



confluence

Promoting discovery, understanding, and resilience for Oregon coastal communities and ecosystems

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Interns aim to help Oregon companies reduce waste, save money

By Tiffany Woods

AN INTERNSHIP PROGRAM IS PROVIDING companies in Oregon with ideas for how they can help the environment and their bottom line.

Launched in 2017, the Oregon Applied Sustainability Experience program is organized by Oregon Sea Grant and the Oregon Department of Environmental Quality (DEQ). Current and recent college students in Oregon receive a \$5,000 stipend from the Environmental Protection Agency and are matched with businesses to help them conserve water and energy, keep waste out of landfills and waterways, and save money.

The interns spend their summers up to their elbows in spreadsheets, crunching numbers and calculating carbon emissions and energy savings. They interview employees, study the lifecycles of products, and tour manufacturing and processing facilities. At the end of 10 weeks, they offer recommendations for ways to reduce pollution, and they tally up what that could mean for the environment and the companies' pocketbooks.

The first cohort interned at five companies in Portland, Eugene, Albany, Hermiston and West Linn. If those businesses were to implement the interns' recommendations, each year they could save nearly \$900,000, reduce water use by 60 million gallons, and decrease solid or hazardous materials by 8.5 tons, said Lisa Cox, a toxics reduction analyst at the DEQ.

One of those companies is Widmer Brothers Brewing, which implemented its



Anika Sarkar interned with Knife River. She calculated the environmental impact associated with the production of some of its concrete mixes. She took into account factors such as how far raw materials traveled and how much electricity and water were used to produce the mixes. (Photo by Tiffany Woods)

intern's recommendations for preventing expensive-to-treat byproducts from the brewing process from going down the drain. With help from Alan Haynes, who graduated from Oregon State University's School of Chemical, Biological and Environmental Engineering in 2018, the brewery has reduced total suspended solids in its wastewater by over 60 percent and saved more than \$150,000 a year. As a result, it won an award from the National Pollution Prevention Roundtable in 2018.

Last summer, eight interns were selected from a pool of about 60 applicants. Here's a snapshot of what they accomplished:

The interns interview employees, study the lifecycles of products, and tour manufacturing and processing facilities.



Emily Hodges tours a brewery during her internship with the Craft Brew Alliance. (Photo by Emily Hodges)

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Jake Price, an environmental engineering student at OSU, interned at Boeing's Portland operations. He located a company that may be able to recycle the facility's nonhazardous dust from sandblasted glass beads and steel shot, potentially resulting in 84 fewer tons of waste going to the landfill each year. In another project, he calculated that by using a new nonhazardous sealant on its 777X jet, the Portland plant could reduce its hazardous waste by 1.45 tons a year.

Emily Hodges, a 2018 graduate of OSU's College of Liberal Arts, helped the Craft Brew Alliance analyze carbon emissions from the production of a variety of beers at three of its breweries. To reduce emissions, she recommended that the companies buy glass bottles and hops from vendors that are closer to the breweries.

Jensen Perrick, who is studying environmental science and urban development at Portland State University, was paired with Columbia Sportswear Co. She estimated how much money the firm could save if it were to install LED lights and occupancy sensors in the parking lot of its headquarters in Portland and LED lights in 19 stores slated for remodels in 2018 and 2019.

Ashley Baker, a master's student in journalism at the University of Oregon, and Brit Swann, who graduated from OSU with a master's in chemical engineering in 2017, worked with Northwest Green Chemistry. By surveying users of 3D printers in Oregon, they found that the 51 respondents throw out about 1,700 pounds of plastic each year.

Anika Sarkar, a master's student in OSU's School of Civil and Construction Engineering, interned with construction materials company Knife River. She helped create labels that disclose the environmental impacts – such as energy and water use – associated with the manufacturing of 479 concrete mixes at four plants.

Maya Vigil, who is majoring in Spanish and environmental studies at the University of Oregon, was paired with Nossa Familia Coffee and the Oregon Coffee Board. She created a best-practices guide that coffee roasters and cafés can use to decrease their carbon footprint and waste, as well as energy and water usage.

Sharlee Hughes, a geography student at PSU, calculated that if New Seasons Market donated 10 percent of its most commonly discarded foods each month, it could reduce monthly carbon emissions by an amount that's equal to a vehicle driving about 4,400 miles. This is because the food wouldn't be releasing methane gas in landfills.

Additional reporting by Rick Cooper.



The 2018 interns show off their Oregon Sea Grant hats. From left to right are: Sharlee Hughes, Ashley Baker, Maya Vigil, Jensen Perrick, Jake Price, Emily Hodges and Anika Sarkar. Not pictured is Brit Swann. (Photo by Sarah Kolesar)

PSU researchers find suspected microplastics in Oregon oysters

By Tiffany Woods

RESearchers at Portland State University have found what they think are tiny plastic fibers in about 120 Pacific oysters from the Oregon coast.

On average, 11 particles were found in each oyster, and nearly all were microfibers, said Britta Baechler, a PSU doctoral student on the Oregon Sea Grant-funded project.

“We don’t know if the levels we found would have any impact on the health of these oysters or the people or animals that eat them,” she said, adding that there are no regulations on what amount of microplastics is safe for either sea life or humans to eat.

The researchers are referring to the particles as “suspected microplastics” until they can analyze their chemical composition to determine if they are in fact plastic.

At less than 5 millimeters, microplastics can take the form of tiny exfoliating beads in cleansers. Also, foam packaging and plastic bags and bottles can disintegrate into small particles. And when people wash synthetic clothes, fibers can go down the drain and can end up in waterways and the ocean. That’s because wastewater treatment plants do not remove microplastics from the water.

Microplastics are worrisome because chemicals can adhere to them, and those chemicals might harm the organisms that eat them, Baechler said. Additionally, she noted that one study found that polystyrene microparticles impaired reproduction in Pacific oysters, and another study found that they damaged the DNA of clams.

In April 2017, Baechler purchased 10 Pacific oysters from each of six growers at the following sites: Tillamook Bay, Netarts Bay, Yaquina Bay, Winchester Bay, North Bend and Coos Bay. She did the same in July 2017.

The oysters were then taken to marine ecologist Elise Granek’s lab at PSU where they were measured, weighed, shucked and frozen. They were later dissolved in a chemical bath. The process leaves a clear liquid that contains only sand, small shell frag-



Plastic debris, like this trash at Clatsop Beach, can disintegrate into tiny particles that can end up in the ocean and be ingested by oysters. (Photo by Tiffany Woods)

ments and any plastics that may be present. Researchers analyzed the liquefied remains under a microscope.

They found between one and 42 suspected microplastics in each oyster. The amount varied depending on when the oysters were purchased. The ones from April contained an average of 14 particles versus an average of eight for the oysters from July.

Baechler wonders if it’s because heavier rains in the spring wash more water, and possibly more plastics, down storm drains and into rivers and the ocean. Or perhaps, she said, it’s because people launder different clothes in the spring than in summer.

Researchers also found that the fibers ranged in length from 0.1 millimeters to 6.1 millimeters. The average length was 1.2 millimeters, which is almost the thickness of a dime. Roughly three-quarters of the fibers were colorless, and 17 percent were blue. The average number of suspected plastics per gram of oyster tissue was about the same at each location.

Because microplastics are in the air and on surfaces, Baechler said that some of the plastics in the samples may actually have come from the lab. Researchers sought to prevent this by wearing all cotton and rinsing equipment three times.

They compared their data to findings from a few studies of microplastics in clams,

Microplastics are worrisome because chemicals can adhere to them, and those chemicals might harm the organisms that eat them.

The researchers conducted a similar study on razor clams but are still analyzing data.

mussels and oysters in a handful of countries. When comparing the number of microplastics per gram of tissue, they found that Oregon oysters had fewer microplastics than bivalves studied in China and western Canada but not Germany or Belgium.

“Ultimately, we’re hoping that this study brings awareness to Oregonians and even

visitors to the state of Oregon that plastics that we use in our daily lives make their way into the environment,” Baechler said in a four-minute video that Oregon Sea Grant produced about the research.

The researchers conducted a similar study on razor clams they dug up at nine sites on the Oregon coast but are still analyzing data.

Tours show consumers how to buy seafood from fishermen and markets

By Tiffany Woods

OREGON FISHERMEN AND SEAFOOD sellers are reaching new clients, thanks to free, guided tours of docks and markets that demystify the process of buying seafood.

The initiative is called Shop at the Dock and is run by Oregon Sea Grant and the Oregon State University Extension Service.

They’ve been offering tours every summer in the coastal town of Newport since 2014. In 2017 and 2018, a slightly altered version of the event expanded to Warrenton, where attendees toured the docks, ventured to the Skipanon Brand Seafood cannery or Warrenton Deep Sea Market, and learned where to buy seafood between Astoria and Cannon Beach.

Also in 2018, tours debuted in Garibaldi. Participants visited the port and the Fishpeople Seafood Market, met fishermen and learned to make smoked tuna tacos from the chef of the Garibaldi Portside Bistro. More tours are planned for Garibaldi in 2019, including outside the summer.

Joe Phillips is one of the fishermen who sold seafood

during the tours in Newport. He said the event builds long-term relationships with customers. He’s seen people return to buy halibut or come back the next summer to buy albacore after they’ve studied up on how to can it.

“You definitely see a boost in your profits,” he said.

Participants in Newport spent a total of about \$20,000 during the tours in 2016 and 2017 combined, said Kaety Jacobson, a former fisheries specialist with Oregon Sea Grant and Extension who led tours there.

In Warrenton in 2017 and 2018 combined, participants spent nearly \$800 on seafood plus about \$2,800 on lodging, meals, entertainment and other items, said Amanda Gladics, a coastal fisheries specialist with Oregon Sea Grant and Extension.

More than 1,200 people have participated in all the tours since 2014, according to organizers.

During the tours, attendees learn what seafood is in season, how it’s caught, whether it’s sustainable, and how to identify and buy high-quality fish and shellfish. They also learn about the different fishing boats, and they take recipes home with them.

“I didn’t know we could shop at the dock,” one participant wrote in an evaluation after a tour in 2015. “Now I know to look for signs [at the docks] to know what is available and where.”

The program started after a survey found that consumers were intimidated by the process of buying seafood at a dock, Jacobson

More than 1,200 people have participated in the tours since 2014.



Joe Phillips, who sold seafood during the tours in Newport, shows off an albacore tuna during Shop at the Dock. (Photo by Lynn Ketchum)

said. Those who did buy seafood directly from fishermen had learned to do so from a friend or family member. So Oregon Sea Grant and Extension decided to become that “friend” and teach others, she said.

U.S. Sen. Jeff Merkley recognized Shop at the Dock at a town hall meeting in Newport when he awarded Jacobson a flag that had flown over the U.S. Capitol.

“The Sea Grant program is a textbook example of a smart and targeted investment in local communities that helps create economic growth,” he wrote in a Facebook post following the meeting.

For those unable to attend the tours, they can watch videos of Jacobson explaining how to buy fish on the dock (youtu.be/2l-spr6Uh_Dk) and at a grocery store (youtu.be/ELZ3EvVVzXc).



Amanda Gladics, a coastal fisheries specialist with Oregon Sea Grant and the Oregon State University Extension Service, teaches the public about the fishing industry at a Shop at the Dock tour in Warrenton. (Photo by Stephen Ward)

More information about Shop at the Dock is in a video at youtu.be/dGhqF7a-4Q.

Tourism expert helps outdoor recreation companies on Oregon coast

By Tiffany Woods

MILES PHILLIPS’ JOB IS TO HELP coastal tourism businesses be successful, particularly those involved with outdoor recreation.

Hired in 2016, the tourism specialist with Oregon Sea Grant and the Oregon State University Extension Service has been busy letting them know he’s here.

“One of the biggest things I’ve been doing,” he said, “is creating awareness in the tourism industry about Oregon Sea Grant and Extension and saying, ‘There’s new help available.’”

That new help includes trainings. Phillips helped create the curriculum for a course that helps guides enhance customers’ experiences. Called the Guide and Outfitter Recognized Professional program, or GORP, it consists of in-person workshops and four self-paced, online lessons.

Participants come away with knowledge about Oregon’s coastal towns, rivers and mountains and its timber, dairy and fishing industries. They also learn to identify 101 plants and animals. Other topics include customer service, group management and

best practices for being safe during outdoor adventures. The instruction is based off voluntary guidelines set by the Adventure Travel Trade Association. Thirteen guides completed the full GORP online program during the first offering in 2018. A second cohort started in January 2019.

According to a report by Phillips, as of July 2017 more than 1,300 people were registered as outdoor recreation guides through the Oregon State Marine Board, the entity that allows people to work as paid guides in the state. The Oregon coast is home to about 130 of them, he said.

With an eye toward grooming the next generation of guides, he also helped create the curriculum for a new 4-H club in North Bend to teach high school students about entrepreneurship in the context of being an outdoor guide. They develop a short business plan, meet guides and go on outings.

At the request of the Bay Area Chamber of Commerce, Phillips helped develop the curriculum for a one-hour, online training for employees and volunteers who interact with tourists in Coos Bay, Charleston and

Phillips helped develop the curriculum for a one-hour, online training for employees and volunteers who interact with tourists in Coos Bay, Charleston and North Bend.



Miles Phillips is a coastal tourism specialist with Oregon Sea Grant and the OSU Extension Service. He is based in Coos Bay and Bandon. (Photo by Lynn Ketchum)

Phillips helped organize a free workshop in Coos Bay in January to teach businesses how to enhance their use of social media.

North Bend. These “community ambassadors” learn to share information about local tours, cultural activities, wildlife, food and lodging. More than 100 people have enrolled, he said.

Wanting to give tour operators a better understanding of how visible their websites are, he enlisted the help of two interns – through Oregon Sea Grant’s Summer Scholars program – who analyzed Google search rankings for coastal companies that offer whale-watching, salmon-fishing and kayaking tours. “We found that many guides are not effectively marketing themselves online,” he said.

The interns also compared the companies’ prices. Of the 35 salmon-fishing companies that appeared in their searches, they found that 10 made the mistake of not including information on pricing. “If potential customers are searching online and don’t see a price, they’re not likely to call,” Phillips said.

He also produced a report about the workforce training needs of coastal businesses and organizations with an interest in tourism. It was based off findings from the Oregon Coast Visitors Association’s survey of representatives of hotels, restaurants, retail stores, guide companies and various organizations. About a third said it was “extremely difficult” to find good employees. The most desired trainings were in customer service, housekeeping, human resource issues and marketing. Some also expressed a need for training in social media. As a result, Phillips helped organize a free workshop in Coos Bay in January to teach businesses how to enhance their use of social media.

Phillips is now busy planning a national conference on sustainable tourism and outdoor recreation set to take place in Astoria this Oct. 8–11.

As Phillips looked back at his accomplishments, he said, “We’re really carving out a significant role in the business and workforce training element. We’ve done a lot, but there’s a lot more to do.”

6 Oregon salt marshes have stayed ahead of rising sea, study says

By Tiffany Woods



(Photo by Laura Brophy)

AHANDFUL OF SALT MARSHES IN Oregon have been gaining height at a rate that has outpaced the rising sea – a finding that bodes well for their ability to survive and store carbon amid a changing climate, according to research by Oregon State University.

With funding from Oregon Sea Grant, scientists studied how much sediment from rivers had settled in salt marshes in seven of the state’s approximately two dozen major estuaries. They also determined how much

the sea was rising, if at all, in those estuaries; how much carbon was in the marsh sediments; and how fast sediment and carbon had accumulated. They wanted to know how a rising sea and sediment from rivers might have affected the amount of carbon stored in the marshes since about 1900.

The researchers collected 62 sediment cores from marshes in Youngs, Nehalem, Tillamook, Netarts and Alsea bays and the Salmon River and Coquille River estuaries. They found that except for the marsh in Al-

sea Bay, the other six marshes had managed to accumulate enough sediment over the past 100 years to outpace the rising ocean. They do not yet know why the marsh in Alsea Bay lags behind the others.

“Because our findings show that abundant sediment is supplied from rivers and creeks in six of these marshes, we predict that these six marshes will continue to accumulate sediment at a rate that will keep them above sea level. In other words, they won’t drown,” said Erin Peck, a doctoral student on the project and a 2018-19 Robert E. Malouf scholar funded by Oregon Sea Grant. “That’s great because they will continue to bury carbon.”

Peck explained that as the ocean rises, more carbon-laden silt from rivers can pile up in the dense vegetation of salt marshes. The mud in the wetlands traps the carbon and doesn’t allow it to decay and be released into the air as carbon dioxide, which is a greenhouse gas. In addition to locking up carbon, marshes are also important because they provide habitat for salmon and birds, keep coastal waters clean, and offer recreational opportunities.

To conduct their research, Peck and her crew stood on an orchard ladder and pounded PVC tubes up to nine feet into the wetlands with a sledgehammer. Sometimes they were up to their knees in murky water; other times they worked in gooey mudflats and grassy fields. They’d inch the tubes out of the ground with a truck jack. Back at the lab, they’d split them open. The cores were like a timeline, with the newer mud at the top and, in some cases, sediment from a massive earthquake and tsunami in 1700 farther down.

The researchers found that the rate at which the ocean rose impacted the rate at which sediment accumulated, and that the rate at which sediment accumulated significantly influenced the rate at which carbon was stored.

“These linkages lead us to believe that as sea level rises, carbon burial rates will probably also increase,” Peck said.

She found that marshes in the Salmon River Estuary and Nehalem Bay had buried the most carbon per square meter each year.

“Areas with higher rates of sea-level rise and sediment accumulation, like the Salmon River Estuary and Nehalem Bay, are doing the best job at sequestering carbon,” she said.

Peck also found that the rates at which carbon was buried in each of the seven marshes were similar to the average for various marshes around the world.

Rob Wheatcroft, a sediment expert in OSU’s College of Earth, Ocean, and Atmospheric Sciences, and Laura Brophy, the director of the Estuary Technical Group at the Institute for Applied Ecology in Corvallis, are the other researchers on the project.

Except for the marsh in Alsea Bay, the other six marshes had managed to accumulate enough sediment over the past 100 years to outpace the rising ocean.



Erin Peck, a doctoral student at Oregon State University, pounds a PVC pipe into the Alsea Bay marsh while OSU graduate student Mike Sepp watches. (Photo by Rob Wheatcroft)

Diverse perspectives are represented at state capitol

By Bryn Hudson

MY FIRST MONTHS IN THE GOVERNOR'S Natural Resources Office have been eventful. I've found that there's a committee, council, board, commission, or task force for just about everyone! It's amazing to see the collaborative process of juggling and satiating groups with different agendas regarding the same topic.



Bryn Hudson stands in front of Oregon's capitol on the second day of the 2019 legislative session. Funded by Oregon Sea Grant, she is a 2018–19 Natural Resource Policy Fellow with the Governor's Natural Resources Office. She has a master's degree in environmental science and management from Portland State University. (Photo by Bryn Hudson)

Gov. Kate Brown's recommended budget has been a major discussion item, primarily the proposed creation of the Oregon Climate Authority (OCA). It would absorb the Oregon Department of Energy, assume the operations of the governor's Carbon Policy Office, and acquire greenhouse gas emission tracking and reporting tasks at the Oregon Department of Environmental Quality (DEQ). It would also provide a marketplace for Oregon's Carbon Cap and Invest program (should that legislation pass in 2019).

I observed budget discussions in different contexts; the Ocean Policy Advisory Council (OPAC) and the Environmental Justice Task Force (EJTF) come to mind. OPAC appeared to be concerned

with high-level topics and big solutions. Its primary interests were in how the governor plans to address ocean acidification and her position on future offshore oil and gas legislation. Because the words "ocean acidification" were not in the budget, it was important for the Governor's Office to communicate that addressing ocean acidification is a priority and that the proposed OCA and Carbon Cap and Invest program seek to tackle the root of the problem, which is global climate change. The council made it clear that they were going to recommend that the governor support the permanent ban on offshore oil and gas legislation.

In the EJTF meeting the following week, I was surprised that the task force was mostly interested in the funding allocated to eliminating the DEQ's water quality permit backlog. They asked if minority communities, particularly Latino communities, had been disproportionately impacted by this backlog and how DEQ planned to prioritize clearing the queue. They were also curious about how DEQ was handling air-quality violations following a fire at an auto-dismantling facility. Members of the EJTF were primarily concerned with local issues impacting specific communities, rather than the overarching issue of climate change.

The main thing I gathered during my interaction with these two groups is that the environmental issues that a group deems as important depend on the scale and distribution of the problem. This bit of knowledge is important to consider when interacting with and advocating for each group, and also when it's time for the governor to appoint new members. I've found that every commission, board and task force provides a place for each stakeholder group to ensure their interests are advocated for in the natural resource policy-making process. Each provides a unique perspective to a problem that the collective aims to solve.

Read more about Bryn's work and that of other Oregon Sea Grant-supported students at blogs.oregonstate.edu/seagrantscholars.

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