

# SEA STAR

## Director's Note

Transition to more in-person work. Page 2

## Logging Change

Reconstructing historical fish populations. Page 2

## 50 Years of WSG

Reflections from longtime staff. Page 6

## Seafarer Collective

Diversifying the maritime workforce. Page 8

## Oyster Cams

Using GoPros to track life beneath the surface. Page 10

## SOWING (CLAM) SEED FOR THE INDIGENOUS AQUACULTURE LEADERS OF TOMORROW

**How the Cross-Pacific Regional Collaborative Hub for Indigenous Aquaculture fosters student participation, research and communications**

**O**n an early morning at Kapapapu Point Park, one of the few public access points to Pu'uloa (Pearl Harbor) in O'ahu, Amanda Millin stands knee deep in mud with chainsaw in hand, preparing to remove an invasive mangrove tree with her crew. This is a typical day for Millin since she began working as food sustainability project manager for the Mālama Pu'uloa project, which includes uncovering loko i'a (traditional Hawaiian fishponds), watershed management, water and soil quality improvement, and planting native plants. How she landed in this new role can be traced directly to when, as a student, she was invited to attend the first summit gathering of the Cross-Pacific Regional Collaborative Hub for Indigenous Aquaculture held on O'ahu, February 2020.

The Collaborative, coordinated by Washington Sea Grant (WSG), is catalyzing a network of stewards, knowledge holders, researchers and students working to advance sustainable Indigenous aquaculture practices and enhance seafood production in the Pacific region. Sea Grant programs in Hawai'i, Alaska and Washington have nurtured partnerships to build this regional network. Fostering leadership among young scholars — by providing training, topical coursework, fellowships, and opportunities to network with Indigenous groups — is one of the Collaborative's key goals.

Indigenous Aquaculture • continued on page 4



Above: participant of the Cross-Pacific Regional Collaborative Hub's first gathering in O'ahu performs a ceremony prior to hands-on work at the He'eia fishpond. Left: Lummi students carrying a canoe. Photo: courtesy of Marco Hatch

**W**hew, what a ride this has been! We at

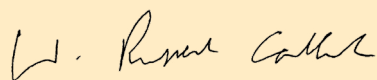
Washington Sea Grant (WSG) have been doing our best to stay productive and to continue being a useful resource to the people of

Washington. Over the last few months we have been transitioning to more in-person work. Even as we navigate our continued health and safety precautions, it has been a joy to once again see old coworkers and meet newer ones for the first time.

Looking back over the past couple of years, I was super impressed by how quickly we moved to a virtual work environment when the pandemic started. I have also been impressed by how the entire WSG team found creative ways to continue our mission despite the challenges. Some of the WSG team and their cadre of Crab Team and SoundToxins volunteers have been safely doing in-person work for basically the entire pandemic — my hat is off to them! We also figured out ways to continue supporting the shellfish industry, help communities with food security challenges, and work with partners to help shellfish growers and fishermen find alternative markets. Staff who were planning events came up with innovative substitutes to holding them in-person, from the activities delivered to the inboxes of NOAA Science Camp participants to our interactive virtual 50th anniversary celebration.

One of the brighter sides of the pandemic is that we grew stronger as a team. I was taken by how WSG staff found the mental and physical energy to support each other when they were struggling. The team also figured out ways to build relationships and trust with several new staff members that we hired during the pandemic. The level of passion and commitment of the entire organization in continuing to serve Washington in these uncertain times was inspiring.

We never really left — but it's good to be back!



W. Russell Callender, Washington Sea Grant Director



# LOGGING CHANGE IN PUGET SOUND:

## Researchers used UW vessel logbooks to reconstruct historical groundfish populations

**T**o understand how Puget Sound has changed, we first must understand how it used to be. Unlike most major estuaries in the U.S. — and despite the abundance of world-class oceanographic institutions in the area — long-term monitoring of Puget Sound fish populations did not exist until 1990. Filling in this missing information is essential to establishing a baseline that would provide context for the current status of the marine ecosystem and could guide policymakers in setting more realistic ecosystem-based management recovery targets.

Researchers from the University of Washington School of Aquatic and Fishery Sciences, UW Puget Sound Institute, NOAA's Northwest Fisheries Science Center and Washington Department of Fish & Wildlife have discovered an unconventional way to help fill in these gaps in data: using old vessel logbooks.

The crews of the University of Washington's then School of Fisheries' research vessels R/V *Oncorhynchus* (1947 to 1955) and R/V *Commando* (1955 to 1980), both of which were skippered by Tom Oswald, took notes on all of the fish tows conducted under their watch. With funding from Washington Sea Grant, the researchers combed through more than 1,000 of these logbook entries to analyze the information regarding the groundfish species caught in each tow, including when and where the fish were caught. Then, the researchers analyzed historical logbook data from 1948 to 1977 and contemporary monitoring data to reveal longer-term trends in the local groundfish populations. The research was published in Marine Ecology Progress Series.

Although there were changes throughout the periods analyzed, the researchers did not find that groundfish populations today in Puget Sound look fundamentally different from the historical populations. "We see the same types of fluctuations in the historical data as in the contemporary data," says Tim Essington, professor at the School of Aquatic and Fishery Sciences and the study's lead author. "This suggests that boom and bust populations are natural, and speaks to the importance of having a long time view to establishing a baseline."

However, some trends did stand out, Essington explained. For example, Pacific cod used to be very common but is rare today, and the abundance of Pacific spiny dogfish has decreased.

The fact that the researchers were able to fill in any of the historical gaps was really a matter of luck: the right people had maintained the research vessels at the right time. "They were remarkable, the records," Essington says. "They not only noted the species and size, but also detailed descriptions of the locations. It was amazing what we could reconstruct."

Bob Hitz was a graduate student at the School of Fisheries from 1957 to 1960, during which he ventured out on the *Commando* along with Oswald and his advisor, Allan DeLacy, to collect data for his research on Puget Sound rockfish. He remembers once being chastised for filling out the logbook incorrectly.



"I had misspelled one of the scientific names — that was the only time I remember that DeLacy got mad at me," Hitz says. "He said that the logbooks had to be correct."

This level of precision made Essington's work possible decades later. For Hitz, the logbooks also became a rich repository of memories. "When I was going through the logs of the *Commando*, I found an entry that I had written on May 3, 1960," he wrote in a 2015 blog post. "It was for trip #6017 and it brought back a wave of memories, since that was my first encounter with the open waters of the Pacific Ocean. At the time I was being considered for a job with the Exploratory group which worked the outside waters from Mexico to the Bering Sea. The first thing that came to my mind was, would I become seasick once I was outside? If so, would three years of graduate school be wasted? There was no class about seasickness given at the [School of Fisheries], but there was talk."

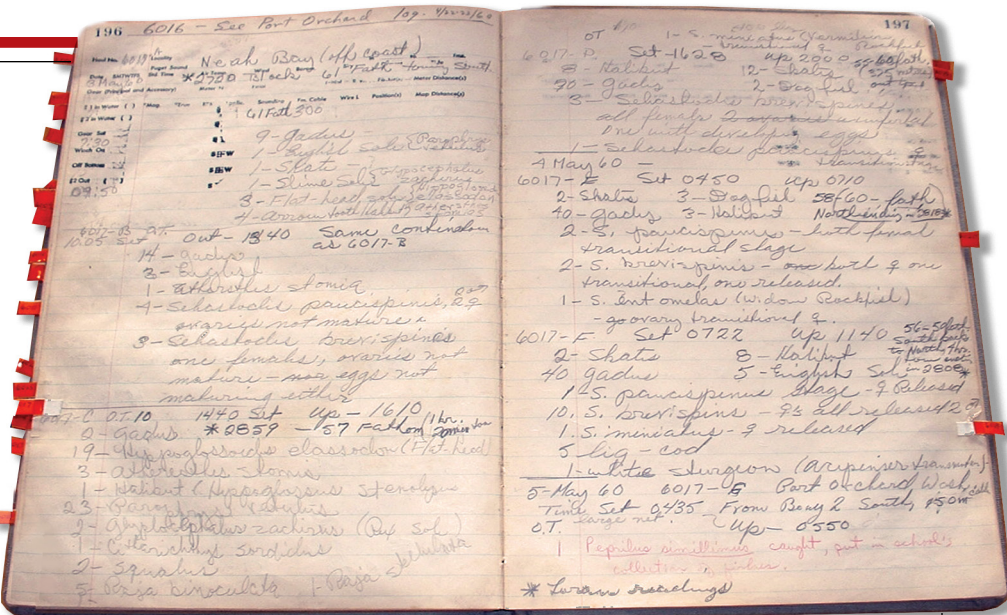
Although the researchers analyzed logbooks up until 1977, Essington explained that they became considerably less useful after 1973. As Hitz recalls, this was around the time the school began to place more emphasis on chartering the *Commando* for outside research, rather than using it for students' education and research.

"I assume the logbooks became less important when the boat was being chartered," Hitz says.

Essington described the project methods as "half detective work and half computer work." The detective work involved the researchers carefully perusing the old logbooks while wearing N-95 masks to protect themselves from the mildew and dust (prior to COVID-19). The computer work involved analyzing how the catch rates of 15 groundfish species differed between the historical and contemporary datasets, to understand how the general groundfish populations differed between the two periods.

Given that the details within the logbooks petered out, and then stopped altogether once the *Commando* was retired, the researchers were forced to leave out an important period in their analysis.

"There was a 17-year gap between the captain's books and current monitoring, and no amount of scrappiness could fill this in," Essington says.



A page from one of the logbooks on the R/V *Commando*. Photo: Bob Hitz

The years between the two datasets — the bulk of the 1970s and 80s — also happened to coincide with extensive environmental change in Puget Sound, including the implementation of regulations to address pollution and protect endangered species. A few changes particularly impacted groundfish: For example, the 1974 Boldt decision resulted in increased non-tribal recreational groundfish fishing. Subsequently, the introduction of bag limits, marine protected areas and species-take prohibitions in the late 1980s and early 1990s reduced the intensity of recreational groundfish fishing.

In June 2020, groundfish were added as a food web indicator species for the Puget Sound Partnership's Puget Sound Vital Signs, which has guided policy since 2010. This research could help shed light on how to evaluate this vital sign, the authors say.

"It might be better to think about baselines in the dynamic sense," Essington says. "To focus on acceptable ranges of fluctuation, rather than a precise number."

**For Hitz, the logbooks also became a rich repository of memories.**





Millin was working on her Masters of Advanced Studies in Marine Biodiversity and Conservation at Scripps Institution of Oceanography when she was invited to help plan and participate in the Collaborative's first gathering. At the time, she was unsure how an Indigenous aquaculture gathering with over 125 participants representing dozens of Indigenous groups from across the Pacific would work. But within the first day, she saw similarities among their aquaculture systems and how intertwined each one is within their unique places, ecosystems and cultures. The gathering inspired Millin to change the direction of her capstone project to Indigenous aquaculture and, ultimately, altered the course of her career.

Millin's story is just one of many instances in which students at various career stages have engaged in place-based learning through the Collaborative. These experiences have included: site visits and hands-on work restoring ancient clam gardens and fishponds; producing videos; publishing papers; and learning about place-based research. Each experience provides early career STEM leaders with fresh perspectives on marine science, restoration and Indigenous knowledge — and how they might approach educating their communities for the next generation. Read on to learn about a few more highlights of how working with students have been central to the Collaborative so far, and what is yet to come.

## Engaging Indigenous Scholars

The first summit gathering was held at the Kāko'o 'Ōiwi farm and He'eia fishpond on O'ahu and organized by the Hui Mālama Loko I'a network and Kua 'aina Ulu 'Auamo. Funding came in part from NOAA Sea Grant through the Hawai'i, Alaska and Washington Sea Grant programs, which also participated in the gathering. The gathering served as an epicenter for sharing knowledge and was ideal for informal workshops, conversations over meals, and hands-on efforts, such as rebuilding a 120-foot kuapā (seawall) at He'eia fishpond with bare hands and teamwork.

Four students from the Northwest Indian College also attended: Alisha Jefferson (Lummi), Roberta Hall (Lummi), Tamara Tso (Dine') and Layla Wilbur-Westerdorf (Swinomish). Alisha was able to witness traditional Hawaiian aquaculture systems first-hand. Reflecting on how the experience could help guide projects back home, she observed: "Hawaiian traditions of sharing, community and a strong relationship to the land ties it all together. Their community is really immersed in it. We are beginning to start our clam garden, so seeing this is encouraging."

The students gained other insights from the gathering in O'ahu. "Today we helped rebuild a seawall," Wilbur-Westerdorf said. "There are rocks in that wall that I touched. This is extremely empowering. Here you get to be with people doing empowering things."

Tso noted that the food shared at the gathering had been harvested locally by the very people who cooked it. Layla carried this thread further: "Our culture starts with our food. If we lose the harvesting of clams, we lose our culture. It felt like a celebration [at the gathering]. I've heard this before, that this was the norm, much like our potlatches. And it feels right, it feels like home here." Hall added, "This is the direction we students would like to see our own community go."

The Collaborative also cultivates opportunities for community-to-community learning that crosses international boundaries. For example, Northwest Indian College students met with Coast Salish Indigenous groups such as the WSÁNEĆ and Hul'qumi'num who are restoring their clam gardens in what is today Canada, in partnership with Parks Canada. Through this connection, the Swinomish Indian Tribal Community coordinated an exploratory trip to the clam gardens, where the students gained firsthand experience practicing ancient mariculture techniques.





## Supporting Student Research

Sonni Tadlock is a graduate of the UW School of Public Health and an alumna of the Northwest Indian College. With a fellowship from WSG, Sonni's master's thesis focused on the planning for the Swinomish clam garden. She developed a sociocultural framework for restoring ancient mariculture, basing her framework on observations of the relationships with the WSÁNEĆ and Hul'qumi'num Nations. Her story is one of the many examples of how students have contributed original research to the Indigenous Aquaculture Collaborative project.

Another example is the work of Sonia Ibarra, who recently earned her doctoral degree from the University of Alaska Fairbanks (UAF). Ibarra's thesis focused on Indigenous communities in Southeast Alaska — in particular, she studied the impacts of sea otters on customary shellfish resources and the importance of Indigenous governance for productive clam beds. She reoriented the standard Western approach to science by adapting her project to reflect the community's values, weaving traditional knowledge with Western science and prioritizing the needs of the community over other goals. Ibarra has contributed to the Collaborative by sharing her findings in a seminar and continues as a member. This fall, she begins her career as program coordinator for the Tamamta Program at UAF.

Octavio Cruz is a recent Western Washington University graduate that began his journey studying clam garden restoration with Professor Marco

Hatch. Cruz was among the students at the gathering, where he lifted boulders while helping to restore the fishpond. Today, his career is underway as a marine data researcher at Pauquachin First Nation. He is leading the marine data analysis on the Saanich Peninsula, near Victoria, BC and working with native communities to apply both scientific and cultural tools to manage or restore traditional food systems, as well as conducting marine monitoring around the Gulf Islands. Of the Collaborative he says, "so many meaningful connections were made or strengthened through it." In fact, Octavio has now brought the Pauquachin First Nation into the Collaborative.

## Cultivating Community Outreach and Communications

Rosie Alegado, director for the Center of Excellence in Integrated Knowledge Systems with Hawai'i Sea Grant, mentored "community-embedded research" to a cohort of undergraduate students in the Our Project in Hawai'i's (OPIHI) program. Alegado emphasizes to students the importance of collaborating with community when undertaking any research — and that collaboration should begin from the project's inception. Working with Rosie and OPIHI staff, a recent group learned hands-on skills in the lab and in the field with traditional fishpond practitioners. They learned to dissect fish, collect samples, and even learned to throw a fish net. Rosie says, "By immersing themselves for a full year, the students prepare for future success in the sciences."

Indigenous Aquaculture • continued on back page



Left page and above: Working on the fishpond at the Cross-Pacific Regional Collaborative Hub's first gathering in O'ahu. Below: A clam garden in British Columbia.





# LOOKING BACK ON 50 YEARS STAFF REFLECT ON THEIR

In honor of the program's golden anniversary, we asked four current and former staff to reflect on what they have accomplished

By Grace Freeman, WSG Science Communications Fellow

**B**ased in Seattle and housed within the University of Washington's College of the Environment, Washington Sea Grant (WSG) celebrated 50 years in 2021. The world has changed immensely since its inception, and WSG has continued to adapt. Even with these changes, a few key tenants of Sea Grant's mission remain: WSG strives to impact and is continuously influenced by the marine ecosystem, industry, policy, and perhaps most importantly, the community it serves.

We asked four current and former staff — Jeff Adams, Teri King, Bob Goodwin and Penny Dalton — to reflect on their time here and how their work contributed to some of the key pieces of the organization's mission. Here's what they had to say.

## Supporting Healthy Ecosystems



The Salish Sea ecosystem has changed in myriad ways in the last half-century. One of these changes comes in the form of a new invasive species: European green crabs. These unwelcome visitors were first spotted in Washington's inland waters in 2016

and spawned the creation of a new project called the WSG Crab Team. When **Jeff Adams**, a marine ecologist with WSG, helped usher Crab Team off the ground, he and the rest of the team were hoping the project would fail. No one wanted to find invasive European Green Crabs on Washington's coast: "Had we not had the success we hoped not to have," he says, "[the project] wouldn't be what it is today." Despite the unfortunate circumstances that led to its creation, Crab Team serves as a model program for others: it partners with the Washington Department of Fish & Wildlife and many community members, scientists, policymakers, and researchers to manage Washington's ecosystem holistically. Tapping into these networks and communities allowed for the creation of a nimble project that has grown in a new direction every year. "Just when you think it might settle into a pattern, it takes another leap forward," Adams says.

## Supporting Vibrant Marine Industries



As the climate and environment change, so do the industries that depend on them. In the case of the boating industry, WSG's adaptations are illustrated through the work of **Bob Goodwin**, a coastal resource specialist who held the

position from 1975 until his retirement in 2004. As part of his work, Goodwin discovered a critical lack of knowledge regarding marina and moorage data in Washington. "We literally didn't know how many boats there were in Washington," he says. This inspired Goodwin to search through public records regarding retail boat sales in the state to compile the data so sorely missing from the collective knowledge. Goodwin's work has been extremely useful for marinas, developers, and those interested in promoting coastal resilience across Washington's communities.

## Supporting Seafood and Aquaculture

Beyond marinas and the boating industry, WSG has had a mutually impactful and beneficial connection with shellfish and aquaculture industries across the state. The annual Conference for Shellfish Growers, organized in part by **Teri King**, WSG aquaculture and marine water quality specialist at WSG, exemplifies this work. Typically held in-person over the course of a weekend, the event brings together shellfish growers from all over the state. "All are welcome," King says, and despite being competitors in the industry, they come together that weekend to "swap information, experiences, and stories." The collaboration helps large and small growers alike and offers an opportunity for WSG to facilitate conversation and glean important feedback directly from growers in Washington's dynamic and highly valuable seafood industry.



# ARS: LONGTIME WSG R WORK

## Supporting the Next Generation



WSG's work has wide-reaching effects on research, policy, and the training of further marine science leaders. **Penny Dalton**, former WSG director, is a model of these impacts. When she was placed on Capitol Hill for her year as a National Sea

Grant Knauss Fellow, Dalton became a biologist in a sea of lawyers. This position, however, served to deepen her interest in marine issues and expanded her awareness of what marine policy can do. After completing the one-year Knauss fellowship, Dalton's path included several marine policy positions before ultimately bringing her back to where she started: at Sea Grant. This time, however, she was hired as WSG's director, a position she held from 2005 until her retirement in 2018. In this role, Dalton not only worked to approach problems holistically and pull industry, community, and researchers together, she strived to do so while also engaging the help of students and fellows. "I'm a huge fan of all the fellowship programs!" she says. It is clear that the fellowships provide a unique symbiotic relationship between WSG and the students it hires: Dalton listed name after name of fellows who went on to permanent jobs at Sea Grant. "[Sea Grant] fellowships are about building relationships and policies backed by good science," Dalton says. Dalton's own career path made it clear that these relationships are mutually beneficial.


## Supporting Community

When he's not conducting surveys with Crab Team, Adams can be found facilitating beach walks and other outreach events. A self-proclaimed "naturalist at heart," Adams finds great satisfaction in "bringing science out to the communities where it can have an impact." In fact, he is always seeking more opportunities for outreach and community education and believes that these projects truly exemplify the important work WSG carries out. One such project, which Adams helps run, is the Kitsap Beach Naturalist program. To date, hundreds of people have moved

through the program, which holds outdoor workshops and beach walks to educate curious minds about the coastal habitat. When reflecting on the program, one woman stands out in Adams' mind: She attended a workshop and was so inspired by the lessons on lichens and mosses that she spent the following months learning everything she could on the topic. "She was so inspired that she even leads her own workshops now," Adams says. "It's an environmental educator's dream!" And just as communities are impacted by WSG's work, he points out, "it's important to remember that the inspiration goes both ways."

Many WSG projects rely heavily on community involvement. For example, at State of the Oyster collection events, overseen by Teri King, homeowners with tidal properties bring samples of the shellfish growing on their beaches to be tested for bacteria and algae that could potentially cause harm to humans and animals. The program creates a "partnership with homeowners," King says, since everyone involved "works hand-in-hand to solve whatever problem arises." Through the program, King and her beach-owning partners have discovered and worked to remediate problems with failing septic systems and animal waste. The tests and their results, which are paid for by the homeowners, foster a mutually beneficial relationship in which neighborhoods express vested interest in helping each other care for their environment. It's this community buy-in that makes the State of the Oyster Study so unique and earns a spot as one of King's favorite aspects of working at WSG.

## The Next 50 Years

As Washington's industries, communities, and ecosystems continue to evolve, so too will WSG. For instance, the in-person outreach that was paused due to the pandemic will continue to resume, with new dimensions possible in a more Zoom-savvy world. WSG's work to reach more communities and organizations also dovetails with its mission of enhancing diversity, equity and inclusion, which has become increasingly central to WSG's work. In the next half-century, Washington's environment, policy, and society will continue to change, and WSG will evolve right along with it — all while maintaining the character and mission it embraced 50 years ago. 

**As Washington's industries, communities and ecosystems continue to evolve, so too will WSG.**





# A MARINER'S

**The Seafarer Collective provides accessible educational programs for aspiring mariners to sustain and diversify the maritime workforce**

By Kathleen McKeegan, WSG Science Communications Fellow

**F**or Captain Halee Grimes, all it took was one look at an old wooden boat while she was in college. Since then, she has sailed the seas on several differently-rigged tall ships, like the kind you may associate with a certain Disney movie starring a bumbling but loveable antihero played by Johnny Depp. In fact, once Grimes landed in Grays Harbor, Washington, she quickly rose through the ranks from chief mate to captain of the *Lady Washington*, a ship that appeared in that very movie as the *HMS Interceptor*.

However, Captain Grimes, like many mariners, faced several roadblocks on her path to building a career in the maritime industry. One of the major barriers facing new mariners is the cost and acces-

sibility of classes required to get crucial United States Coast Guard (USCG) certifications and licenses. For example, the classes, trainings and paperwork fees required to receive an Able Seaman Credential, one of the beginner-level licenses in the maritime industry, cost approximately \$3,000 out-of-pocket — and that's disregarding the time required to complete the certification. "In the maritime industry, if you're not working, you're not getting paid," explained Grimes. "The cost for classes is tough, but you also have to take time off of work to do them." This means that many people who may be interested in a maritime career are essentially priced out of it.

A local program called The Seafarer Collective (TSC) aims to change this by making the industry easier to access. TSC is operated through the non-profit maritime organization Grays Harbor Historical Seaport (GHHS) and provides maritime learning platforms, career mentorship, USCG licensing support and crew volunteer opportunities to people from underrepresented populations who are interested in a career at sea. With the help of funding from the Magic Cabinet Foundation and Washington Sea Grant (WSG), TSC was able to begin operations in 2018 with a mission to change the face of the maritime industry.

The idea of TSC began after a few key discoveries. First, the Washington maritime industry is growing 6.4 percent annually, and yet the industry is struggling to recruit new workers. Second, the industry is very homogenous and male-dominated, with only two percent of the global maritime workforce identifying as female. According to the City of Seattle Office of Economic Development, over 90 percent of the Washington maritime industry is white male. Last, almost half of experienced tall ship sailors report that they are unable to afford the professional licensing that can propel them into higher-paying positions. Brandi Bednarik, the executive director of GHHS, noticed similar issues amongst her program and crew on the *Lady Washington*. "One of our biggest problems was a crew shortage," Brandi said. "We had to figure out how to be sustainable. That's where The Seafarer Collective was born." She and her colleagues at GHHS realized the need for new, accessible pathways into the maritime field in order to sustain and diversify the workforce.

Originally called Sea School Northwest and later coined The Seafarer Collective, the program offers a variety of outreach and educational offerings that



# LIFE FOR ME

include self-paced online courses, community industry panels, vessel open houses, mariner mentorships, volunteer crew placement, and USCG endorsement and licensing support. With the funds from WSG, TSC was able to offer scholarships, grants, and free community events to support equal access to the maritime industry. In fact, Captain Halee Grimes was one of the scholarship recipients through TSC. “Halee’s success is one of my favorite stories,” Brandi said with a smile. “She had such quick upward mobility and grew into this really solid leader and captain. A lot of organizations don’t get to see their direct impact, and it’s pretty special.”

In order to make the program easily accessible, TSC offers three self-paced, online courses that are designed to increase knowledge and understanding of the maritime industry. The Entry-Level Merchant Mariner course includes both an online portion and an in-person crew position aboard a GHHS vessel. The Able Bodied Seaman course is a USCG-approved online course that provides the training needed to receive an Able Seaman certification. The Recreational Marlinspike course allows any interested mariner a chance to learn the basics of tall ship sailing.

Unfortunately, the COVID-19 pandemic caused TSC to reduce operations for about a year. In 2020, only weekend sails were offered during the summer, and there was a significant reduction in crew and staff members. Currently, they are operating in a limited capacity, with only a few students in the Entry-Level Merchant Mariner course. TSC hopes to get everything back up and running in 2022, COVID-dependent. “The stress of COVID impacted the people who worked here, and financially the first year was brutal,” Brandi explained. “But we’ve learned a lot, and we will come out stronger.”

With the funds from the WSG Program Development Award, TSC reached over 140,200 people through outreach and worked with over 70 students and grant awardees. Graduates saw up to a 320 percent increase in earned income after being hired with their USCG credential obtained while participating in TSC. Furthermore, the goal of TSC is to provide equal opportunity and a safe place for people to come and learn in the field. Today, 40 percent of TSC students identify as female or non-binary, and a large majority of the *Lady Washington*’s crew identify as queer. As Captain Grimes explained, “This is a place where anyone can be and feel safe and supported.”

WSG supports programs like TSC that aim to sustain and diversify the maritime workforce in order to ensure the future workforce is diverse and skilled in disciplines critical to coastal and ocean economies and ecosystem health. While TSC faced many unexpected challenges in its first few years, namely the global pandemic, it was able to push through and utilize the funding and support from WSG to implement a permanent and impactful program. “Without the funders, this program would not have been a thing,” Brandi explained. “The Seafarer Collective was just a dream, and we were so excited and humbled to receive the funding to pilot something like this, something that has a direct impact on people’s lives.”

To learn more about TSC, visit their website at <https://www.theseafarercollective.org>.



# FIELD NOTES



Congratulations to **Maile Sullivan**, WSG education specialist, for receiving the 2021 Johnette D. Bosarge Memorial Award at the National Marine Educators Association (NMEA) Conference. This award honors service and dedication to NMEA and loyalty, efficiency and enthusiasm for marine and aquatic education. Maile has shown leadership by developing and coordinating lasting education programs — in particular, Orca Bowl and NOAA Science Camp — that have given students K-12 access to marine science knowledge throughout Washington state.



A warm welcome to two new WSG staff: fisheries specialist **Jenna Keeton** (above left) and executive assistant **Andrea Chateaubriand** (above right)!

Jenna began her career in fisheries as an undergraduate with the UW School of Aquatic and Fishery Sciences and earned her master's degree in aquatic ecology from Utah State University studying aquatic invasive species management. Most recently, she worked with the agriculture industry in central Oregon developing and implementing sustainable water conservation practices. Jenna has always held fisheries close to her heart. She even joined the commercial fleet in the summer of 2021 as a deckhand in the Bristol Bay sockeye salmon fishery!

Andrea immigrated to Seattle from Brazil, where she worked as an Assistant to foreign correspondents covering the news throughout South America. Most recently, she spent 18 years working for Health Alliance International (HAI), an NGO within the UW Department of Global Health. Andrea is bilingual in English and Portuguese and is proficient in Spanish. She loves the outdoors and has two rescue dogs. When she's not working, she loves to be in the garden and grow all kinds of edible and beautiful things.



The Quaternary Research Center (QRC) appointed WSG tsunami and coastal resilience specialist **Carrie Garrison-Laney** as a new member. Founded in 1969, the QRC is a hub of interdisciplinary research that attracts UW faculty, students, associates and visiting scientists who study a range of topics—including tectonics, climate, ecosystems and human adaptations to environmental impacts over the Quaternary (the geologic period that spans the past 2.6 million years). QRC is the oldest interdisciplinary center at UW and one of the oldest Quaternary centers in the country.



We are thrilled to announce the 2021–2022 class of fellows. Recent UW graduate Alanna Greene was selected as a finalist for the John A. Knauss Marine Policy Fellowship, where she will spend a year working in a federal government office in Washington, D.C. Recent UW graduates Allison Lu, Corrine Noufi, Katie Byrnes, Katie Shelledy and Natalie Lowell were selected for the WSG Herhman Fellowship, which places early-career marine scholars in coastal host offices throughout Washington state. This year's host offices are the Northwest Seaport Alliance, Puget Sound Partnership, Port of Seattle, Northwest Indian Fisheries Commission, and the Makah Tribe. Grant Adams, a doctoral student at the UW School of Aquatic and Fisheries Science was awarded a National Marine Fisheries Service-Sea Grant Population and Ecosystem Dynamics Fellowship, through which he will study the performance of multispecies harvest control rules.

**Teri King**, WSG aquaculture and water quality specialist, and **Nancy Nguyen**, former WSG research analyst along with partners from NOAA National Centers for Coastal Ocean Science, NOAA Northwest Fisheries Science Center, Northwest Indian College and AquaTechnics Inc. have sleuthed out the culprit to the shellfish mortality events that occurred in the summers of 2018 and 2019: high concentrations of yessotoxins, which are produced by blooms of certain phytoplankton. The researchers' findings were published in the open-access journal *Harmful Algae* this past spring. Since then, WSG and partners were awarded NOAA funding to continue this work. The researchers' goal is to develop and optimize a monitoring program for yessotoxins and the algae that produce them.

NOAA Sea Grant awarded WSG, along with California and Oregon Sea Grants, funding for a three-year project to address the economic impacts of the COVID-19 pandemic on the West Coast seafood industry. Led by **Sean Macduff** and **MaryAnn Wagner**, the WSG director for community engagement and director for communications, the project seeks to enhance seafood availability along the West Coast by developing marketing resources and infrastructure and conducting associated trainings for West Coast Seafood providers and handlers, with the goal of strengthening the overall stability of the seafood industry.

WSG is part of the new Cascadia Coastlines and Peoples Hazards Research Hub, or Cascadia CoPes Hub, which received funding from the National Science Foundation to increase coastal resiliency among Pacific Northwest communities. The hub will engage communities, train a new generation of coastal hazards scientists, and co-produce research to increase the capacity of communities to adapt and prepare for earthquakes, coastal erosion, regional flooding and sea level rise. **Carrie Garrison-Laney** and **Ian Miller**, tsunami and coastal hazards specialists at WSG, will serve as coastal community leads.

## LOOKING ENVIRONN

By Hannah Jeffries, WSG Sciences Communications Fellow

Researchers use Go-Pro cameras to document life beneath the surface on shellfish farms





# UNDERWATER TO UNCOVER THE MARINE ENVIRONMENT OF SHELLFISH AQUACULTURE

Shellfish growers spend countless hours on the tideflats each year to produce sustainable seafood for everyone to enjoy. All of this time out on the tideflats gives growers an extensive understanding of the environment around their farms, including the other organisms that live there. But their eyes can only take in what goes on above the water—and many have often wondered what goes on underneath the surface. This inspired one grower to try to put waterproof cameras on their farm. After the grower approached NOAA about the idea, an exciting new project was brought to life.

Through a Washington Sea Grant-funded project, researchers from The Nature Conservancy and NOAA partnered with shellfish growers to study the ecological role of the shellfish aquaculture habitat compared to the natural habitat. Researchers used waterproof GoPro cameras to study the presence of species on shellfish farms vs. natural habitats at high tide. This project is an important step in understanding the impacts and benefits of shellfish farms on the ecosystem within Puget Sound. The waters of Puget Sound are home to a large diversity of marine life, with each region supporting varying degrees of diversity. Because of this, shellfish farms in one area of the Sound may have different species than farms in other regions.

Due to their initiative and interest in better understanding aquaculture, shellfish growers are natural partners for working on these types of scientific questions — and so the research team made it a priority to engage with growers from the beginning. “We held small workshops at shellfish conferences to gauge interest from other growers,” Molly Bogeberg, the project lead from the Nature Conservancy, said. “From there, more growers joined the study.” The growers who participated were instrumental in helping the project move forward, because they guided the researchers around their farms, helped to determine the best tides for the study to take place, and helped with deploying and retrieving the cameras.


Many farmers already have a deep sense of connection with the environment around them. “This is my quiet place. I come out here, and I can work, and I can think about our ancestors,” Marlin Holden, a shellfish grower from the Jamestown S’Klallam Tribe, said. Collaborating on this project gave them the opportunity to dig even deeper. “We have a good sense of what’s happening out there at low tide,” said Lissa Monberg of the Hamma Hamma Oyster Company. Some growers dive to learn more about their farms at high tide, but there is still a lot of information they do not know about their farms when tides are high. “It’s really awesome to have those cameras out there so that we can get a better sense of how these animals are using the gear at high tide,” Monberg said.

This study occurred in three different regions around Puget Sound, where the GoPro cameras were deployed. They targeted shellfish beds in three different types of growing areas, as well as in unfarmed habitats. Once in place, the cameras begin record-

ing at high tide and capture videos of the species that interact with the shellfish farms. “Documenting with GoPros will help other people understand how diverse and how dynamic our beaches are,” said Shina Wysocki, owner of Chelsea Farms. More than 400 hours of video was collected, reviewed and analyzed to quantify fish and crab use on the sites. “With GoPro cameras and the new technology, this has opened a door to allow us to collect data that we wouldn’t have been able to collect even a couple of years ago,” Beth Sanderson, a research scientist with NOAA Fisheries, explained.

One of the biggest challenges the researchers faced was getting footage with enough visibility in the water. “Our Puget Sound waters can be full of plankton and sediment that can sometimes make it hard to get good footage on the cameras,” Bogeberg said. “However, when you get the right tide, sunlight, and clear waters, the footage is pretty incredible!”

The results showed that the fish and crab species interaction with the shellfish aquaculture farms varied across three study regions in Puget Sound (North Sound, South Sound, and Hood Canal). Hood Canal did not show any changes in diversity with the presence of the aquaculture, while there was an increase in diversity in the North Sound sites, and a decrease in diversity in the south Sound sites. However, more studies will need to be done to better understand the interactions between fish and crab species and shellfish farms. Bogeberg said that, throughout the project, “it was really neat to see how the whole process works from raising seed in hatcheries to working midnight low tides in the winter to harvest. The tidelands are full of activity with harvesters working through the night to bring shellfish to our tables.”

Now, with the ability to look below the water, it will be possible to look towards the future of shellfish farming in Washington with greater focus. 



Photos courtesy of The Nature Conservancy.



**Washington Sea Grant**  
College of the Environment  
University of Washington  
Box 355060  
3716 Brooklyn Avenue NE  
Seattle, WA 98105-6716



[seagrants@uw.edu](mailto:seagrants@uw.edu)

[wsg.uw.edu](http://wsg.uw.edu)

Twitter: @WaSeaGrant

Facebook.com/WaSeaGrant

Instagram: @WaSeaGrant

Editor, Samantha Larson; Designer, Robyn Ricks; Assistant Director for Communications, MaryAnn Wagner; Technical Advisor, Karen Morrill-McClure. © Washington Sea Grant; all photos WSG except as noted. ©2021 WSG-MR 21-04

Indigenous Aquaculture •  
continued from page 5

**Many innovations from the past provide viable and timely solutions for challenges in shellfish and fishing food resources.**

Often, communicating about science is just as important as the research itself. Professor Anne Salomon's class of graduate students from Simon Fraser University took this to heart. Many innovations from the past provide viable and timely solutions for challenges in shellfish and fishing food resources; with this in mind, the students created a story map of ancestral mariculture innovations, evaluating the commonalities and differences between systems around the Pacific Rim. The students came to the gathering in Oah'u to experience an ancestral fishpond first-hand. The experience grounded them, providing inspiration and direct hands-on knowledge that shaped the story map. As Salomon says, "The gathering propelled the work forward so that it became not only a scholarly endeavor but an artistic one, grounded in a community of practice, that also documents the role of ceremony in building community cohesion and social-ecological resilience." Ultimately, the map will be a key element of the Collaborative website and a living document that will evolve, catalyzing further research in ancestral mariculture around the Pacific and offering innovations for the future.

WSG is also mentoring students through fellowships and student assistantships where they help with coordination and planning for the Collaborative. This includes a communications fellow, who

will contribute to social media, produce videos and write stories about our Collaborative partners.

### More Opportunities to Come

Looking ahead, Melissa Poe, WSG social scientist and project lead for the Collaborative, sees even more educational opportunities evolving for students. Alaska Sea Grant has plans to launch a one-year fellowship sponsored by the Collaborative, which will provide new career skills to a recently graduated masters or doctoral student. Activities will include working towards biocultural restoration goals of a host tribe, as well as supporting a comprehensive review of Pacific region systems.

The Tamamta Program another graduate fellowship program at University of Alaska funded by the National Science Foundation, bridges Indigenous and western sciences to transform graduate education and research in fisheries and marine sciences. The merging of these two programs has great potential for becoming an ongoing Indigenous aquaculture fellowship in future years.

"We celebrate the learning outcomes and opportunities of all the various students from around the Pacific who are participating in the Collaborative," Poe says. "We're excited to shine light on this facet of our collaborative story!" 