ENVIRONMENTAL SCIENCE & MANAGEMENT

Discovery Starts Here

DO YOU SWIM IN THE WILLAMETTE? PSU RESEARCHERS EXPLORE WHY AND WHY NOT

By Summer Allen

Beachgoers enjoying a sunny Portland day along the Willamette (photo courtesy of Olyssa Starry)

Whether it is safe to swim in the Willamette—and when—is a frequent topic of debate for Portlanders, but little is known about how people make decisions about going in the river. A pilot study by Portland State researchers is investigating how Willamette River water quality changes over time and how beachgoers decide when to use the river.

Thanks to a $1.4 billion investment in the Big Pipe Project completed by the city of Portland in 2011, very little sewer overflow now makes its way into downtown sections of the Willamette, and E.coli in the water has remained well within levels appropriate for recreational use. However, potentially toxic cyanobacteria "algal" blooms continue to pop up along the river—as occurred in August from Cathedral Park to Willamette Cove. Microcystin, a toxin found in the cyanobacteria, can cause symptoms similar to food poisoning in humans and can be lethal to dogs when ingested.

PSU researchers Olyssa Starry, associate professor of urban ecology, and Jennifer Morse, associate professor of environmental science and management, have teamed up with Jennifer Morace, a hydrologist with the U.S. Geological Survey, to study how people's

Join us for ESM's annual Research Colloquium and Alumni Lecture on May 23rd, 2023! This year's keynote speaker is clean air advocate and climate justice consultant Nakisha Nathan, and there will be student research posters, lightning talks, presentations, and food and drinks. We hope to see you there! See the ESM website for details.

perceptions of the water quality of the Willamette compare to actual water sample measurements and how people decide when to swim in the river. Melissa Haeffner, assistant professor in environmental science and management, consulted on the project.

This pilot study is funded by a seed grant from the USGS-PSU Partnership (UPP), a longstanding collaboration between Portland State University and the U.S. Geological Survey (USGS).

"Catalyzing joint research is one of the UPP's primary activities," says Alison Hopcroft, partnership manager for the UPP. "Our seed grant program is a great example of collaborative research between our institutions that also engages students in the scientific process."

Both Starry and Morse have experience studying stormwater management—practices that prevent pollution from entering our rivers and lakes—and this pilot study is giving them an opportunity to look at the effects "downstream" of this work.

"We've been working on all these things in the landscape that you can do to clean the water so that people can ultimately swim in local lakes and rivers," says Starry. "Occasionally, it's good to look up and say, 'is anything we're doing making a difference?'"

USGS hydrologist Jennifer Morace collects sediment samples along the Willamette with PSU student researchers (photo courtesy of Olyssa Starry)

Sediment sample collected from Poet's Beach (photo courtesy of Olyssa Starry)

To see how water quality in the Willamette has changed and continues to change, the research team is synthesizing and analyzing historical water quality data collected by other organizations and taking their own water samples to measure microcystin concentrations at different points along the river. The team is also collecting sediment samples that Morace will analyze with the technical equipment in her USGS lab to look for metals and emerging contaminants.

Starry and Morse are looking for relationships between microcystin concentrations and other environmental variables like dissolved oxygen, nutrient concentrations, and water temperature. The goal is to see if there are variables that can be used to predict when harmful cyanobacteria algae blooms are likely to show up.

The team is focusing their research on six popular recreational sites along the Willamette: Willamette Park, Poet's Beach, Sellwood beach, Audrey McCall beach, Kevin Duckworth dock, and Cathedral Park. Besides collecting water samples at these sites, the researchers are also surveying beachgoers about how they spend their time near the Willamette and how they evaluate when it is safe to go in the water.

Morse says she's been surprised by how enthusiastic people have been when questioned about their experiences with the river.

"Some people who have been swimming for years at these beaches have a really strong emotional connection to this activity in these places," she says. "This is definitely, in terms of my career, the project where I've had the most direct interaction with people being passionate about what I'm doing. That's pretty great."

PSU students Arden Goldberg, Kaisa Holt and Michelle Hesek helped with the project by surveying beachgoers and taking water samples, all while gaining valuable job skills.

"They're learning about communication, working as a part of a team, managing logistics," says Morse. "These are really important professional skills that transfer to any discipline."

After they finish analyzing their results, the researchers plan to share their findings with community partners the Human Access Project, which runs the Big Float, and Oregon Health Authority. They hope to have preliminary results this spring.

PSU student Michelle Hesek (photo courtesy of Olyssa Starry)

"We hope that this project is just the beginning of quite a bit more joint USGS-PSU Willamette River research in the future," says Hopcroft. "The Willamette is a critical urban waterway, and UPP researchers are well-placed to study it." Hopcroft notes that the USGS named the Willamette River Basin its fourth Integrated Water Science basin in March, which means it is being prioritized as a site of in-depth scientific study.

Starry and Morse have already started thinking about possible follow-up studies. For starters, they want to know where the cyanobacteria algal blooms are coming from.

"There is this idea that they're coming from the Ross Island lagoon because that's where there tends to be blooms earlier and the conditions to foster those blooms, but if that were true then you would expect there to be blooms closer to Ross Island than Cathedral Park," says Morse. "So something else is going on besides just proximity to Ross Island."

A potential way to look at this could be to sequence the DNA of the cyanobacteria in different parts of the Willamette to see which populations of bacteria are related to one another and which are not.

Other insights could come from looking at the geomorphology of different beaches to see if some of them are more likely to host blooms due to having slow moving water or other characteristics.

Learning more about how cyanobacteria algal blooms form and spread in the Willamette could one day lead to more detailed guidance for Portlanders eager to splash about in the river.

"We might have policies that better inform the swimmers about the water quality more frequently," says Starry. And that may make more Portlanders feel comfortable taking a dip.

From the Department Chair

Dr. Max Nielsen-Pincus

The 2022-2023 academic year is coming to a close, and it's been a busy year, but it's not over yet! In this note, I share two big curricular changes in ESM, highlight some of the activities and events that have occurred this academic year, say goodbye to a few wonderful faculty and staff members who have departed, and reflect on our future at PSU. In the fall we welcomed another cohort of new majors and graduate students, and this spring we say goodbye to our graduates and welcome them as alumni. These comings and goings are a constant in academia. I hope that wherever you are in this cycle, this newsletter brings you some connection to the Environmental Science and Management department at PSU.

This year's rollout of two curricular revisions is substantial news. The first is the biggest redesign of the Environmental Studies degree since it was established in 1996. The new Environmental Studies degree, which began enrolling students in the fall, aims to serve students interested in understanding environment-society interactions with a scientific foundation in ecology and environmental science. Students can choose upper division electives from several focal areas including Environmental Justice and Humanities, Environmental Policy and Governance, Resource Management and Sustainable Systems, and Interdisciplinary Skills. The degree is designed to help prepare students seeking careers in environmental justice, policy, or governance, as well as those seeking to contribute to positive socio-environmental change.

The second big curricular change is to our Professional Science Masters (PSM) degree; and although the change isn't finalized yet, we hope to be able to start recruiting new students to the program as early as next year. The revamped degree will be a collaboration various PSU programs including environmental science and management, geology, geography, and others. Students will complete two graduate certificate programs from a list including certificates in Hydrology, GIS, Geology, Conflict Resolution, Sustainable Food Systems, Emergency Management and Community Resilience, Environmental Economics, and Sustainability. A capstone project or an internship will provide a culminating experience. The aim of the new program is to attract the increasing number

Undergrad in Focus: Ruby Howard

Ruby Howard is an undergraduate in the PSU Honors College majoring in environmental science and management and minoring in sustainability. Ruby is interested in environmental management and stakeholder engagement, environmental justice, and regenerative agriculture—in practice and the enabling political, economic and cultural factors that make this approach possible. Last year, Ruby had the opportunity to explore real-world applications of her interests through the Rosenbaum Service Leaders Scholarship, where she interned for the conservation nonprofit, Willamette Partnership. Ruby was involved with the working lands conservation initiative, where she helped research and outline a certification system for white oak savanna habitat, compiled information on carbon budgets and carbon offsetting for landowners in the Willamette Valley and wrote and published a report on the barriers that Oregon farmers face in transitioning to regenerative practices.

Currently, Ruby works as the garden coordinator for the Student Sustainability Center on campus. In this role she maintains the campus gardens, coordinates the garden volunteer team, and mentors other students interested in gardening and sustainability. She is excited to continue learning alongside volunteers about gardening, as well as the environmental, climate and social justice issues surrounding food and agriculture. She is also excited to start working on her honors thesis with Dr. Melissa Haeffner, where she will explore Oregon farmworker's water values. After graduation, Ruby hopes to attend graduate school for environmental management or policy, and eventually work to promote equitable, climate-smart, and sustainable practices in working landscapes.

of graduate students interested in interdisciplinary programming, while allowing them to stack credentials from graduate certificates earned along their degree pathway. We are excited to welcome students into both new programs as we adapt to a changing future.

The work of our Association of Environmental Science Students (AESS), Alumni Association, and our winter public lecture series highlight the breadth of opportunities for building a network and professional connections in ESM. AESS seminars and social events included topics focused on snow, glaciers, and climate change; water resources, dams, and salmon; forests, wildlife, and bacteria; gaming events, social hours, and town halls on diversity, equity, and inclusion. The ESM Alumni Association hosted a Sunday get together in the fall for faculty and alumni to connect at Wayfinder Beer – a welcome break from November rain and grading. The Alumni Association and AESS partnered to put on a second annual ESM Career Week this winter that included 23 panelists across 5 events focused on career pathways and preparation, job opportunities and future job outlooks. Panelists discussed their experiences in various sectors ranging from local to federal government agencies, the private sector, to non-profit organizations. And this year's winter lecture series theme was *Water in the West*; experts discussed the state of the science, management, and policy emphasizing aquatic ecosystems in the Western US, including the Colorado River, Great Salt Lake, the Klamath Basin, and the Columbia River. I am truly indebted to the dedication and leadership of our student and alumni leaders: Emma Scott (MEM), Nani Ciafone (MS), Lydia Lyall (BS-EVSC), Clare McClellan (MEM '21), and Betty Lee (BS-EVSC '21). I also want to thank Steve Wille for continuing his generous contributions to the ESM department to support our Winter Lecture Series and other events, which aim to offer opportunities for student engagement with leading professionals and scientific experts. Without Steve's generosity, we would not be able to bring such consequential experts face to face with students and our community.

ESM is a little leaner this year after a few departures and retirements. We said goodbye last spring to Professor Bill Fish who retired after more than two decades in ESM and Civil and Environmental Engineering. Dr. Fish taught classes including *Environmental Systems I* and the *Fate and Transport of Toxics in the Environment*. Senior Instructor Sarah Carvill left PSU over the summer and returned home to California where she teaches environmental policy at University of California Santa Cruz. Dr. Carvill taught courses at PSU in *Environmental Policy*, *Project Management*, and *Environmental Impact Assessment*. Instructor Brian Turner also left PSU over the summer to begin a new position as a research scientist in the Washington Department of Fish and Wildlife Aquatic Invasive Species unit. After 22 years, Rich Miller retired as a research assistant for the Center for Lakes and Reservoirs, where he managed the Center's summer field campaigns. Emma Spadaro left the ESM office last summer to move across the country to Pennsylvania where she is pursuing her career and education in counseling. We are grateful for each of your contributions and wish you all the best in your endeavors.

As we come close to the end of the academic year, it is appropriate to reflect on ESM's future. Although there are more ESM majors this year than a decade ago, we have a smaller faculty and PSU's overall enrollment has been declining as part of a national trend. The changes have led faculty, staff, and students to ask questions about what these changes mean for hiring, curriculum, and student experience. Part of the academic cycle is transition; whether as a student entering the school, a graduate entering the workforce, or an academic program adjusting to changing demands and resources. In our case, we've started to look at the future through the lens of collaboration, and in February kicked off a new Exploratory School Initiative with several other departments. You can read more about this initiative on its website (and offer feedback). A workgroup of over 15 faculty and staff has been conducting outreach, collecting information about peer models, and gathering institutional data all to help inform a vision for what a new school might look like.

At the end of this newsletter you'll find an *ESM by the numbers* graphic. The newsletter showcases stories that intend to bring those numbers to life. The cover article highlights research reflecting on the changing nature of the Willamette River. Student and faculty highlights include Ruby Howard (Environmental Science and Honors College BS student), Nani Ciafone (MS Candidate), Hannah Smiley (BS-EVSC Alumna), and Gabriel Campbell (ESM Research Associate and Director of the Rae Selling Berry Seed Bank and Plant Conservation Program). Their stories and accomplishments are a few highlights from our numbers. Happy reading!

Graduate in Focus: Nani Ciafone

Nani is a graduate research assistant in Dr. Kelly Gleason's Snow Hydrology Lab in the Environmental Science and Management department. She is passionate about leveraging GIS and remotely sensing to quantify snow accumulation and melt trends in a changing climate.

Nani has been passionate about snow science since she joined the Mountain Hydrology Lab at the University of Colorado as an undergraduate field assistant. Her enthusiasm for the fieldwork she participated in led her to write an Undergraduate Research Opportunity Program grant, which funded her own research and an honors thesis project. Not wanting to leave the world of snow hydrology, Nani continued to graduate school at PSU immediately following her graduation.

Supported by the Army Corp of Engineers, Nani's graduate research involves using structure-from-motion photogrammetry to construct snow cover over a burned landscape. This work pushes the boundaries of snow science as this method has not been used to survey snow at such a large spatial extent, leading Nani's advisor to fondly describe the project as the 'wild west' of snow hydrology. Nani's research is conducted in a 4-person Civil Air Patrol prop plane on the flanks of Mt. Jefferson, miles deep up a forest service road on skis, and in the Snow Lab on PSU campus. While she believes snow is intrinsically remarkable, she is motivated to study snow because of the value it holds for water resources in the West. She sees snow as an invaluable but incredibly fragile resource.

Nani believes that science is nothing if not shared. As an Oregon Museum of Science and Industry Science Communication Fellow and officer of the Association of Environmental Science Students at Portland State, she regularly spends her time at the interface of academia and the public.

Career Preparation

This year AESS, the ESM Alumni Association, and the Department collaborated to host the second annual ESM Career Week in mid-February. This year's events included in-person and virtual environmental professionals roundtables, career and internship panels, and a resume writing workshop with the PSU Career Center. In total, 23 panelists from federal, state, and local governments, non-profit organizations, and the private sector joined ESM students to answer questions about career pathways, worklife, the employment outlook in their fields, and how to start a career in environmental sciences and management. Students had opportunities to meet in small groups with panelists, ask questions, and interact informally.

Panelists included representatives from the following organizations:

City of Portland
Oregon Metro
Oregon Department of Fish & Wildlife
Oregon Department of Environmental Quality
Bureau of Land Management
US Fish & Wildlife Service
US Forest Service
Air Sci
Ash Creek Forest Management
Environmental Science Associates
Mosaic Ecology
PBS Engineering & Environmental
Wolf Water Resources
Clackamas River Basin Council
Sauvie Island Center
Willamette Partnership
Institute for Natural Resources
Institute for Sustainable Solutions

Internships

Recent ESM Student Internship Hosts

Coleman Agriculture
Columbia Springs
ODFW
City of Portland
Clackamas Water Providers
Oregon DEQ
Lake Oswego Corp
OR Institute of Marine Biology
US Forest Service.

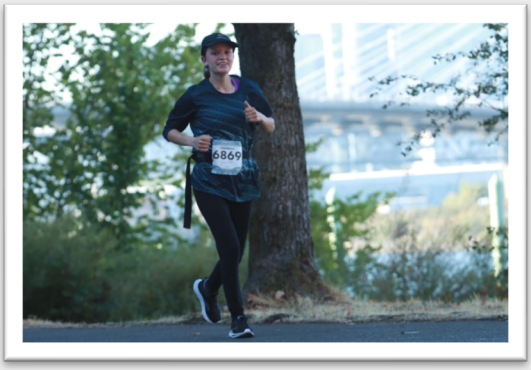
Students also earned internship credits for work in ESM labs including the Aquatic and Coastal Ecology Lab, the Environmental Biogeochemistry Lab, the Snow Hydrology Lab, and others.

For Students

Internships offer a great opportunity to gain work experience and network in your field. You can earn up to 4 400-level credits (ESM 401 or 404) that count towards your elective requirements. See more information on the ESM website, or contact a faculty member in the department.

For Potential Internship Hosts

ESM students can receive credit towards their degree from internships that provide students mentorship, practical skills and hands-on experience in the field, exposure to the work environment of your organization, and cultivation of professional contacts. A 4-credit internship equates to approximately 120 hours of work. If you believe that offering an internship might make sense for your organization, please reach out to the ESM Department Chair at maxnp@pdx.edu



Alumni in Focus: Hannah Smiley

On my way to becoming a scientist, my early experience was with Dr. Patrick Edwards as an ESM undergrad. I led groups of college and high school students to streams where we collected and identified macro-invertebrates. I also worked as a Learning Assistant for the ESM 200 series lab courses.

After graduating, I delivered pizzas for a few months before I got a job working with Dr. Eugene Foster as a Water Quality Analyst at the Department of Environmental Quality (DEQ). I worked on the Drinking Water Team and identified potential hazards to drinking water.

When my contract ended at DEQ, it was not renewed because of the Covid-19 pandemic. During this time I volunteered at the Wetland Conservancy looking for amphibian egg masses and I presented a poster at Oregon State University's Hydrophiles Conference.

It took persistence, but I got a job with Environmental Science Associates. I spent my days identifying plants or looking for special status species like Bald Eagles, Streaked Horned Larks, and Nelson's Checkermallow. When it rained, I collected stormwater and inspected construction sites at the Port of Portland (Port). One of my bigger tasks was inspecting water from their outfalls by smelling it and looking for an oil sheen. I also kept an eye out for potential hazards and contaminant spills and worked on spill response.

While working at the Port, I realized I wanted to work for a public agency. I saw DEQ post a stormwater specialist position and knew I needed to apply. After applying and two interviews, DEQ offered me the job. I am happy to use my training and skills to become a stormwater expert!

Faculty Update

Dan Bedell – Instructor

Dan has been teaching courses through the Center for Science Education since 2015. This year, he also taught field methods in environmental science, and several University Studies courses. Dan is continuing his research on community-based macroinvertebrate biomonitoring in the Puget Sound / Willamette Valley ecoregion and has also partnered with the Opal Creek Ancient Forest Center to study the impacts of the Beachie Creek fire.

Gabriel Campbell – Director (Berry Seed Bank), Aquatic Botanist (CLR), Botany Program Manager (INR), Instructor

Gabriel is starting his second year working with three non-profits associated with PSU. He works with rare plants, seeds, and invasive species and also teaches a few classes. He has an interest in applying horticultural techniques to plant conservation and restoration problems and questions. Ask him for a tour of the seed bank and greenhouse!

Catherine de Rivera – Professor

After a year-long sabbatical, Cat de Rivera is excited to return to teaching bio-invasions, science communication, environmental problem solving, and marine ecology. She spent the year doing field work, and writing grant proposals and papers, as well as serving on the Oregon Invasive Species Council and various other panels and working groups on invasions or habitat connectivity. Last spring she recieved an award from Sigma Xi Columbia Willamette Chapter for Outstanding Senior Researcher Award in Environmental Science.

Patrick Edwards – Senior Instructor, EPP Program Director

Pat is continuing his work with community groups to biomonitor stream health and evaluate the impacts of river restoration in the Clackamas and Tualatin Basins. Pat has also been busy evaluating the impact of efforts to restore rivers around the PNW. This year, he is teaching Introduction to Environmental Systems, Natural Science Inquiry and Water in the Environment.

Cody Evers – Faculty Research Associate

Cody continues work on numerous research projects examining wildfire risk in the western US. His work on firesheds served as the science foundation for the USFS Wildfire Crisis Strategy. His program to assist in spatial prioritization within natural resource planning, ForSysR, has been adopted for use by Google, Vibrant Planet, and Wildfires.org. He introduced dozens of ESM students to the language (and art) of data science in ESM 333/334, and he co-teaches a field course on the ecology and management of wildfire in Central Oregon looking at how wildfire shapes ecosystems and impacts society.

Kris Freitag – Laboratory Manager, Rae Selling Berry Seed Bank & Plant Conservation Program

Kris has managed the Seed Bank lab since 2011, with a three-year stint as Acting Director. She fulfills contracts collecting and banking seeds of rare plants for research and conservation. She also serves as Coordinator of Citizen's Rare Plant Watch, a community science arm of the Conservation Program deploying volunteers in updating rare plant population data in the field, in support of public land managers all over the state.

Linda George – Professor

Linda's term as Director of the University Studies program has come to an end, and she is now enjoying a break from teaching and service while on sabbatical. This year she has been catching up on research, writing papers, and brainstorming more ways to get undergraduates involved in research. She is also spending several months reproducing her work on neighborhood scale diesel particulate matter exposure in the Netherlands at the Institute of Advanced Metropolitan Studies, Wageningen University.

Jeff Gerwing – Associate Professor

Jeff continues to advise graduate students on research projects related to the management of forests in and around Portland. He is also continuing to revise his courses in Environmental Literacy and Forest Ecology to include more diverse perspectives and approaches.

Kelly Gleason – Assistant Professor

Dr. Gleason is PI on two large research projects launching this year, including, one for NASA to evaluate the uncertainty in snow albedo measurements in Alaskan Boreal forests over scales in space and time, and another for the USACE in western Oregon to characterize and model forest fire effects on snow hydrology relative to watershed characteristics, climate change, and rain-on-snow events. Gleason is also co-leading the Snow Albedo Strategic Implementation Plan for NASA's Alaska field and airborne campaign. She looks forward to bringing students and colleagues together through snow-water resource science exploration in the coming years.

Elise Granek – Professor

Dr. Granek continues to run the Applied Coastal Ecology Lab, mentoring undergraduate and graduate students on applied research ranging from examining the effects of contaminant stressors on marine organisms to assessing the level of knowledge and understanding Oregonians have about microplastics. This academic year, Dr. Granek was invited to speak at the Northwest Environmental Business Council Meeting, the Clean Water Conference, the Pacific Northwest Consortium on Plastics Annual Meeting, and the Oregon Marine Reserves Summit. She continues to collaborate with colleagues in state and federal agencies, at other universities, and recently, with a graduate student, has begun a collaborative project with Oregon confederated tribes.

Melissa Haeffner – Assistant Professor

Dr. Haeffner was awarded the Roy Koch Award for Sustainability Leadership and the Excellence in Sustainability Awards for both Research and Teaching. She is PI on a NOAA grant investigating the level of trust coastal residents have in the government to mitigate flooding. She is also a co-PI on an NSF Build & Broaden grant to promote Water & Society research at PSU. Her most recent publication was "On capturing human agency and methodological interdisciplinarity in socio-hydrology research," with David Yu and 13 other co-authors in socio-hydrology in the *Hydrological Sciences Journal* https://doi.org/10.1080/02626667.2022.2114836.

Amy Larson – Teaching Assistant Professor

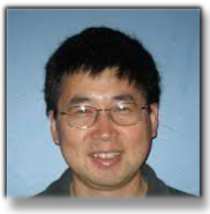
Amy Larson is back to teaching full-time after a sabbatical last year, where she spent time in the field working to monitor predation and an invasive crab in estuaries and designing strategies and curriculum to connect undergraduates with field research projects. She teaches the biological concepts series, research methods, environmental success stories, and courses in University studies.

Jennifer Morse – Associate Professor

Jen Morse is excited about ongoing updates to her courses to reflect greater diversity of perspectives and approaches in environmental science, particularly in Ecosystem Restoration, Environmental Systems II, and Watershed Biogeochemistry. In research, she is supervising a variety of graduate student projects and NSF-funded collaborative research projects in restored wetlands, urban streams, and soil biogeochemistry, focusing on regional PNW sites as well as nationwide cross-site and cross-scale analyses.

Max Nielsen-Pincus – Associate Professor, Department Chair

After three years as department chair, Max is finally feeling like he understands the job. He continues to teach courses on environmental and natural resource management, and this winter he took on the graduate core course in *Project Management*. Max continues to partner with the US Forest Service on several projects aiming to help the agency work to minimize and mitigate wildfire risk in forest communities, and he is Co-PI on an NSF-funded project on adapting to wildfire in the US West.



Yangdong Pan - Professor

Pan organized this winter's School of the Environment seminar speaker series with a theme of "Water in the West". Speakers spoke about their research on water resources and challenges in the West including the Columbia River, Colorado River, Lake Tahoe, Great Salt Lake, harmful algal blooms in Oregon lakes and Klamath River dam removal.

Arick "Kit" Rouhe – Instructor & Interim Director of the Center for Lakes and Reservoirs

Kit focuses much of his instructional time developing and teaching online courses for ESM majors and non-majors. This past year he became the interim director of the Center for Lakes and Reservoirs (CLR) at PSU. CLR monitors Oregon water bodies for aquatic invasive species from May to September, so when he is not teaching he works with state agencies and field crews to manage this statewide monitoring program.

Marion Dresner - Emeritus Professor

Marion completed her book, *That Which Roots Us: Environmental Issues in the Pacific Northwest and Beyond*, a work of natural and environmental history that explores the origins of and resolutions to some of our environmental problems. She offers hope for a new stewardship of the land and a focus on science literacy and direct experience in the natural world as the most grounded way of knowing the planet. The book is set to be released in December 2023 from the University of Nevada Press. Next project, a novel…

David Ervin - Emeritus Professor

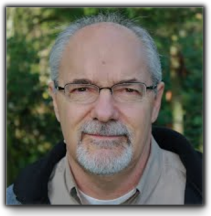
In recognition of his contributions to environmental economics and management, David was elected as a fellow of the American Association for the Advancement of Science (AAAS). Most recently David was spotted on campus shooting a video about his research identifying and addressing socio-economic barriers to the adoption of herbicide resistance best management practices in turfgrass systems.

William Fish - Associate Professor, Retired

After 24 years at PSU, Bill retired at the end of the 2021-2022 academic year. Although he may be occasionally spotted on campus in the summers and falls while residing in the Pacific Northwest, he spends the rest of the year finding sun in southeast Florida. Bill reflects, "I was very fortunate to have had such friendly and talented faculty colleagues, a great support staff, terrific graduate teaching assistants, and dedicated students in my classes." He has adapted his environmental interests to the observation and enjoyment of oak savannas in the Columbia River Gorge and the incredibly diverse terrestrial and aquatic ecosystems of Florida.

Ed Guerrant - Retired Director of the Rae Selling Berry Seed Bank and Plant Conservation Program

After a 25 year study of the endangered western lily (Lilium occidentale), Ed passed the project on to a long time USFS seasonal botanist who lives near the population and is able to visit it almost daily during the flowering season, something Ed could not do from Portland. She is able to hand cross-pollinate the plants, harvest, and plant the resulting seeds. Ed continues as a consultant on the project.



Mark Sytsma - Emeritus Professor

Mark recently wrapped up several long-term projects on invasive species and turned ongoing work over to others in the department. He serves on the boards of the Whidbey Island Conservation District and the Island County Noxious Weed Control Board and led a work group for the Washington Association of Conservation Districts to develop a statewide monitoring and management program for toxic algae in Washington.

Faculty in Focus

Gabriel Campbell

Dr. Gabriel Campbell is the new director of the Rae Selling Berry Seed Bank and Plant Conservation program and the Aquatic Botanist for the Center for Lakes and Reservoirs, both located in the ESM department. He is also the Botany Program Manager responsible for the management of botanical conservation programs at the Institute for Natural Resources located on the PSU campus. Additionally, Gabriel taught a summer course in 2022 (ESM 342) on plant sampling and seed conservation.

Gabriel is interested in the intersection of conservation biology and horticulture and uses his background as a field botanist and greenhouse grower to inform his work and research. He has been working with plants for over a decade across the Southeastern US, Great Plains, and since 2020, in the Pacific Northwest. He is most proud of having propagated nearly 500 species of North American native plants and is most comfortable botanizing among the coastal dunes and marshes.

Since beginning his work at the seed bank notable achievements include being awarded two small grants, submitting two large grant applications to the America the Beautiful Challenge, hiring three student interns, and securing research materials including growth chambers, greenhouse propagation bench space, and space for outdoor nursery plant production. The seed bank has also been busy doing applied conservation horticulture research including 250+ propagation trials resulting in the propagation of 119 species, new website content including 984 pictures of 250+ species, and propagation protocols for 15+ species, all of which are available in an online field guide to cultivating Pacific Northwest native plants. From this work, two peer-reviewed publications are currently under construction. Additionally, Gabriel and the seed bank staff have gone on three collection trips to coastal Oregon and Washington to collect seeds of dune plants for storage in the seed vault and for future research including germination and greenhouse trials.

Since beginning his work at the Center for Lakes and Reservoirs notable achievements include a grant awarded by the USACE for work with invasive aquatic plant species including Flowering Rush (*Butomus umbellatus*), an invasive grass-like species that threatens ecosystems in the Columbia River and elsewhere. He has also located two new occurrences of the invasive dense-flowered cordgrass (*Spartina densiflora*) in Coos Bay, Oregon which had only been

documented at one site historically. Gabriel has also been trained by Rich Miller and will help the Center for Lakes and Reservoirs with their plant work.

Since beginning his work at the Institute for Natural Resources Gabriel has been doing botanical surveys for the lotic Assessment, Inventory, and Monitoring located on BLM land in California, Nevada, and Washington. He has also been producing species account sheets for species of conservation concern the USFS will use to develop their National Forest System Land Management Plans.

Gabriel is excited to continue his plant conservation work at PSU and looks forward to getting more involved with student research including serving as committee members for graduate students. To get in contact with him please send an email to gec2@pdx.edu. Lastly, please follow the Berry Seed Bank on Instagram (@berry_seed_bank) and come to the Portland Farmers Market where they will have a booth set up and native plants available for donation!

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Donations to ESM by alumni, friends, and family are a crucial way to support students and faculty members in the teaching, research, and community service activities. We are honored and humbled by the generous contributions received by our programs, including the Environmental Science and Management Fund, the Rae Selling Berry Seed Bank and Plant Conservation Program, the Center for Lakes and Reservoirs, among others.

We extend our gratitude again to **Stephen A. Wille for supporting the ESM Annual Lecture Seminar Series**. This year's lecture series focused on *Water in the West*; experts came to PSU to discuss the state of the science, management, and policy emphasizing aquatic ecosystems in the Western US, including the Colorado River, Great Salt Lake, the Klamath Basin, and the Columbia River. Rodé Krige (EVSC-BS) remarked that, "...attending the seminars was often the light of my week… These speakers provided an opportunity for me to see what is possible with my future degree. I spoke to many of the speakers about how they got to where they are today, and am still in contact with many of the speakers about graduate research positions and internships they host." Thank you, Steve, for your generosity!

Donors to ESM support scholarships and awards to undergraduate and graduate ESM students to engage in research, internships, and professional activities, which makes students attractive to their future employers. Over the last decade, generous contribution to ESM have supported hundreds of students with resources needed to participate in research and professional development activities.

Today's challenges have never been greater for our students, and your contribution will help expand ESM's support to more of our future leaders in environmental science and management.

Your gift can help provide the following:

$20 can pay to print a student research poster for a scientific meeting.
$50 can help purchase supplies needed for lab and field research.
$100 can help pay for registration for scientific meetings.
$200 can help pay for an undergraduate to register for an internship credit.
$500 can fund the undergraduate Paul Croy or Barry Commoner merit scholarships.

Larger gifts can support ESM programs and endowed professorships. We are grateful for all of the donors to all of our programs. Providing a gift to the Department of Environmental Science and Management is a powerful way to support the future of ESM and our students. The PSU Foundation is an excellent resource if you are considering providing support to ESM in your will or any other form of planned giving. **Visit psuf.org or call 503-725-4478 for more information.**

ESM Awards

Paul Croy Scholarship - Lydia Lydell (2022)
Named for a western educator and poet, the Paul Croy Environmental Scholarship was established to provide support to Undergraduate students who are pursuing academic and career goals related to preservation of the environment. This will be awarded to an outstanding student with career interests in the social and policy aspects of environmental protection and management.

Barry Commoner Scholarship – Saville Feist (2022)
Dr. Commoner is an internationally known environmental scientist; founder of the Center for the Biology of Natural Systems at Queen's College, and a former candidate for President of the United States. The Barry Commoner Environmental Scholarship was established to provide support to undergraduate students with academic and career interests in environmental science.

David Dunnette Scholarship - Elsia Connolly-Randazzo (2022)
Professor David Dunnette was one of the founding members of the department. An endowment was established in his memory to support ESM graduate student travel to present their research at meetings.

Edwards D. and Olive C. Bushby Scholarship
The Bushby family established an endowment for the support of outstanding graduate and undergraduate students in the Department of Environmental Science and Management that have financial need. Recipients may use the funds for research, travel to a professional conference, or as a stipend. Applicants may request up to $2,000.

2022: Corinne Heath, Jose Aparicio-Castillo, Amanda Gannon, Keir Allison-Bourne, Nani Ciafone, Sage Ebel, Ruby Howard.

2021: Olamide Alo, Rebecca Sinichko, Alexandra Tissot, Hannah Spencer, Daisy Zamacona, Tapiwa Chabikwa, Reagan Thomas, Peyton Priestman, Caroline Kovacs, Christian Heisler, Alicia Gamble, Emma Scott, Jacob Rose, Elisa Mickelson, Laurel Liebeseller, Peyton Priestman, Mariah Vertulfo.

Selected Student & Faculty Awards

Kelly Gleason (Assistant Professor) - PSU Early Career Research Award (2023)

Sarah Carvill (Senior Instructor) - College of Liberal Arts and Sciences John Elliot Allen Award (2022)

David Ervin (Emeritus Professor) - Elected as a Fellow to the American Association for the Advancement of Science (2022)

Melissa Haeffner (Assistant Professor) - PSU Excellence in Sustainability Research and Teaching (2022)

Shersten Finley, MEM - Student Inspiring Excellence in Sustainability (2022)

Kaegan Scully-Engelmeyer, PhD - Outstanding Dissertation - Natural Sciences (2022)

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