EXPLORE SCIENCE

in the PACIFIC NORTHWEST

WASHINGTON STATE UNIVERSITY
VANCOUVER

Graduate Study *in*
NATURAL SCIENCES

Interdisciplinary research in pursuit of GREAT discoveries

Take part in *exciting* research that can change the world.

Explore science in the Pacific Northwest.

In search of new insights, we work as an interdisciplinary group of scientists. As a graduate student, you will participate in research from ecology to mathematical biology to hydrology to adaptive genetics. This involves cross-collaboration among four primary disciplines: biology, environmental science, mathematics and neuroscience.

Adaptation Genomics Laboratory

Seth Rudman

How does the genetic diversity of populations influence their ability to persist in response to environmental change? Are specific genetic variants required for adaptation? Combine field experiments, observational studies and large-scale comparative genomic approaches to answer questions at the interface of ecology, evolution and genomics to better understand the fate of populations experiencing environmental change.

Aquatic Microbial Ecology

Gretchen Rollwagen-Bollens

Investigate planktonic food webs, with particular emphasis on understanding the dynamics of harmful algal blooms in lakes, reservoirs, rivers and estuaries. Participate in fieldwork and experiments to characterize the trophic relationships among algae and small planktonic grazers and implications for aquatic resource management.

Aquatic Ecology/Biological Oceanography

Stephen Bollens

Explore the ecology of estuarine and freshwater zooplankton, fish and benthic invertebrates, including behavior, community ecology and ecosystem dynamics, with an emphasis on the impacts of invasive species in aquatic systems. Participate in fieldwork throughout the Columbia River Basin and beyond.

Climate Extremes and Societal Impacts Lab

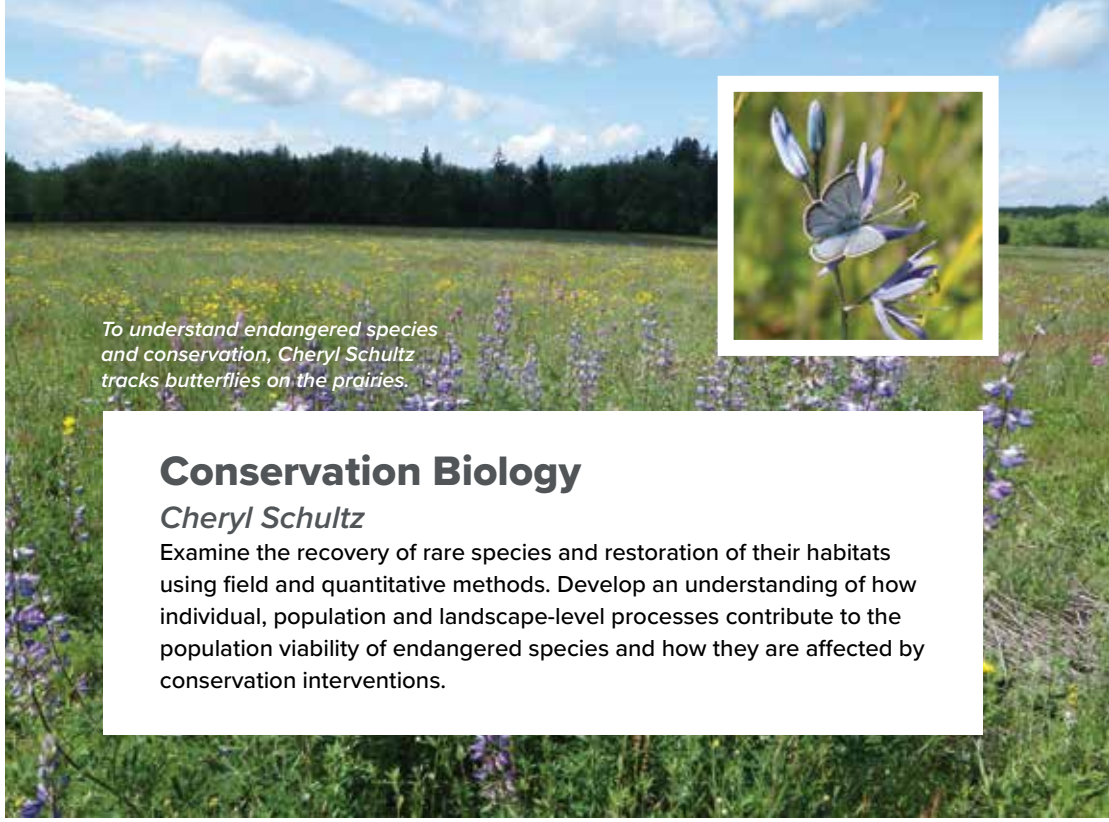
Deepti Singh

Human activities are changing the Earth's climate, and extreme weather, or climate events, are among the main ways we experience the impacts of this change. Use a combination of surface and satellite-based observations, climate modeling and machine learning to understand the physical causes of extreme events such as heatwaves, droughts, extreme precipitation and wildfires, how such events can be affected by natural climate variability and projected climate change, and how climate variability and change can affect food security, water availability and public health.

Community Ecology and Global Change Biology

Jonah Piovia-Scott

Explore the effects of a rapidly changing environment on populations, communities and ecosystems. Apply a combination of field studies, laboratory experiments and statistical modeling to investigate ecological responses to environmental change. Projects often focus on amphibians. Current research examines the spread of amphibian pathogens through trade networks and the impacts of amphibian disease, the effects of climate change on at-risk amphibians, the ecological impacts of beavers and the effects of hurricanes on coastal ecosystems.



To understand endangered species and conservation, Cheryl Schultz tracks butterflies on the prairies.

Conservation Biology

Cheryl Schultz

Examine the recovery of rare species and restoration of their habitats using field and quantitative methods. Develop an understanding of how individual, population and landscape-level processes contribute to the population viability of endangered species and how they are affected by conservation interventions.

John Bishop studies plants and animals in the pumice plains of Mount St. Helens.

Disturbance Ecology

John Bishop

Learn about the forces that shape the development of biological communities and associated ecosystems on landscapes left barren by Mount St. Helens' 1980 eruption. Recent work focuses on effects of insect herbivores, anthropogenic nitrogen deposition and soil microbes.

Environmental Hydrodynamics Laboratory

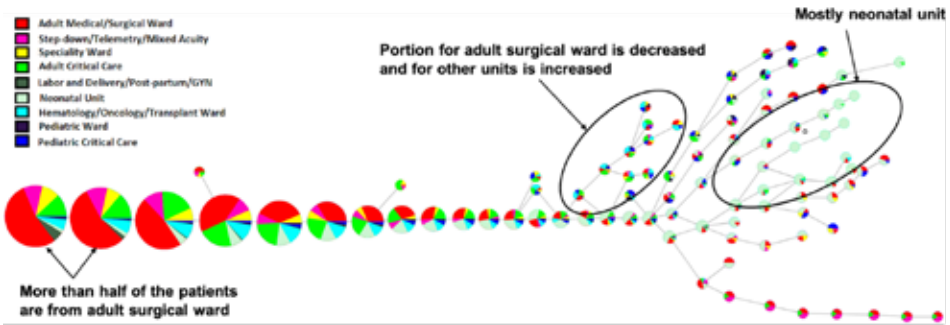
Stephen Henderson

Study natural water flows and gain expertise by working with a variety of scientific tools, ranging from extensive field measurements to computer simulations and original theoretical models. In the long run, an improved understanding of environmental hydrodynamics wiil help managers plan for problems such as pollution, flooding and coastal erosion and engineers design better coastal structures such as jetties and breakwaters.

Geometry, Topology and Optimization

Bala Krishnamoorthy

Look at theoretical and applied problems from algebraic topology, geometric measure theory, optimization and machine learning. Collaborate with orthopedic surgeons, biologists, physical chemists, agronomists, criminologists, electrical engineers, computer scientists and mathematicians.

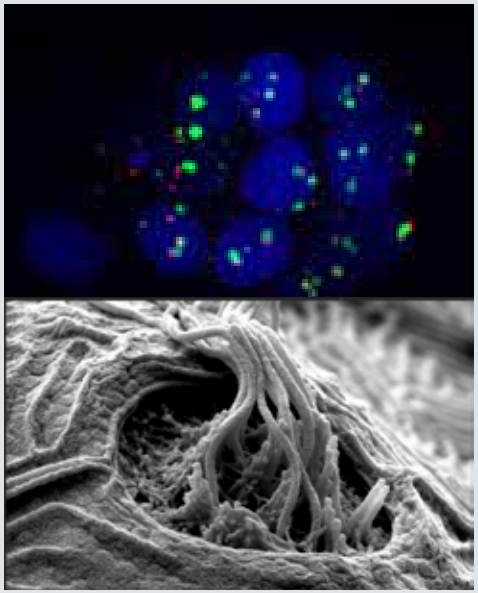


Global Change and Watershed Biogeochemistry

John Harrison

Largely due to human activities associated with food and energy production, nutrients such as nitrogen and phosphorous are flowing at unprecedented rates into streams, rivers and coastal waters, with marked environmental consequences. Use experiments, field observations, remote sensing and computer modeling to study streams and watersheds. The goal is to learn how nutrients and carbon are mobilized, transported and transformed, as they move downstream through watersheds and how these nutrients affect aquatic ecosystems. Do this work with an eye toward the generation both of a new fundamental understanding of nature and the production of knowledge that can enhance the sustainability of human and natural systems.

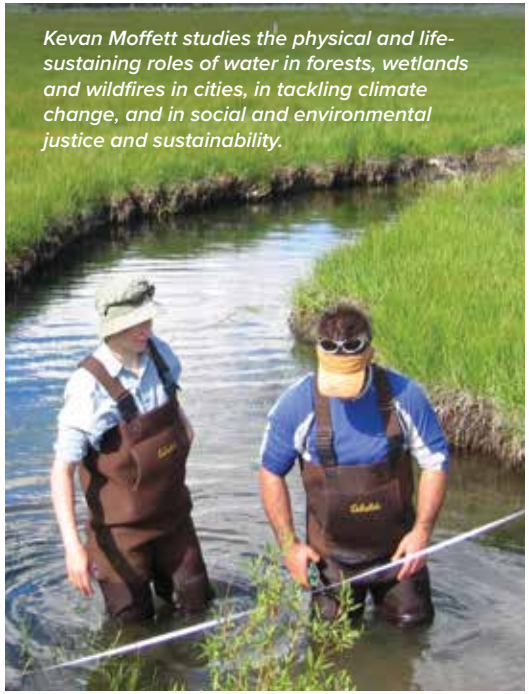
John Harrison studies how human activities and natural processes interact to control nutrient flows and associated impacts in aquatic ecosystems ranging from streams to coastal waters.



Hearing Modulation Laboratory

Allison Coffin

Hearing is one of our basic senses, allowing us to communicate and perceive the world around us. Study hair cells—not the cells on your head—but the cells in your inner ears. The research addresses fundamental and applied questions about how external factors (diet, noise exposure, medication use) and internal factors (hormones, age) influence hearing health. Projects use a variety of animal models, including zebra fish, rodents, plainfin midshipman fish and salmon.



Kevan Moffett studies the physical and life-sustaining roles of water in forests, wetlands and wildfires in cities, in tackling climate change, and in social and environmental justice and sustainability.

Hydrology, Ecohydrology and Landscape Dynamics

Kevan Moffett

Water defines our planet. Follow it wherever it goes—across landscapes, underground, through plants and cities—and investigate how it shapes and sustains natural environments and human systems. Learn how water is a vital and finite resource and an agent of both subtle and catastrophic landscape change, even as it is the circulatory system connecting the earth, biosphere, atmosphere and oceans.

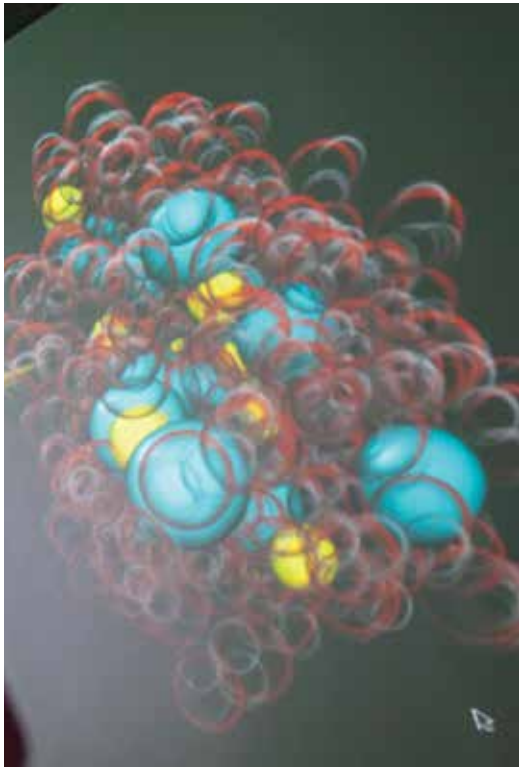
Mathematical Biology

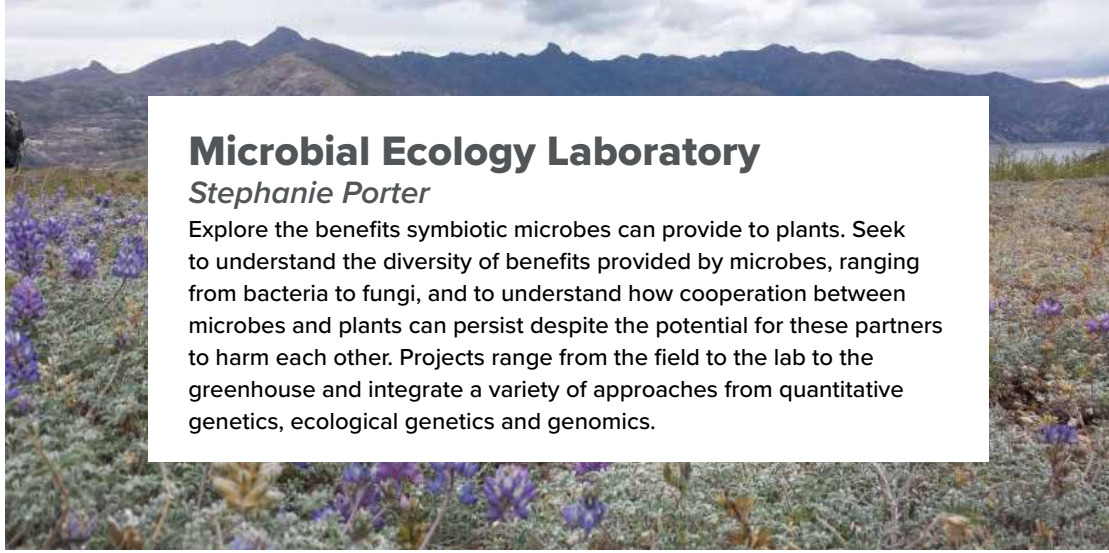
Alexander Dimitrov

Explore neural information processing, neural coding and information representation in biological systems. Learn about the information processing functions of neural ensemble activity and the biological mechanisms through which these functions are implemented. Apply model neural systems in novel neuromorphic computers.

Nikolay Strigul

Mathematical methods in concert with field and experimental studies can improve understanding of multiple-scale biological phenomena. Bring mathematical biology to bear on specific areas of ecology and environmental science, such as ecotoxicology, soil, microbial and avian ecology, and the self-organization patterns of forested ecosystems.





Microbial Ecology Laboratory

Stephanie Porter

Explore the benefits symbiotic microbes can provide to plants. Seek to understand the diversity of benefits provided by microbes, ranging from bacteria to fungi, and to understand how cooperation between microbes and plants can persist despite the potential for these partners to harm each other. Projects range from the field to the lab to the greenhouse and integrate a variety of approaches from quantitative genetics, ecological genetics and genomics.

Doctoral student Luke Reyes collects tree litter to gauge carbon and nitrogen impact.

Stable Isotope and Organic Geochemistry Laboratory

Marc Kramer

Use stable isotopes and environmental chemistry analytic techniques (ion chromatography, inductively coupled plasma, organic carbon and nitrogen analyses) to study organic and inorganic matter in both natural and human-altered environments. Study interactions among climate, the biosphere and soils from sites around the world and here in the Pacific Northwest. Use these tools to better understand the relationship between humans and soil, and to better understand the biogeochemical effects of climate change.

Zebra Fish Pigment Cell Biology Laboratory

Cynthia Cooper

Research the biology of pigmentation, using zebra fish to ask questions regarding the cell biology of pigment and skin cell development in humans. Black pigment cells, or melanocytes, reside throughout human skin, in hair follicles and eyes, and are essential in providing color to those features and tanning the skin. Similar cells are present throughout the animal kingdom and serve a variety of purposes, including mate choice in ducks, warning response in frogs and social behavior in fish.

Cynthia Cooper uses tiny zebra fish to ask questions relevant to human skin cells.

DEGREE PROGRAMS

Biology *and* Environmental Science

DEGREES:

- M.S. and Ph.D. in biology
- M.S. and Ph.D. in plant biology
- M.S. and Ph.D. in environmental and natural resource sciences

RESEARCH AREAS IN VANCOUVER

- Adaptation genomics
- Animal behavior
- Butterfly ecology
- Climate change and impacts
- Community ecology
- Conservation biology
- Disturbance ecology
- Ecology of aquatic invasive species
- Ecosystems ecology
- Environmental physics
- Evolutionary ecology
- Global change biology
- Marine and freshwater plankton ecology
- Microbial ecology
- Oceanography
- Plant ecology
- Plant-herbivore interactions
- Plant-insect interactions
- Restoration ecology
- Successional dynamics
- Watershed biogeochemistry

Mathematics *and* Statistics

DEGREES:

- M.S. and Ph.D. in mathematics
- M.S. and Ph.D. in statistics
- Graduate minor in statistics

RESEARCH AREAS IN VANCOUVER

- Applied math
- Computational algebraic topology
- Computational neuroscience
- Ecological modeling
- Mathematical biology

Molecular Biosciences *and* Neuroscience

DEGREES:

- M.S. and Ph.D. in molecular biosciences
- Ph.D. in neuroscience

RESEARCH AREAS IN VANCOUVER

- Cell and developmental biology
- Computational neuroscience
- Hair cells and hearing
- Molecular biology
- Neuroscience
- Zebra fish genetics

Questions?

Contact the graduate program coordinator

360-546-9636 • van.cas.gradcoordinators@wsu.edu

GET STARTED

For admission to graduate programs in the natural sciences at WSU Vancouver, you must have a faculty advisor. Contact a faculty member whose research matches your interests before you apply.

ADAPTATION GENOMICS LABORATORY
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Cynthia Cooper
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A BEAUTIFUL PLACE FOR WORLD-CLASS RESEARCH.

WSU Vancouver is only **20 minutes** from Portland, **90 minutes** from the Pacific coast and boasts gorgeous views of Mount St. Helens, Mount Hood and Mount Adams.

WASHINGTON STATE UNIVERSITY
VANCOUVER

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