

SEA STAR

WASHINGTON SEA GRANT

Winter 2020–2021

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THIS YEAR HAS PRESENTED CHALLENGES that none of us have ever experienced before. As individuals and as an organization, we at Washington Sea Grant (WSG) have struggled to adapt in many ways. Staying connected to each other and to the partners and stakeholders with whom we work has become difficult when we can't meet in person. With schools

held remotely, those of us who are parents have had to re-figure the balance between our own work and our children's care and education. Even planning a vacation to help alleviate feelings of burnout has become difficult when we don't have certainty about where it is or isn't safe to go.

At the same time, I am tremendously proud of how WSG has found creative solutions to many of the hurdles we have encountered. WSG Crab Team and SoundToxins were quick to get the appropriate approvals so that volunteers could keep getting out into the field and continue the crucial work of these programs, even if at a reduced capacity. When it became clear that we would not be able to hold NOAA Science Camp in person, we explored new avenues for K-12 education. This included partnering with *NOAA Live!* to offer four webinars geared for grades 6–8, which highlighted some of the scientists we usually work with at camp. This fall, the River & Oceans Film Festival also went online for the first time.

All of us became a lot more comfortable holding and attending virtual meetings and events, and we also became practiced at the art of remaining flexible. While this time has been difficult, we are continuing to learn and progress — for example, over the past several months, we have grown by adding four staff members to our team, including two new assistant directors. We also added a new equity, access and community engagement lead position for an existing staff member.

These months will shape who we will become as individuals and as an organization for years to come. The truth is that we are incredibly lucky. We have continued to show up for each other, with empathy. We have continued to grow as an organization and in our commitment to diversity, equity and inclusion. And we have continued to do the work that we love, serving Washington's marine and coastal environments and communities.

As we head into 2021— the 50th anniversary of Washington Sea Grant! — I'm looking forward to new beginnings with every expectation that our organization will continue to evolve. We have many plans for achieving our vision of healthy, productive and resilient coastal and marine ecosystems that sustain Washington's rich cultural and maritime heritage, vibrant coastal communities, clean waters and beaches, prosperous fisheries and aquaculture, diverse wildlife and an engaged public.

Russell Callender, *Director, Washington Sea Grant*

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SPOTTING SALMON WITH SOUND

Kerry Accola's Research Took Her to Seattle's Seawall in Search of Salmon

By James Lee, WSG Science Communications Fellow

PICTURE GOING OUT ON A SMALL BOAT OR A KAYAK. Do you see yourself paddling past a serene, relaxing marsh? Or perhaps along some rugged, remote coastline?

You probably don't picture Kerry Accola's routine: paddling past the piers and bulkheads of the downtown Seattle waterfront. "It's a different experience! It can be relaxing at certain times, while stressful at others, what with the waves and all the wakes created by the boats and ferries," Accola says. "But, overall, the waterfront is an interesting place to be." It's especially interesting because the Seattle waterfront is an important place for salmon — which is what brought Accola here in the first place.

Accola is a graduate student at the University of Washington's School of Aquatic

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The camera footage revealed that salmon are more likely to be found beneath the modified piers in the new seawall, indicating that the habitat enhancements have had their intended effect.

and Fisheries Sciences. She's co-advised by research scientist Jeff Cordell, whose previous Washington Sea Grant (WSG)-funded research helped lay the foundation for modifying the renovations to Seattle's Elliott Bay seawall in order to create habitat for juvenile outmigrating salmon. Now, three years after the seawall renovation was finished, Accola and Cordell are wrapping up another WSG-funded research project to analyze the ecological success of the new seawall design.

To do this, the research team completed more than one thousand salmon monitoring surveys at the seawall, using a hydroacoustic camera mounted beneath a kayak. This camera helped Accola and others observe salmon activity around the wall. The camera footage revealed that salmon are more likely to be found beneath the modified piers in the new seawall, indicating that the habitat enhancements have had their intended effect.

Because it uses sound waves and not light, the hydroacoustic camera allowed the research team to monitor during the night as well as during the day, and they found that there were more salmon along the waterfront at night, mostly out in the open between the piers. Accola points out that she spent an entire season snorkeling in the area the year before she conducted the hydroacoustic surveys, which put her in a good position to interpret what her camera was telling her. "The snorkel surveys really helped me familiarize myself with which fish were in the area and how they were moving," Accola says. The research team found that the trends they observed in the footage from the hydroacoustic camera corroborated their snorkel survey observations.

The scale, visibility and success of this urban restoration work has garnered much media attention in the last few years. As a result, Accola has had many opportunities to share her work with the public. "I've

done quite a few talks, and I've really enjoyed it," Accola says. "People can go see the seawall, so it's something that's immediately tangible and easy to understand. That makes people enthusiastic." The results also have good implications for the groups who fish in Elliott Bay, which includes the Muckleshoot and Suquamish Tribes (the area falls within their usual and accustomed fishing grounds).

At the same time, Accola emphasizes that the seawall is just a small part of the salmon's migration journey, and as a scientist, she is always mindful that just because everyone is enthusiastic about a project doesn't mean that it's working the way it was intended. In the case of the seawall, however, the results so far do seem to be something to celebrate.

Cordell will continue post-construction monitoring of the seawall's effects on outmigrating salmon for another seven years. As for Accola, she's excited about the future of the seawall and salmon research. "I would love to do more, since we've only scratched the surface of what we could learn about salmon distributions and differences in behavior and movement at night and along the new seawall," she says. "Salmon travel long distances, and while most die at sea, there are high mortalities at every life stage. That's why only a small percentage return to spawn, so anything we can do at this juvenile life stage to increase their chances of returning seems important to me."

Accola says that while people often desire to restore ecosystems to so-called natural condition — something resembling that idyllic marsh or rugged coastline — this is rarely feasible in urban environments like Seattle's waterfront. She adds, "The seawall is a great example of an innovative way to think about restoration and improving nearshore habitats in an urban environment. I think it was really forward thinking of the City of Seattle to go ahead with this project, and I'm so glad to have been a part of it." ✓



POINTING THE DATA TOWARD PROSPERITY

How the WSG Economic Dashboard helps coastal communities grow and flourish

By Brandon McWilliams, WSG Science Communications Fellow

WHILE THE POPULATION SIZE OF GRAYS HARBOR COUNTY has remained remarkably stable over the past seven years, the population dynamics of the county have shifted dramatically. Older people have been moving into the county and younger residents moving out. On top of that, the county has become more separated by age: tourism-driven coastal towns are home to older populations than manufacturing- and professionally focused inland towns. Because the area is struggling economically, these changes have huge implications — gaining a complete understanding of these changes could help maximize economic opportunities. For example, when a large call center was looking for a new location, Grays Harbor County was able to point the call center inland, where it has subsequently reaped economic rewards.

This sort of economic insight doesn't happen on its own. Kevin Decker, coastal economist at Washington Sea Grant (WSG), has been building the Washington Coast Economic Dashboard to help counties like Grays Harbor, as well as other government agencies, individuals, and private groups, better understand and plan for the economic reality of coastal life.

The Economic Dashboard currently exists as a series of seven datasets, ranging from population size to income and housing. Each category contains a series of charts, maps and visualizations, allowing users to sort through year, location, industry and other filters. And that's pretty much it — just a lot of charts and graphs. What's so helpful about that?, you may ask. A lot, as it turns out.

The seeds for the Dashboard came from the Washington Marine Spatial Planning Project, a multifaceted initiative in which WSG participated. The Planning Project helps coastal communities and industries make informed choices about future resource and land use. The project researchers required an economic understanding of the coastal communities they would be working with, so the team hired an economic evaluation firm to produce a report. The firm's report was necessarily broad, focusing on qualitative trends rather than the nitty-gritty of local economies. However, this meant the report was less helpful to the communities themselves, who wanted an in-depth, quantitative source of data that they could more readily apply to their economies. Plus, within those communities, each person and organization has a different "what if"

question. Everyone wants to know something different from the data, and thus reports can quickly turn into massive, unwieldy monsters as economists try to answer each hypothetical question. So, how can resource-strapped communities get the information they need?

Luckily, there are many data sources available for free to the public. However, "Just because the data is free, doesn't mean it is usable to these communities," Decker said. "Data by itself is not informative. It's interpreting and understanding the data that helps you make decisions." So, even though communities and planners can access the data, they "don't have the resources to analyze it."

Decker heard the communities' need for *usable* economic information. The Dashboard takes all that available-but-hard-to-use data and makes it understandable. "The Dashboard allows people to ask and answer their own questions," Decker said. It's the best of both worlds: the Dashboard contains all of the nitty-gritty details, but the interface makes it easy for people to hone in on only the data that they want.

Decker continues to work on building more tools and enhancing the Dashboard. Recently, he added two tabs for recreational boat sales, the legacy of longtime WSG coastal resource specialist Bob Goodwin (now retired), who had collected more than 16 years' worth of data in excel spreadsheets.

The fruits of adding the boat sales data have already paid off. In May 2020, Washington Governor Jay Inslee was preparing to roll out the regulations of phase one for COVID-19 reopening. Northwest Marine Trade Association (NMTA) and other boating groups had been lobbying the governor's office and the Department of Commerce to get boat dealers included in phase one businesses of the COVID-19 opening, which would include car dealerships, landscaping companies and pet walkers. "The first thing I did was bust open Bob's data in Excel," George Harris, president and CEO of NMTA, said. Then he remembered Decker's Dashboard. "In three minutes, I had this beautiful table."

This table and the accompanying data, which clearly showed the importance of May-July for boat dealers,



Kevin Decker, Washington Sea Grant coastal economist



ECONOMIC DASHBOARD • CONTINUED ON PAGE 8

REIMAGINING OUR FUTURE SHORELINES

OWEN BEACH, LOCATED IN POINT DEFIANCE

PARK, is a popular area for many communities in Tacoma, providing beach access for boaters, swimmers and kayakers, and a space for public events. A few years ago, city planners recognized that the site was regularly experiencing erosion and flooding. They knew that as the seas continue to rise due to climate change, these events will become more frequent. Something needed to change.

Enter the Washington Coastal Resilience Project (WCRP). Led by Washington Sea Grant (WSG) and funded by the NOAA Regional Coastal Resilience Grants Program, the three-year effort aimed to rapidly increase the capacity of Washington state communities to prepare for natural hazards, such as the erosion and flooding that Owen Beach was experiencing. Since the project launched in 2017, the WCRP team has improved risk projections, provided better guidance for land-use planners, strengthened capital investment programs for coastal restoration and infrastructure, and made critical information easier for everyone to access. Now, the project is wrapping up; yet, WCRP's end is really just the beginning, as communities across coastal Washington are continuing to use the tools and information that resulted from the project, helping them to prepare and become more resilient.

WCRP was a close collaboration among WSG, the Washington State Department of Ecology, UW's Climate Impacts Group (CIG) and The Nature Conservancy, plus ten additional partners. "We are also indebted to the NOAA Office for Coastal Management West Coast Region, which provided valuable technical and administrative advice to the project team," says Paul Dye, project lead and WSG program strategist. In 2019, the UW recognized the efforts of the WCRP team by awarding them with the College of the Environment Community Impact Award.

Owen Beach Park is a prime example of the project's community impact. In 2017, Marty Stump, Metro Park Tacoma's deputy director of planning and development, and consultants from SiteWorkshop approached the WCRP team about the deteriorating site. Metro Park had received a grant to restore and rebuild the park, and Stump wanted to consider sea level rise in their planning process so the park could be functional for another 100 years.

Nicole Faghin, coastal management specialist at WSG, worked closely with Metro Park's staff, drawing upon the many tools and data produced by the WCRP team to incorporate the best science available on sea level rise. Stump says they learned much from Faghin about storm surge, wave impacts, and particularly sea level rise probabilities. "The sea level rise planning we did with Washington Sea Grant and the WCRP team elevated the conversation around resilience and sustainability — and reset our plans for an entire park," Stump says.

Working on Owen Beach with Metro Park Tacoma was just one example of WCRP's many community efforts. "WCRP was one of the largest state-wide projects for WSG in the past four years, and remarkable for the large number of partners that collaborated, many for the first time," Dye says.

WCRP produced a number of publications and online content to make it easier for coastal communities in Washington to incorporate sea-level rise considerations in their policies, plans and development projects. This included a major new assessment of sea level rise led by WSG's Ian Miller and CIG's Guillaume Mauger. This assessment, for the first time, integrated vertical land motion into sea level projections for all of Washington's shorelines. The team also published *Extreme Coastal Water Levels in Washington State: Guidelines to Support Sea Level Rise Planning*, which provided further guidance for planners and engineers addressing critical infrastructure and community safety concerns, and a variety of "how to" guides for implementing the data. These and other useful documents are available on the Washington Coastal Hazards Resilience Network's newly designed website.

Today, local jurisdictions are continuing to incorporate these WCRP materials into coastal planning projects, including the state's largest county. King County recently attributed WCRP's work with helping in the development of regulations related to sea level rise for its Comprehensive Plan. The WCRP team also recently assisted the Island County Planning Department with developing a strategy for addressing sea level rise in the county's shoreline master program and a framework for community-based resilience planning.

As for Tacoma's Owen Beach, Stump points out, "The park is seen as a place that the City is willing to invest in for the future, our future. And, although it took longer

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Though the initiative is wrapping up, the Washington Coastal Resilience Project will continue to help communities prepare for shoreline hazards for years to come



FIELD NOTES



Melissa Watkinson, previously a WSG social scientist, transitioned into a new role: the equity, access and community engagement lead. Watkinson has been a leader of the DEI workgroup since it was founded two years ago. “It has been an honor to lead WSG in the beginning phases of recognizing our responsibility in advancing DEI,” she says. “I am excited to shift into a position that is formally recognized and responsible for leading the organization toward becoming a place where diversity is valued, people feel welcome and included, and our efforts and programming are equitable.” This position is the first of its kind within the broader Sea Grant network.

WSG welcomes several new staff. The leadership team expanded, hiring **Sean Macduff** as the assistant director for community engagement and **Wei Ying Wong** as the assistant director for science and technical assistance. In addition, **Brandii Holmdahl** and **Nicole Naar** joined the outreach team as a fisheries specialist and an aquaculture specialist, respectively. Welcome aboard!

WSG announced the 2020–2021 WSG Hershman Fellows: Henry Bell, Emily Buckner, Elise Lasky and Dorothy Mulkern. They will be working at the Washington Department of Ecology, the Pacific Northwest Crab Research Group, and the Port of Seattle. This year’s WSG Keystone Fellow is Andres Sheikh, who will be working at the Puget Sound Partnership. Sam May was selected as a National Marine Fisheries Service–Sea Grant Fellow for his research on genomic techniques; he will be investigating the fitness effects of processes such as inbreeding in sockeye salmon. The Knauss Fellowship finalists from WSG this year are Katy Dalton, Megan McKeown, Max Showalter and Hally Stone; they will be placed in federal government offices in Washington, DC. Congratulations to all!

The WSG diversity, equity and inclusion (DEI) workgroup is thrilled to have published the 10-Year DEI Roadmap. The document outlines 13 goals that address the work and people who make up WSG, with strategies that are designed to achieve the outcomes consistent with each goal. A special kudos and thank you to the Roadmap authors: **Melissa Watkinson** (equity, access and community engagement lead), **Karen Morrill-McClure** (computer systems administrator), **Nicole Faghin** (coastal management specialist), **Melissa Poe** (social scientist) and **Kate Little** (deputy director).



MARINE PARASITES ON THE RISE

The abundance of a type of worm commonly found in sushi has dramatically increased

FROM WARMING TO ACIDIFICATION AND SEA

LEVEL RISE, the world's oceans have undergone a frightening amount of change over the past few decades. In a recent study, ecologists found yet another shifting factor, one that's sure to give more people the heebie-jeebies: there has been a 283-fold increase in the abundance of "sushi parasites" over the past 40 years.

This parasite study, funded by Washington Sea Grant, was led by Chelsea Wood, an assistant professor at the University of Washington School of Aquatic and Fishery Sciences who has dedicated her career to studying these types of creepy-crawlies. She and her team found a sharp increase in the abundance of anisakid nematodes, a type of parasitic worm that infects fish as part of its life cycle. They accomplished this by sifting through the scientific literature, which provided snapshots of anisakid abundance at different times. The striking results, which have implications for both human and marine mammal health, were published in the journal *Global Biology Change* this past spring.

The original goal of this study was to better understand the human health risks of eating raw and undercooked seafood. Anisakiasis, the sickness caused by eating anisakid-infected fish that haven't been properly prepared through a deep freeze or thorough heat, is thought to account for more than a third of food poisoning episodes associated with seafood. Wood says salmon is probably the biggest culprit in the United States. To help sushi lovers eat their nigiri without worry, Wood and her team set out to investigate the patterns behind the presence of the worms. "We don't want people getting sick or being turned off of seafood if they don't need to be," Wood explains. If the researchers found that anisakids were more likely to occur in, say, certain areas or during certain times of the year, perhaps fishermen, seafood distributors and restaurateurs could use this knowledge to avoid those locations and times.

The researchers began a meta-analysis on a total of 123 scientific papers that had been published between 1967 and 2017, most of which were related to *Anisakis* species (about a third were related to *Pseudoterranova* species, another type of parasitic worm). This was the first time anyone had assessed long-term change in these parasites at a global scale. A total of 56,778 fish were examined across all the studies they analyzed, which resulted in finding a total of 446,615 anisakids. Through a meta-regression model — a method for conducting a quantitative survey of existing scientific literature — the researchers detected a substantial increase in the number of *Anisakis* species worms over the 50-year period. (The relative number of *Pseudoterranova* species remained stable throughout this same time.)



These findings prompted the researchers to pivot from their original focus in order to write the recently published paper about the change in global abundance. "The most exciting thing about this paper is that no one knew that this major global change was happening until we dug into the historical resources," Wood explains. "It really shows the power of historical ecology to find changes that would otherwise be too gradual for a person to pick up on."

While anisakidosis in humans usually poses more of a nuisance than a severe health threat, the impacts can be more serious to marine mammals. The realization that anisakids have increased so dramatically over the past few decades could shed new light on our understanding of why some marine mammal populations, such as the southern resident killer whales, are struggling. "These parasites live for a long time in the gut tracts of marine mammals," Wood says. "Think about the marine mammal problems that we're having right now — they're all emaciated." Which is to say that the issue for the southern residents might not only be a lack of food, it could also be that the whales have increasingly had to share the food they've already eaten with the critters inside of them.

That's for future research to determine, and Wood's lab is already on the case. In the meantime, Wood doesn't want her findings to keep readers from eating seafood — she insists that she still eats sushi all the time. "Seafood processors and seafood chefs remove the worms and are generally really good at it," she says. If you're still worried about it, she recommends cutting each piece of sushi in half to take a peek yourself, as "the worms are big and easy to see." It may sound gross, but for a lot of Pacific Northwesters, it's a lot less scary than the idea of giving up salmon. ✓



"The most exciting thing about this paper is that no one knew that this major global change was happening until we dug into the historical resources."
— Chelsea Wood



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to plan (because of added sea level rise considerations}, at the end of the day, the construction costs will not result in increases. In fact, we are adding green spaces that are less expensive to build than hard cement structures, plus they are more aesthetically pleasing.”

The three-year WCRP grant was the appetizer to what will be a full menu of programs led by WSG over the next few years to address coastal resilience in Washington state. “Among the ideas in the works are a dedicated staff person on the coast working on coastal resilience projects, a multi-year resilience package proposed to the State Legislature, and a plethora of projects along the coast that support this vision into the future,” says Russell Callender, WSG director. “This grant is just the first stepping-stone in a series of coastal hazard resilience efforts with partners at UW Climate Impacts Group and Washington State Department of Ecology.”

The WCRP effort has set the bar high, enhancing resilience to coastal hazards by improving the coordination of research, outreach and technical support in Washington state.

That is good news for shoreline sites in Washington. Thanks to the WCRP team, those communities now have guides and examples to follow. As Stump says, “This winter, Owen Beach will become a more resilient space, as well as a more sustainable, natural park, which will serve as a model for 100 years to come.”

ECONOMIC DASHBOARD • CONTINUED FROM PAGE 3

was included in an updated request letter that NMTA sent to the governor’s office. By that evening, boat dealerships were a confirmed part of phase one.

The Dashboard is still a work in progress, according to Decker. Much of his time is spent inputting data, such as historical records of fishing data, and building new tools that are specifically focused on marine and coastal issues. The fishing and shellfish industries have asked for industry-specific tools also, which may be the next addition to the Dashboard.

Ultimately, the Dashboard is changing the way communities and organizations access economic data. And, it is fast and affordable. It makes data available on a more equitable basis by offering free analysis tools. Anyone can use it, from individuals seeking a place to live to state and even national organizations. It is information for all, open and ready to help people learn about their communities and more effectively tell their story. All they need to do is start by asking a question.