHV-1 microvariant, using new genetic tools. This focus results from the 2018 discovery of an OsHV-1 microvariant in San Diego Bay and the threat of its potential spread to other Pacific coast locations. This new ARS program will build on the achievements of the MBP to ensure the future success of Pacific coast oyster farming.

Chris Langdon
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Book Review: The Soft-Shell Clam *Mya arenaria*: Biology, Fisheries, and Mariculture



Kennedy, V.S. and Beal, B.F. (eds.), American Fisheries Society Bethesda, Maryland 2023, 595 p.

Many readers may be surprised to find that the knowledge of an abundant commercially important (at least in New England and previously in Maryland), widely distributed intertidal to shallow subtidal species such as *Mya arenaria* is remarkably thin. This may be due, in part, to the difficulty in bringing a deep-burrowing species into a laboratory setting. To the credit of the chapter authors, many

offer suggestions for research to fill these gaps.

Overall, I found the chapters somewhat uneven in their depth of coverage. Some briefly summarized what is known, while others provided detail on the methodology and experiments that elucidated the conclusions. As is typical for comprehensive volumes, there are also some inconsistencies because of source material, e.g., in one chapter only two studies on the numbers of eggs produced are noted, while in another chapter the numbers of eggs expected is discussed, but these data are not from the primary literature. The lack of some basic information on this species is illustrated in various chapters.

- The current flux in systematics results in morphometric and molecular techniques that do not provide similar phylogenies. The importance of this is further emphasized near the end of the book in the discussion of the spread of the species from its presumed native range.
- The present distribution may represent multiple introductions into Europe, the West Coast of America, and the Eastern Pacific and Mediterranean.
- The basic anatomy and functional morphology are not as well-known as for other commercial species.
- Few studies have indicated feeding rates of *Mya* relative to temperature.
- While not confined to *Mya*, many terms used in bivalve life history stages are ambiguous, and this ambiguity can lead to different interpretations of important processes in early life history.
- A list and illustrations of organisms that may infect *Mya* is provided, but the implications of many of these infections are not delineated.
- Experimentalists may need additional caution to include the source of the experimental animals if the interaction of the animal with harmful or toxic algae is to be thoroughly evaluated.
- Given the wide geographic spread of the species, its intertidal to shallow water habitat, it was surprising that extensive fisheries are mostly confined to the area of the mid-Atlantic to New England.
- The final chapter listing English names is interesting, and can be viewed in conjunction with Chapter 1 to elucidate how difficult it can be to assign a name to a species either locally or scientifically. Even within this book another “common” name is added, but in German.

In summary, Beal and Kennedy have done a great service to the research and management communities by gathering together authors to condense what is known about the softshell, *Mya arenaria*. The volume should be on the shelves along other volumes that attempt to condense the scattered literature on various bivalves.

John Kraeuter

The Aquaculture Information Exchange: Elevating U.S. Aquaculture through Collaboration

Imagine a social networking experience designed just for you, a member of the thriving aquaculture community. That is the vision behind the Aquaculture Information Exchange (AIE), the new online home of the U.S. aquaculture industry. I'm Joe Caterine, the Community Manager of the AIE, and I'm thrilled to introduce you to a platform that is transforming how aquaculture professionals communicate and collaborate.

Launched last October through a NOAA/USDA grant and developed by Virginia Sea Grant, the AIE is rapidly becoming the go-to aquaculture hub for over 1,000 aquaculture enthusiasts across the nation and beyond. Our community is diverse, vibrant, and flourishing, comprising growers, hatchery operators, students, researchers, government personnel, nonprofit staff, environmental consultants, educators, and more. No matter what you do in the industry, chances are there is someone on the AIE who shares your passion, and it is easy to connect.

That is one of the most exciting parts about the AIE - the collaborative problem-solving culture. As one example, a member recently posted an image of a mystery protist in an oyster gill and quickly received assistance identifying it.

There is no cost, no ads, and no distractions. Scrolling down our activity feed, you will find industry announcements, videos about recirculating aquaculture systems, colleagues chatting about approaches to aquaculture education, and more. As one member put it, it's “like LinkedIn, but without the noise.”

The AIE is not just a website – it is a community. You can send messages, share photos, write posts, and enroll in educational programs. Work with sea urchins? There is a group for that. Hosting a webinar? List it with us. Looking to take the next step in your career? Our job board is full of opportunities.

Speaking of opportunities, the creation of the AIE opens the door for the US aquaculture community to chart its course and face common challenges together like never before. Conversations that begin at conferences can continue in our discussion forums, where issues can be hashed out collectively. By joining the AIE, you are not just signing up for another social network; you are helping to shape the future of the aquaculture industry.

Sign up for the Aquaculture Information Exchange! Invite your colleagues and start making new connections. As aquaculture professionals, we play a crucial role in feeding our country, and through the AIE we can amplify our impact, one post, one message, and one collaboration at a time. Register here – <https://aquainfoexchange.org>

Joe Caterine
AIE Community Manager



Recruits Corner

Fellow Recruits,

As we welcome the arrival of some warmer weather, we hope you are finishing a productive spring semester and are looking forward to the upcoming summer field season.

First, a warm welcome to our new student Recruits Co-chair, Emily Fuqua! Emily is a Ph.D. candidate at Florida State University working under Dr. Sandra Brooke, and investigating the effects of multiple stressors on the physiology of the eastern oyster. Please feel free to reach out to Emily and welcome her aboard. A huge thank you to Fiona Boardman for serving as a Co-chair over the past two years - and a big congratulations on her upcoming graduation.



It was a pleasure to meet and reconnect with all of the students at the 116th Annual Meeting in Charlotte in March. We hope you enjoyed the many informative sessions, networking opportunities, and social time with your fellow Recruits. Please do not hesitate to reach out with any comments you have on the conference or events you would like to see in the future. We would like to thank each and every student who volunteered to help with talk loading, session A/V, the auction, sales booth, poster hanging, and working the registration booth. Having all of your help made the conference run smoothly (even through the great laptop fire of 2024)! We hope to see you again next year for the NSA Triennial Conference in New Orleans.



Congratulations to the student research grant and presentation award winners. Everyone should be reminded that five awards (Carriker, Castagna, Abbe, Creswell, and Shumway) all provide \$1,250 of research funds or award money. This is a considerable amount of money, and the application process is very straightforward. Applications for these awards have been low in recent years, and we highly encourage all students to apply for these grants. The annual deadline to apply for these awards is November 1st, and students can apply to multiple awards. More information about the awards can be found in the student members section of the NSA website (<https://www.shellfish.org/grants-and-awards>).

Finally, we remind students to join the Recruits Facebook page ("NSA Students") and follow the NSA Instagram, @nationalshellfisheries. This is a great way to stay up to date on important announcements and information about grant deadlines, job opportunities, workshops, and information about next year's conference.

Hannah and Emily
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NSA Pacific Coast Section News

The Pacific Coast Shellfish Growers Association (PCSGA) / NSA-PCS 78th Annual Conference and Tradeshow will be held at the Lynnwood Event Center, Lynnwood, WA from September 10-12, 2024. The agenda is full of great presentations in exciting sessions like Ocean Conditions, Pest Management, and Down on the Farm. Early bird registration will be opening soon, you can find more information at: <https://pcsga.org/annual-conference>.

Attention student members: the NSA-PCS offers travel support for student members presenting at the Conference and Tradeshow (registration, banquet dinner, accommodation, and travel). The deadline to apply for travel support is **August 30, 2024**. The student presentation awards offer an opportunity to earn a cash prize (\$200 and the runner-up receives \$100) and free membership to the NSA. If you have any questions regarding student travel support or presentation awards please contact Jodie Toft (jodie@restorationfund.org) or Laura Spencer (lhs3@uw.edu). Apply now for the Ken Chew Student Research Grant Award. This competitive grant provides a \$1,200 award to a graduate student to support their research. Application deadline is **August 1, 2024**. For more information on the Ken Chew Award and application instructions, visit: <https://pcsga.org/2023-kenneth-k-chew-student-research-grant/>.

The NSA-PCS website and Facebook page are your best resources for news and information about the Pacific Coast Section. Please join our community online. You can follow NSA-PCS on X (formally Twitter): @nsapcs. You can like NSA-PCS on Facebook: <https://www.facebook.com/pages/Pacific-Coast-Section-of-the-National-Shellfisheries-Association/1438569826443936>.

I look forward to seeing you in Lynnwood, WA. Have a fun and safe summer.

Sandy Zeiner
Pacific Coast Section Chair



**Abstract Deadline:
June 7, 2024**

[https://
www.icsr2024.com](https://www.icsr2024.com)

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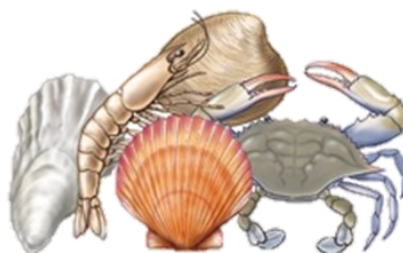
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Upcoming Events

78th Annual Shellfish Conference and Tradeshow (PCSGA/NSA-PCS joint meeting): Sept. 10 - 12, 2024. Lynnwood, Washington, USA. For more information: <https://pcsga.org/events/annual-shellfish-conference-tradeshow/>

International Conference on Shellfish Restoration 2024: Sept. 15 - 18, 2024. Jekyll Island, Georgia, USA. For more information: <https://www.icsr2024.com/>

5th International Symposium on the Advances in Marine Mussel Research: Sept. 17 - 20, 2024. Sopot, Poland. For more information: <http://www.iopan.pl/ammr-2024/>

Aquaculture 2025 (Triennial): Mar. 6 - 10, 2025. New Orleans, Louisiana, USA. For more information: www.was.org

118th NSA Annual Meeting: Mar. 22 - 26, 2026. Portland, Oregon, USA. For more information: www.shellfish.org

If you would like to announce a meeting, conference, workshop, or publication of interest to NSA members, please contact the *QNL* Editor, Steven Allen (stevenmallen@gmail.com).

