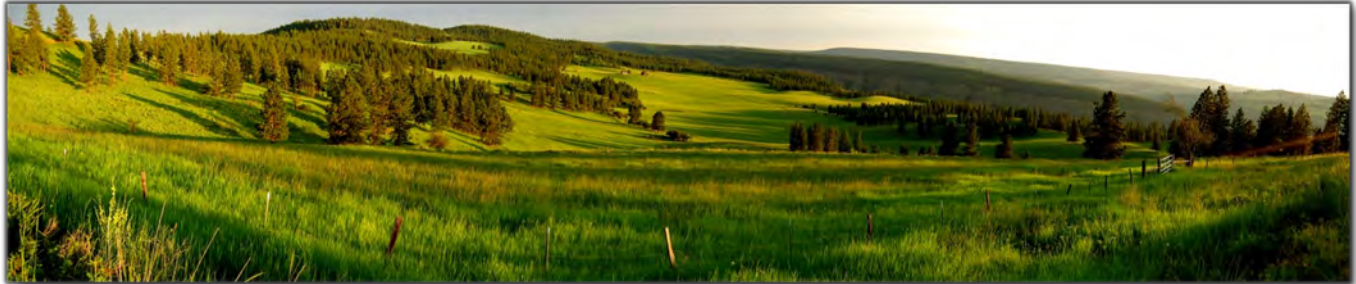


# ENVIRONMENTAL SCIENCE & MANAGEMENT

D i s c o v e r y   S t a r t s   H e r e



## **Environmental microplastics in the Pacific Northwest: Students contributions to our understanding of their presence, problems, and possible solutions**

**By Dr. Elise Granek**



**Summer Traylor demonstrating our lab protocol to collaborator, Dr. Jordyn Wolfand.**

Plastics have a myriad of uses and benefits and are integrated into every facet of modern life. Plastic use is so widespread that plastic production may exceed 500 million metric tons per year by 2050. Although plastics have become a norm in much of life, their risks in the environment have more recently become apparent. Plastics break down into smaller and smaller microplastics when subjected to heat, light, and environmental forces such as wind, wave, UV, biological, and mechanical disturbances, such that microplastics are now ubiquitous and found in terrestrial, aquatic and marine ecosystems, as well as in the air we breathe, the soil in which we grow our crops, freshwater, saltwater, and ice. Once in the environment, animals, plants, and other organisms uptake microplastics that then get incorporated into their tissues and organs. Research in ESM's Applied Coastal Ecology (ACE) Lab has identified the breadth of their presence in the Pacific Northwest and is beginning to identify the impacts of plastics on life.

On their journey from manufactured products into the tissues of organisms, microplastics travel through air, water, and soils. Microplastics are shed by clothing in our washing machines, become airborne in our homes and workplaces, and can be deposited by rain or transported through stormwater systems into waterways. A single washing machine load of synthetic clothing can generate up to 700,000 microfibers, which get flushed through gray water into wastewater treatment plants. A single city or urban area could generate

hundreds of billions of fibers per day, many of which are then input into rivers and streams via treated wastewater effluent or deposited on agricultural lands as biosolids. Annually, rivers transport over 2 million tons of plastic into oceans across the globe. Microplastics in air, water, and soil become bioavailable and are mistakenly or unintentionally ingested by terrestrial, aquatic, marine, or terrestrial organisms, including humans.



**Britta Baechler collecting razor clams for microscopic analysis.**

Incorporation of plastic particles into the guts, gills, and tissues of living organisms has risk, both from physical impacts and the chemicals added to or adsorbed onto plastic particles. During plastic production, multiple fillers, plasticizers, pigments, antimicrobials, heat and UV stabilizers, and flame retardants are used. In fact, there are several thousand distinct chemical additives used in plastics to make them flexible, resistant to heat, and more durable; many of these additives are associated with well-established environmental and human health risks, including compounds that have been widely studied and are known endocrine disruptors (e.g., BPA). These additives can become mobilized and leach into the surrounding environment or into organisms that ingest microplastics. Contaminants from the surrounding environment can readily stick to microplastics, making them effective at collecting and harboring concentrations of heavy metals, pesticides, flame retardants, pharmaceuticals, and personal care products. Plastics and plastic additives can then get transferred into organisms and through the food web, as demonstrated in laboratory and field-collected samples.

The ACE lab in ESM has been at the forefront of these studies in Oregon and the Pacific Northwest. Undergraduate and graduate students have contributed to our understanding about both plastics in the environment—including about the spatio-temporal variability of microplastics in aquatic organisms and waters; and the knowledge, attitudes and concerns about microplastics held by decision makers and the public. Ongoing work is testing two interventions designed to reduce environmental microplastics, and the ACE lab is leading the establishment of the upcoming Oregon Microplastics Research Center.

Two graduate and three undergraduate students in the ACE lab have focused on establishing a baseline of microplastic contamination in waters and marine organisms. Ashley Peterson (EVST-BS, 2020) and Amy Valine (EVSC-BS, 2019) examined microplastics in four Oregon rivers, identifying microplastics in water samples collected from the Deschutes, Rogue, Willamette, and Columbia Rivers. MS student Becky Talbot (advised by Heejun Chang in Geography; Geog-MS, 2022) with assistance from Rosemary Wood (EVSC-BS, 2024) examined spatial and seasonal variability in microplastic types and concentrations across samples collected from 10 sites in

the Portland Metro Region along the Clackamas River and Johnson Creek, identifying tire wear particles and higher overall numbers of microplastics in the rainy season.

Britta Baechler (EES-PhD, 2020) was the first ESM student to study microplastics in marine organisms as well as the first to study microplastics in organisms collected from the Oregon Coast. Since there were no baseline data for Oregon at the time (2016-17), Britta set out to establish a baseline of microplastic contamination in the tissue of two Oregon coastal bivalves, razor clams and Pacific oysters, and to document spatial (across 15 sites coastwide) and temporal (spring versus summer) variability. Britta also worked with a state agency and tribal government in Washington state to examine variability in microplastic contamination in razor clams on the Olympic Peninsula. Britta's research revealed that microplastics are present in almost every organism tested (out of over 250 individual organisms, only 2 were free from microplastics). Most of the microplastics in the tissue were fibers, present in similar concentrations in both gut and non-gut tissues. Finally, microplastic concentrations exhibited little spatial variability demonstrating their ubiquity, but organisms collected in the spring had higher microplastic concentrations than those collected in the fall—potentially a signal from spring flush. Building on Britta's work, Summer Traylor (MEM, 2022), with assistance from Marilyn Duncan (EVSC-BS, 2024), set out to determine whether finfish and crustaceans collected offshore from the Oregon coast contained microplastics in their edible (muscle) tissue, and whether microplastic concentrations varied based on trophic position of the fish. Summer also tested whether microplastics concentration varies between whole fish collected directly from the vessel and filets purchased from grocery stores. Summer found that microplastic concentrations were highest in lower trophic level organisms (pink shrimp followed by herring); present at lower concentrations in two early life stages of lamprey; and lowest in chinook salmon and black rockfish. Summer found no significant difference in microplastic concentrations between vessel caught and grocery store filets.



Lest you think that avoiding seafood will help you avoid consuming microplastics, a recent study found that 88% of proteins sampled contained microplastics, including seafood, pork, beef, chicken, tofu, and three types of plant-based meat alternatives; and another study found astronomical levels of micro- and nano-plastics in single use water bottles! Additionally, air samples collected from national parks contain microplastics as does tap water in many municipalities nationally. And as Keir Allison-Bourne (PSM-2023) discovered, even the salt used to manage salinity in research aquaria has microplastics; this unfortunate contamination was found in an experiment to examine the effects on mussel fitness of different microfiber types and resulted in equally high plastic concentrations in experimental and control units. Although the science is just beginning to unravel the impacts, Keir found that when organisms are food stressed, they are more likely to 'hold onto' the microplastics that they ingest, whereas organisms that have sufficient food are able to expel much of the ingested microplastic. Other experiments have shown that environmentally relevant concentrations of microplastics can impact organismal reproductive capacity, growth, and fitness.

The first step in knowing what to do about all this microplastic contamination is to understand knowledge, perceptions, attitudes, and concerns about microplastics by the general public and decision-makers. And several graduate students in the ACE lab have focused on just that. Maya Hurst Mayr (MEM-2022) interviewed professionals from agencies, non-governmental and private-sector organizations, and researchers to assess their levels of knowledge and concern. Currently, Amanda Gannon (MEM candidate) is analyzing data from a statewide survey of the public aimed at gaining a similar understanding from the voting public and also assessing differences

across geographic locations statewide, political affiliations, gender, and willingness to engage in personal actions to reduce household microplastic release into wastewater. The results will reveal who the public thinks is responsible for managing microplastics in our environment, and the level of public willingness to make personal and policy changes to reduce environmental microplastics.

But studying the problems doesn't necessarily allow us to solve the problems, so we are shifting part of our work to testing solutions. Currently, the ACE lab is leading the Microplastics Science Optimizing Solutions (MP-SOS) project funded by Oregon Sea Grant, a collaboration between the ACE Lab and ESM faculty Max Nielsen-Pincus, Oregon State University, University of Portland, the Oregon Department of Environmental Quality and Department of Fish and Wildlife, the Ocean Conservancy, and Oregon Sea Grant Extension. The MS-SOS project will work with four coastal municipalities to test the effectiveness of two interventions in reducing microplastics in stormwater and wastewater, and to assess challenges faced by the municipalities and participating households while utilizing these interventions. Additionally, the ACE lab was recently awarded a Congressional appropriation to establish the *Oregon Microplastics Analytical Research Center*, which will include state of the art instrumentation to analyze environmental samples for microplastic contamination.

And what can all of us do to reduce environmental microplastics? Reducing plastic use is the most effective. For example, purchasing products that are not packaged in plastic (shampoo bars instead of bottles, toothpaste tablets instead of tubes, metal packaging rather than plastic) and generally avoiding single use plastics (drink containers, take out containers, straws, etc.). Other solutions include purchasing clothing made of natural materials rather than synthetics, installing a washing machine filter, and advocating for change. Although microplastics have rarely made the national or state policy agenda, voting for elected officials that support legislation and regulations to address plastic production and microplastic pollution is an important next step as we unravel the risks presented by plastics here in the Pacific Northwest and globally. For more information about the ACE lab, check out: <https://sites.google.com/pdx.edu/accelab/home>.



Rosemary Wood and Becky Talbot sampling Johnson Creek for microplastics.

## **From the Department Chair**

### **Dr. Max Nielsen-Pincus**



Another academic year is flying by, and there's lots to report. This fall we welcomed approximately 80 new majors and graduate students into our programs. And over the course of this academic year, ESM will help over 1,000 PSU students progress toward their goals while participating in our classes. That feels like a big impact! My hope is whether you are one of those students in our classes this year, an alumni, or a friend and supporter, that this newsletter will offer you some insight into the broader ongoing activities in Environmental Science and Management at PSU.

Last year we initiated two big changes in our curriculum by updating both the Environmental Studies major and overhauling the Professional Science Masters. This year I'm excited to say that both are operational. The Environmental Studies major was declared by more students this fall since before the pandemic, a sign of the strength of the program and the continued desire of students to combine the fundamentals of environmental science with an understanding of justice, policy and governance, and sustainability, among other perspectives. In addition we did a soft roll-out of the new Professional Science Masters program, in which students pick coursework from a menu of graduate certificates and

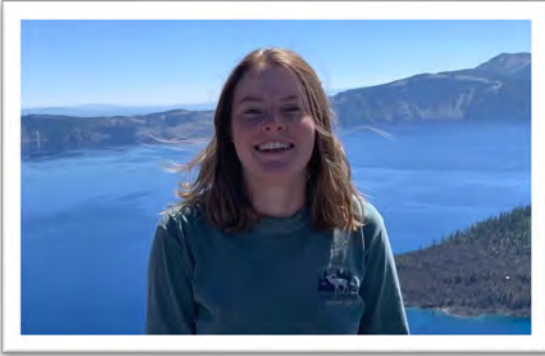
leverage their learning with a capstone project or internship.

Of course, the rest of our programs continue to perform well too, graduating students who are not only prepared, but who are also successful at becoming managers, scientists, and more. This past summer, I spent some time evaluating the employment outcomes of our recent graduates. The bottom line, our graduates are doing great work! We tracked down the jobs reported by about 300 recent alumni of our undergraduate programs and graduate programs. For alumni with a bachelor's degree, 70% reported jobs in environmental science and management, while 97% of those with a graduate degree reported a job closely related to their graduate training! Notably, about 27% of college graduates nationally are employed in a job closely related to their college major according to a recent report by the Federal Reserve Bank of New York. To me, our students' success is a measure of the motivation they bring to ESM and the training and experience they receive while here.

Another notable finding from my study of our recent alumni, nearly 85% of our undergrad program alumni stay in Oregon, with the vast majority staying in the Portland Metro region. This makes ESM an engine for training the current and future environmental science and management workforce in Portland and elsewhere in Oregon. Our graduates work for local government bureaus, state and federal agencies, the private sector, non-governmental organizations, and tribal governments demonstrating their success in a diverse suite of organizations and roles.

The other big piece of news I want to report on is the creation of a new school at PSU. As you know, Portland State has long-standing programs focused on Earth, environment and society; in fact we have a PhD program called, Earth, environment, and society. ESM programs touch on each of these facets, but there are other departments and programs at PSU who expertise intersect these fields too. In recent years, we have identified the need for increased coordination and collaboration across our programs to meet student needs and best support career preparedness and success.

After a two-year-long process, faculty in the Departments of Anthropology, Environmental Science and Management, Geography, Geology, and the Complex Systems (formerly Systems Science) program voted



## Graduate in Focus: Grace Hall

Grace is a graduate student studying urban habitat connectivity for birds in Dr. Cat de Rivera's lab in the Environmental Science and Management Department. Her interest in avian habitat conservation began as an undergraduate biology major at Missouri State University, where she began birding recreationally during the pandemic. For her graduate project, she has partnered with Clean Water Services and the Bird Alliance of Oregon (formerly Portland Audubon) to examine avian community structure and habitat connectivity along an urban riparian zone using a combination of point count surveys, habitat assessments, and GIS analysis.

Grace is also passionate about environmental education and has spent three summers working in the interpretation division of the National Park Service, delivering public programs ranging from patio talks in front of the Great Sand Dunes of Colorado to 2-hour cave tours hundreds of feet beneath the Black Hills of South Dakota. As a graduate teaching assistant and officer for the Association of Environmental Science Students, she enjoys coordinating opportunities to learn alongside her peers about environmental science and related career opportunities.

In addition to her graduate studies, Grace is currently getting experience in environmental policy through an internship in the Regulatory Branch of the Army Corps of Engineers. She processes federal permits for projects that have the potential to impact waterways in Washington State, ensuring that projects remain in compliance with the Endangered Species Act, the Clean Water Act, and the National Environmental Policy Act.

Grace is hoping to graduate from Portland State in 2024 with a master's degree in Environmental Management, and she is excited about the opportunities ahead to continue exploring the world of environmental science.

overwhelmingly this fall to create a new school at the nexus of Earth, environment and society. Our majors will continue on in the new school, which aims to use our collective resources to improve learning and career outcomes for our students, while also serving our community better by collaborating on our research, teaching, and service. As of writing this report, we are working on the next step in that process—creating a name for the school. And toward that end we've been hosting focus groups with students, faculty and staff, alumni, employers, and prospective students at local community colleges. Our goal is to create an inclusive process that highlights the values of many perspectives in the process. While our organizational structure may change, ESM, and our majors and programs, will continue on and thrive in this new school. Feel free to reach out to me if you'd like to know more about what comes next in this newest evolution from ESM.

In the rest of this newsletter you will read about the variety of successes in ESM this year. The cover article highlights the recent work led by Dr. Elise Granek and students contributing to the science, policy, and management of microplastics. Several highlights focus on current students, recent graduates, and our newest faculty. Their stories and accomplishments are but just a few of the highlights from ESM this year. Happy reading!



## Faculty in Focus

### Dr. Paola López-Duarte



**Dr. Paola López-Duarte** joined ESM as an associate professor in fall 2023. She is a marine biologist who combines her research interests with a passion for teaching to support students in their journey to becoming scientists. Paola's research team focuses on the behavior and ecology of invertebrates and fish, especially the factors controlling larval dispersal from and recruitment to adult habitats. They combine field and laboratory approaches to quantify the contributions of nursery habitats within estuaries to marine populations. The work encompasses several research areas, including larval ecology; population connectivity; impacts of anthropogenic stressors on marsh communities; trophic ecology; and biophysical models.

Paola is teaching data collection and modeling (ESM 333). She considers it a privilege to help students build their analytical and computational skills. Learning about experimental design, data and statistical analysis may not be topics that students look forward to while in college, but they are definitely skills that will make them more competitive in the workforce. Training the next generation of scientists is a big responsibility and Paola's hope is that through her role as a

researcher, mentor, and teacher, she can ensure that the next generation of explorers is as diverse and dynamic as the ecosystems they study.

For more information about Dr. López-Duarte's research and how to get involved, please visit [www.lopezduartelab.com](http://www.lopezduartelab.com).

Paola is a third-culture kid. She was born in the Dominican Republic to Colombian parents and lived most of her childhood in Bolivia. Having grown up moving from country to country as a child, she encountered both challenges and benefits. She attributes these experiences to teaching her the valuable skills of adaptability and forming connections with individuals from diverse cultures and backgrounds. Paola grew up knowing that she wanted to be a scientist, but it was not until she participated in research as an undergraduate student that she found her career path.

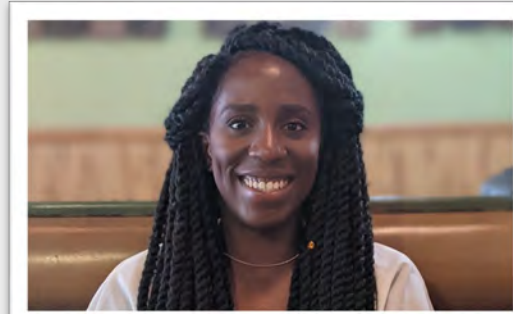
Paola's academic career has taken her from Florida, where she completed a B.S. in Marine Biology and a Ph.D. in Biological Sciences from Florida Tech, to California, where she was a postdoctoral researcher at UCSD's Scripps Institution of Oceanography in La Jolla, to New Jersey where she worked as a postdoctoral researcher at the Rutgers University Haskin Shellfish Research Laboratory in Port Norris and as an assistant research professor at the Rutgers University Marine Field Station in Tuckerton, to North Carolina, where she was an assistant professor at UNC Charlotte. Along the way, she has had the opportunity to study the remarkable adaptations that allow organisms to thrive in intertidal areas along the west, east, Gulf coasts of the US and Panama.

Paola is proud to be a member of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), an organization that seeks to build true diversity in STEM. As a *Sacnista*, she was thrilled to hear about the new SACNAS Chapter at PSU and looks forward to working with them to support more students in STEM.

For more information and how to get involved, contact [PSU SACNAS](#).



**Minnow Trap deployment.** Paola deploying a minnow trap in southern Louisiana as part of a NOAA RESTORE funded project to evaluate fish biodiversity in newly-created saltmarshes. (Photo Credit: LSU/Allison Benelli).



### Graduate in Focus: Monica Zapata-Villegas

Monica is an international, first-generation graduate student from Colombia, currently studying in Dr. Kelly Gleason's Snow Hydrology Lab within the ESM department at PSU. Her research focuses on the interactions between forest fires, black carbon, and snow, exploring the impact in our ecosystem.

She decided to attend PSU for its reputation as a diverse campus, in a state renowned for its commitment to environmental preservation. Monica finds inspiration in Oregon's natural beauty, which is a backdrop to her academic journey. While at PSU, Monica has been involved in academic and community activities. As a teaching assistant, she shares her knowledge and passion with her peers. Beyond the classroom she volunteers at events and organizations, including the Women's Resource Center, where she helped plan activities for the Feminist of Color Community Project team.

As a volunteer with the Oregon Museum of Science and Industry (OMSI) allows Monica to share her love for science and engage with the community, where she promotes scientific literacy and education, inspiring interest in STEM fields among visitors of all ages.

Monica's dedication to making a difference is evident in her outreach efforts for the houseless community in Portland. By volunteering time to provide meals to those in need, she embodies PSU's commitment to social responsibility and community engagement. Outside her academic and volunteer commitments, Monica finds rejuvenation at PSU's REC center and PSU outdoor program for both recreation and to connect with fellow students.

Monica's transition to environmental science from her background in chemical engineering reflects her desire to contribute to a more sustainable future. Her enthusiasm for lab work is profound, and she immerses herself in the complexities of snow science and water hydrology. Monica's graduate research focuses on analyzing black carbon concentration in snow samples and its implications for snow reflectance. She is grateful to gain experience about snow and the value it holds as a water resource.

Monica believes that science should be accessible to all, regardless of background or expertise. As an OMSI Science Communication Fellow, she advocates for clear and engaging science communication, ensuring that scientific knowledge is shared in a way that resonates with diverse audiences. Monica envisions a world where science serves as a catalyst for positive change, driving progress and innovation for the progress of society.

In Monica's eyes, the value of science lies not only in its discoveries but also in its potential to create a more equitable and sustainable world for current and future generations and her solid commitment to community, coupled with her passion for environmental science.





## Alumni in Focus: Brian Turner

I became a graduate student with ESM due to a magazine article. I told my sister I wanted to go to grad school to study marine ecology, invertebrates, or invasion ecology, and she shared an article about a researcher named Catherine de Rivera, who researched an invasive marine crab. Thus began my lengthy time at PSU, where I would become known as “that crab guy.”

While at PSU, I conducted research related to the European green crab (EGC) and other aquatic invasive species (AIS), was a TA, got married, became involved in science outreach at OMSI, served as the assistant to the Environmental Professionals Program, made lifelong friends, performed a lot of data analyses, and performed occasional acts of weirdness.

After completing my doctorate, I became a professor in the department, first as an adjunct (also teaching classes at Portland Community College and Pacific University) and eventually as a full-time instructor. With an odd mix of joy, pride, and disbelief, I became the colleague of so many of my mentors. Even through COVID, I found great pride and satisfaction in working with students and offering the same guidance and support I had received.

In August 2022, I started as the new Research Scientist with the Washington Department of Fish and Wildlife’s AIS Unit. I offer scientific advice regarding AIS policy and management, assist in the design of monitoring protocols, collaborate with managers and researchers across Washington, and attend lots and lots of meetings (so many meetings). I am currently leading the development of the Washington State Long-Term EGC Management Plan in collaboration with the many co-managers, tribes, and partners involved in EGC management across the state. And yes, I am still known as “that crab guy.”

## Faculty Update



### Dan Bedell - Instructor

Dan is teaching a number of ESM and University Studies courses this year. He is continuing his research on community-based macroinvertebrate biomonitoring and has been engaged in a project to understand stream recovery in Opal Creek where the 2020 Beachie Creek fire burned through old growth forests.



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

Gabriel is now in his third year working with the Seed Bank, the Center for Lakes and Reservoirs, and the Institute for Natural Resources. He continues to work with rare plants, seeds, and invasive species, and has an interest in applying horticultural techniques to plant conservation and restoration problems and questions. Gabriel is developing a new ESM course on Wetland Plants. Ask him for a tour of the seed bank or the research greenhouse!



### Catherine de Rivera - Professor

Cat de Rivera is excited to be continuing her research on green crabs and teaching bio-invasions, science communication, environmental problem solving, and marine ecology. She continues her work towards greater inclusion in the fields of introduced species management and habitat connectivity. She had fun working with the talented crew of OPB’s Oregon Field Guide on an episode on green crabs. She is serving on the Oregon Invasive Species Council and various other panels and working groups on biological invasions or habitat connectivity. She is leading the effort to create a state management plan for green crabs and helped with the revised national plan.



**Patrick Edwards - Senior Instructor, EPP Program Director**

Pat is working with several undergraduate students to study the effect of river restoration on nutrient cycling in streams around the PNW. He has also collaborated with several state agencies to develop a novel index of biotic integrity for community science stream monitoring. 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 fireheds 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 continues to manage the Seed Bank lab, collecting and banking seeds of rare plants for research and conservation, while also coordinating Citizen's Rare Plant Watch, a community science 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 is teaching the Environmental Chemistry series for Environmental Science majors and Air Quality. She continues to work on outreach about the Diesel Particulate Matter, modeling, and air quality monitoring.



**Jeff Gerwing - Associate Professor**

Jeff is working with Portland Parks & Recreation to develop approaches to remeasuring long-term monitoring plots in Forest Park that minimize negative impacts to the forest while collecting data that will help us better understand the forest's responses to recent climatic extremes. He is also continuing to revise his courses in *Environmental Literacy* and *Forest Ecology* to include more diverse perspectives.



**Kelly Gleason - Assistant Professor**

Dr. Gleason was awarded the PSU Early Career Research Award in 2023. She is lead PI on two large research projects focused on forest-snow hydrology interactions, 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. She looks forward to bringing students and colleagues together through snow-water resource science exploration in the coming years.



### **Elise Granek - Professor**

Dr. Granek was awarded a Sigma Xi Outstanding Researcher Award in 2023. She 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. Granek and colleagues have been awarded an Oregon Sea Grant Biennial Award to test the efficacy of two municipal interventions at reducing microplastics entering marine waters; the project is a collaboration among three universities, state agencies, and non-governmental entities and is beginning this winter 2024.



### **Melissa Haeffner - Assistant Professor**

Dr. Haeffner has been staying busy this year while on sabbatical.



### **Amy Larson - Teaching Assistant Professor**

Amy Larson is teaching the Biological Concepts series, *Research Methods in Environmental Science*, *Env. Success stories*, *Env. Sustainability*, and *Teaching Everyday Science*. She continues to apply course based undergraduate research projects in many of these courses to (among other applications) support the management and better understand the ecological impacts of invasive species in Oregon estuaries and coastal ecosystems.



### **Jennifer Morse - Associate Professor**

Jen Morse continues to enjoy teaching *Ecosystem Restoration*, *Environmental Systems II*, and *Watershed Biogeochemistry*. In research, she is collaborating on an NSF-funded project in urban stream biogeochemistry, a study of the fate and effect of irrigation with recycled wastewater, and a new project in tidal marshes near Astoria, with a focus on carbon cycling and greenhouse gas emissions.



### **Max Nielsen-Pincus - Associate Professor, Department Chair**

Max started his second term as the ESM Chair this past fall. He continues to teach *Natural Resource Policy & Management* and is teaching the graduate core course in *Project Management* for the second time this winter. Max continues to partner with the US Forest Service on several projects aiming to help the agency learn to work with communities to minimize and mitigate wildfire risk in the western US. He is also currently working with an NSF-funded coupled human and natural systems model to test hypotheses about managers' ability to adapt to risks in time and space across different fire regimes and scenarios of development.



### **Yangdong Pan - Professor**

Pan traveled to China last summer to resume the collaboration with his colleagues there on freshwater science and protection. During his visit, he gave research seminars at Shanghai Academy of Environmental Science and several universities and engaged in field studies.

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

Kit is the interim director of the Center for Lakes and Reservoirs (CLR) at PSU, where he coordinates CLR projects to monitor Oregon water bodies for aquatic invasive species from May to September. This year CLR is staffing its biggest field campaign yet. Kit also continues to teach online courses for ESM majors and non-majors.

**Marion Dresner - Emeritus Professor**

Marion's nonfiction book, *That Which Roots Us: Environmental Issues in the Pacific Northwest and Beyond*, was published in December 2023. It is a work of natural and environmental history that explores the origins of and resolutions to some of our environmental problems. Her novel, *Tree of Life*, is currently in review for publication. The eco-fiction book concerns three generations of a family with strong ties to the land and wildlife. The modern descendants start a school of restoration; the graduates help curb climate change and initiate widespread ecological healing.

**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.



## ESM Awards



### **Alumni in Focus: Cory McCaffery**

Cory completed his M.S. in Environmental Science in 2020, studying under Dr. Patrick Edwards and Dr. Yandong Pan. His thesis work focused on the use of sensitive macroinvertebrates as indicators of sediment pollution in salmon-bearing streams of the Pacific Northwest. He also received a River Restoration Certification from the Environmental Professional Program at Portland State.

Since graduating, he has held a number of roles in the field of restoration: as a project manager for a fisheries enhancement group in Southeast Washington, with the Institute for Natural Resources in Portland, and as a habitat restoration practitioner in the Willamette Valley. Cory has taken his love of rivers to the non-profit realm, first as a project manager for the Tri-State Steelheaders in Southeast Washington where he managed one of the longest fish passage projects in the Northwest. He now resides in Hailey, Idaho as the River Program Director for the Wood River Land Trust, where he implements projects and monitoring strategies that support the health of the Big Wood River and its tributaries.

In November of 2023, Cory and his team were awarded \$1,733,154 from the Bureau of Reclamation for the Warm Springs Preserve Restoration and Irrigation Improvement Project. The project seeks to rewild a former golf course near Ketchum Idaho, and restore over a mile of Warm Springs Creek. The project is set to break ground in the summer of 2025.

Cory and Dr. Edwards are still working together, and are conducting pre-monitoring activities at Warm Springs Creek to assess the impacts of large-scale restoration on nutrient and food web dynamics at the site.

### **Departmental Awards**

#### **2022-2023**

***Leadership in Environmental Sustainability*** – Abby Elkins (Undergraduate) & Tyren Thompson (Graduate)

***Undergraduate Student Research Excellence Award*** – Elisa Mickelson & Madison Haley & Reagan Thomas

***Graduate Student Research Excellence Award*** – Wendy Sangucho Loachamin (Masters) & Anton Surunis (Doctoral)

***Overall Student Excellence Award*** – Lara Jansen

***Graduate Student Teaching Award*** – Tris Kibbey

***Outstanding Teaching Award*** – Melissa Haeffner

***Departmental Service*** – AESS Officers Lydia Lyall (Undergraduate), Emma Scott & Nani Ciafone (Graduate Students)

***Department Service, ESM Staff*** – Becca Wilson & Sherie Huffman

***Department Service, Staff Outside ESM*** – Brenda Fugate, Andrea Haack, Roxanne Treece from the grad school & Karena Bayruns, SPA

***Outstanding Contributions to ESM Department*** – Steve Wille

***Outstanding Alumni Award*** – Shersten Finley

***PSU Award for Research Excellence for Early Career Faculty*** – Kelly Gleason

***Sigma Xi Columbia-Willamette Chapter award for outstanding Environmental Science research*** – Elise Granek

***PSU's Chen Fellowship in Science and Mathematics Entrepreneurship*** – Allie Tissot (EES-PhD Candidate)

## Scholarships

### ***Paul Croy Scholarship*** – Shinoa Greenfield (2023)

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*** – Lydia Lyall (2023)

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 Award*** – Monica Zapata-Villegas (2023)

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. One award will be given each year.

### ***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.

**2023** – Bria Bleil, Justin Kelley, Moriah Conkel, Christian Heisler, Ella Wagner, Ryan Nord, Amanda Newman, Clarissa Cressotti

**2022** – Corinne Heath, Jose Aparicio-Castillo, Amanda Gannon, Keir Allison-Bourne, Nani Ciafone, Sage Ebel, Ruby Howard, Laura Guderyahn, Monica Kelley, Trevor Gelling, Hannah Spencer, Justine Casebolt, Marta Szabatin, Tapiwa Chabikwa.

## Support Environmental Science and Management at PSU

Visit [giving.psuf.org/esm](https://giving.psuf.org/esm) to make a donation or learn about planned giving options at <https://www.psuf.org/gift-planning-options>

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 ESM's Annual Lecture Seminar Series**. This year's lecture series focused on *Pollinators*; speakers came to PSU to discuss the state of the science, management, policy, and practice for supporting pollinators at the local to global scales.

The series brought the experts in bees, butterflies, and more, bringing perspectives from science, endangered species management, traditional ecological knowledge, landscaping, and even a mention of bigfoot! Thank you, Steve, for your generosity!

Donors to ESM support opportunities for students such as scholarships and awards to engage in research, internships, and professional activities, making students more attractive to their future employers. Over the last decade, generous contributions 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 to 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 Oregon's environmental science and management workforce, 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](https://psuf.org) or call 503-725-4478 for more information.





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<https://www.pdx.edu/environmental-science>

## Environmental Science & Management

### By The Numbers...

**360** Majors (Environmental Science & Environmental Studies)

**1,214** Number of students enrolled in ESM classes

**220** Minors and Certificate students

**86** New Alumni (Graduates)

**29** Graduates with Latin Honors

**50** Master's students  
MS, MEM, PSM,  
Grad Certificates

**15** Faculty

**10** PhD students

**48** Peer reviewed articles recorded in the Web of Science (2022-2023)

**\$1,668,251** Research grant activity FY2023

Winter 2023 - Winter 2024  
except where noted