13th Annual Pacific Northwest Water Research Symposium

ABSTRACT BOOK

Oregon State University

WATER RESEARCH SYMPOSIUM

SCAN ME

Water in Our Communities

April 17-18th, 2023

CH2M Hill Alumni Center, Oregon State University

From the Planning Committee

April 2023

Dear Symposium Participants,

The 2023 Pacific Northwest Water Resources Symposium Planning Committee would like to recognize the efforts of those presenting and speaking at this year's event and also highlight the selection of this year's theme, "Water in Our Communities."

First, we want to thank all of those who are speaking, presenting, or sharing their research, art, or words with us at this year's symposium. This two-day, student-centric conference highlights outstanding student research in the fields of water resources science, engineering, and policy. Each year, the symposium provides a valuable opportunity for the exchange of ideas among students, university faculty, professionals working in water resources, and the surrounding community, and would not be possible without the efforts of its many contributors and attendees.

This year, the planning committee chose the theme "Water in Our Communities" to provide an opportunity to explore water-related issues at different scales. At its core, this theme invites us to consider a few key questions. How do my communities think about and interact with water? What can I learn from others? How can I serve my communities in more meaningful and impactful ways to address water resource concerns?

We hope that this theme makes space for participants to come together to share their experiences, knowledge, and ideas within a variety of different, but interconnected, areas of work and study. Finally, the committee would like to recognize those in water-related fields who are committed to building more resilient and just water futures.

Sincerely,

The 2023 Pacific Northwest Water Research Symposium Planning Committee

2023 Planning Committee

Laura Duffy (Chair)
Eliza Amstutz
Zach Butler
Zach Field
Sevval Gulduren
Maria Iglesias
Keira Johnson
Sam Mawutor
Henry Pitts
Zoe Rosenblum
Michael Winfield
Charles Wright
Dragomira Zheleva

Symposium Schedule

DAY 1: Monday, 17th

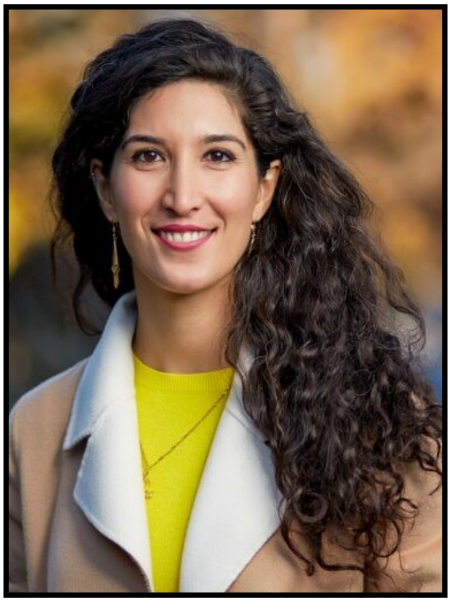
Time	Activity	Location
8:00-9:00	*The Strong People* Documentary Screening	Ballroom A/Lobby
9:00-10:50	Poster Session and Art Display	Ballroom B
11:00-12:00	Dam Removal Panel	Ballroom A
12:00-12:25	Lunch Break	Lobby
12:30-1:30	Keynote Speaker & Lunch: Raha Hakimdavar	Ballroom A
1:40-3:30	Oral Session	Ballroom A
3:40-5:00	Global Perspectives Panel: Two Way Interaction	Ballroom A

DAY 2: Tuesday, 18th

Time	Activity	Location
8:30-9:00	Breakfast and Check-In	Lobby
9:00-10:50	Oral Session	Ballroom A
11:00-12:00	Career Panel	Ballroom A
12:00-1:10	Networking Lunch	Ballroom A/Lobby
1:15-2:20	Keynote Speaker: Racquel Rancier	Ballroom A
2:30-3:45	Water Negotiation Workshop: Aaron Wolf	Ballroom A
3:45-4:00	Closing Ceremony	Ballroom A

Keynote Speakers

DAY 1: 12:30-1:30

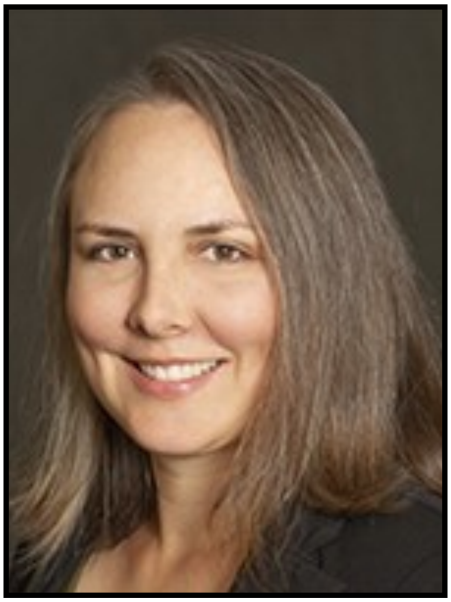


Dr. Raha Hakimdavar

Zyon Space

Dr. Raha Hakimdavar is Founder and CEO of Zyon Space, a climate-tech startup which develops climate solutions to close the risk to resilience gap using the vantage point of space. She was formerly the Director of Space Sciences at Ball Aerospace, where she developed business strategy and led engagements with NASA and the broader space sciences community. She is also an adjunct professor at Georgetown University's School of Foreign Service. Previously, Dr. Hakimdavar served as a hydrologist and acting national program lead in remote sensing and geospatial analysis research at the USDA Forest Service, where she developed innovative approaches to manage forest and aquatic resources in the United States and internationally. Dr. Hakimdavar earned a M.S. and Ph.D. in civil engineering with an emphasis on hydrology from Columbia University. She was a Fulbright Scholar in Water Management at the Delft University of Technology in the Netherlands and was awarded the KLM Airlines Sustainability and Innovation award for her work and research on hydro-ecology.

DAY 2: 1:15-2:20



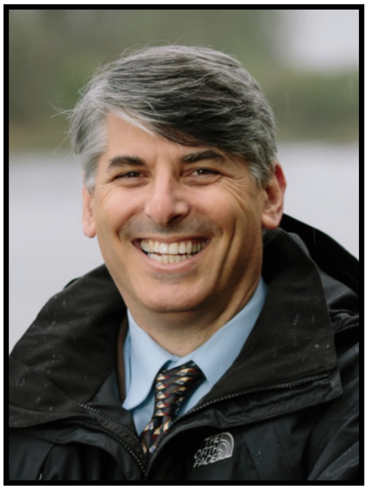
Racquel Rancier

Oregon Water Resources Department

Racquel R. Rancier is the Deputy Director of Strategy and Administration for the Oregon Water Resources Department, where she oversees the Department's work on legislation, public records, rule-making, communications, government-to-government relations, the State's Integrated Water Resources Strategy, information technology, employee services, fiscal services, grants, and complex basin issues. Previously, she worked at the Oregon State Legislature, providing nonpartisan policy analysis for the Legislature's natural resources committees. Ms. Rancier received a Master of Science degree in Water Policy and Management and a graduate certificate in Water Conflict and Transformation from Oregon State University. In 2020, the Association of State Dam Safety Officials (ASDSO) awarded her the 2020 West Regional Award of Merit for her outstanding contribution to dam safety policy in Oregon.

Workshops

DAY 2: 2:30-3:45



Water Negotiation Workshop

Dr. Aaron Wolf, Oregon State University

Participants will build skills to facilitate successful communication around water cooperation and diplomacy.

Aaron T. Wolf, PhD is a professor of geography at Oregon State University, USA, with an appointment as professor of water diplomacy at IHE-Delft Institute for Water Education in the Netherlands. He has acted as consultant to the US Government, the World Bank, and several international governments and development partners on various aspects of water resources and conflict management. A trained mediator/ facilitator, he directs the Program in Water Conflict Management and Transformation, through which he has offered workshops, facilitations, and mediation in basins throughout the world.

Panels

DAM REMOVAL PANEL, DAY 1: 11:00-12:00

Chaired by Kristine Alford, a PhD student in Fisheries and Wildlife at Oregon State University. This panel highlights a phenomenon currently garnering a lot of attention in the Pacific Northwest and beyond: the removal of dams. Panelists consider common reasons for dam removal, benefits and risks associated with dam removal, social and ecological dimensions of removing dams, and much more.

Desiree Tullos, PhD, PE (OSU)

Desiree Tullos, PhD, PE (OR) is a Professor in the Biological and Ecological Engineering Department at Oregon State University. Her research emphasizes the sustainable engineering and management of rivers. Projects focus on questions that range from the particle to basin scale. Current projects include a) Physical and biological responses to dam removal, b) analysis of reservoir operations in systems undergoing change, c) Turbulence and habitat of flow around vegetation and wood in rivers, d) Sustainable flood risk management and infrastructure, and e) using turbulent mixing to suppress harmful algal blooms. She currently serves on the Independent Scientific Advisory Board for Bonneville Power Administration's Northwest Power and Conservation Council and the US Army Corps of Engineers' Environmental Advisory Board.

Richard Whitman (OWRD and ODFW)

Richard is the Klamath Coordinator for the Oregon Water Resources Department and Oregon Department of Fish and Wildlife. He served as Director of the Oregon Department of Environmental Quality, Natural Resources Advisor to the governor, Director of the Oregon Department of Land Conservation and Development, and the Attorney In Charge for the Natural Resources Section of the Oregon Department of Justice. Richard holds a Masters of City and Regional Planning from M.I.T. and a J.D. from U.C. Berkeley.

Scott Wright, PE, PMP, D.WRE (River Design Group)

Scott is a Principal at River Design Group where he manages river restoration and fish passage projects throughout the Western United States. With over 30 years of engineering and project management, Scott brings a holistic view to projects from his experience in all phases including planning, design, and on-site construction. Scott has been the engineer of record for over 50 fish passage culverts and 25 dam removal projects and is one of the few consultants that has worked on the Klamath River dam removal projects for over 10 years. Scott was awarded the "Spirit of the Oregon Plan" from the Oregon Watershed and Enhancement Board for his steadfast dedication to watershed restoration. Outside of work, Scott enjoys everything in nature and especially pursing roosterfish in Mexico, steelhead in Oregon, and permit in Belize on the fly.

Panels

TWO-WAY INTERACTION PANEL, DAY 1: 3:40-5:00

This panel, "Global Perspectives: Two-Way Interaction between Community and (Water) Science," was organized by the OSU Water JEDIs (Justice, Equity, Diversity, and Inclusion) team and is moderated by Sam Mawutor, a second year PhD student in Geography. This panel grapples with a number of topics, including: navigating your position as a researcher in a community, two-way interaction between communities and water science, community perceptions of water, concepts of validity in community-centered work, and the many facets of conducting international research.

Nuha Alagaidi (OSU)

Nuha Alagaidi received her master's degree in Water Resources Engineering from Oregon State University (OSU) in 2022. She is an expert at the Hauge Center for Strategic Studies and a volunteer at Corvallis School District. She chaired the OSU Water Resources Graduate Program Equity and Inclusion team, now the Water JEDIs.

Alexa Britton (OSU)

Alexa Britton is a first-year PhD student in the Geography program at OSU. Her interest in water resource management began at a young age, due to her upbringing in Pacific Northwest K-12 education that placed a heavy emphasis on the health of Washington's rivers. Rooted in regenerative studies and human geography, Britton's research focuses on the relationship between local communities, governing bodies, industries, and the natural environment in order to improve resource management strategies. Past research projects include "Developing Lithium Valley: Green Extractivism and the Importance of Community Engagement for a Just Transition" and research at the Tijuana River National Estuarine Research Reserve on Enterococcus Exceedance Events on Southern California Beaches in Relation to Tijuana River Flow and The Role of Citizen Science in Determining the Long-Term Establishment of Tropical Species in Southern California Estuaries.

Alexandra Caplan (OSU)

Alexandra Caplan is a PhD candidate in Geography at Oregon State University. Her research brings a multi-scalar perspective to hydropolitical analysis, with a focus on how power influences transboundary water interactions at different spatial scales. Her research aims to utilize this knowledge to understand how seemingly intractable water conflicts may be transformed into more equitable and sustainable situations, with a focus on the Middle East. Alexandra is the manager of the Transboundary Freshwater Diplomacy Database, a global repository of data relating to the governance of internationally shared freshwater resources. She is also a visiting researcher at the Environmental Law Institute, where she has coordinated a Massive Open Online Course (MOOC) on Environmental Security and Sustaining Peace, which attracted a global cohort of over 10,000 learners across its three iterations. Alexandra also contributed to an evaluation of GEF support in fragile and conflict-affected situations, with a focus on the conflict sensitivity of GEF-funded projects in Lebanon. She is a founding member of the Environmental Peacebuilding Association and a member of the North American Youth Parliament for Water.

Dr. David Lewis (OSU)

David Lewis, PhD is an OSU Assistant Professor of Anthropology and Ethnic Studies & Indigenous Studies. Member of the Grand Ronde tribe, descended from Chinook, Takelma, and Santiam Kalapuya people of western Oregon. Professional consultant, educator and researcher he teaches at Oregon State University, and contracts with tribes, local governments and nonprofits. David works in areas of archival development and research, exhibit curation, traditional cultural properties, western Oregon tribal ethnohistory, tribal maps, and traditional ecological knowledge (TEK). David is a lifetime member of the American Anthropological Association and on the Advisory Board of the Oregon Encyclopedia. David regularly makes presentations to large and small groups, writes articles and essays and has the blog The Quartux journal (ndnhistoryresearch.com) with more than 500 essays about Tribal history.

Adrianna Nicolay (OSU)

Adrianna L Nicolay (she/they) is a Diné graduate student from Shiprock, NM, on the Navajo Nation. They are currently working toward a Ph.D. in Geography at the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University. She received a BA in Environmental Science from Willamette University in 2019 and an MS in Water, Society, and Policy from the University of Arizona in 2021. With their training on water policy, traditional ecological knowledge, and Indigenous methodologies, her research focuses on Indigenous relationships with water and how important they are to Indigenous futures in climate change. She is an alumnus of the Indigenous Food, Energy, and Water Security and Sovereignty (Indige-FEWSS) Training Program, former Director of Indigenous Partnership Programs at Willamette University, and former Community Engagement intern at Watershed Management Group in Tucson, Arizona.

Panels

CAREER PANEL, DAY 2: 11:00-12:00

Michael Ahr (Benton SWCD)

Michael Ahr joined Benton SWCD in April 2021 and oversees conservation programs as well as coordinating the Willamette Mainstem Cooperative and Invasive Species Program. Much of the Willamette River work that Michael manages relates to Aquatic Invasive Species, but he's also trying to engage farmers and land managers in river conservation on their properties. Prior to his work at Benton SWCD, Michael worked at West Multnomah SWCD for 11 years assisting woodland owners in developing and implementing management plans for their properties. Forest restoration projects included thinning, habitat enhancements, invasive species control, and erosion prevention. Michael has a B.S. from Ohio State University in Wildlife Management and a M.S. from the Oregon State University College of Forestry where he focused on Natural Resources Education & Extension.

Jordan Beamer (OWRD)

Dr. Jordan Beamer is currently the ET and Water Use Program Coordinator at the Oregon Water Resources Department (OWRD), where he started as a Hydrologist in 2016. He is the Department's technical lead on the remote sensing of evapotranspiration (ET) technology and is currently collaborating with researchers from Desert Research Institute (DRI), OpenET, and USGS to apply Landsat-based ET models to estimate ET and consumptive use from irrigated lands statewide. In addition to water-related pursuits, he serves on the OWRD Diversity, Equity, and Inclusion team, is a board member for the Corvallis Environmental Center, and lives in Corvallis with his wife and two young kids. (PhD, Water Resources Engineering, Oregon State University; MS, Hydrogeology, University of Nevada Reno; BS, Earth Sciences, Montana State University)

Leah Cogan (GSI)

Leah is a water resources analyst with GSI Water Solutions. Her work focuses on water supply planning, water rights transactions and management, source water protection, groundwater sustainability, and climate change and drought adaptation. She joined GSI in 2020 after completing her MS at Oregon State in Water Resources Policy and Management.

Amalia Handler (EPA)

Dr. Amalia Handler is a Research Biologist with the EPA's Office of Research and Development in the Pacific Ecological Systems Division. Amalia's research focuses on how water quality is impacted by nutrients and harmful algal blooms under changing climate and land use patterns. Amalia earned her PhD from Arizona State University where she studied nitrogen cycling in urban wetlands and dryland streams and started at the EPA in 2020.

Holly Purpura (Marys River Watershed Council)

Holly joined Marys River Watershed Council as its Executive Director in September 2018. Within this role, she brings years of experience in non-profit leadership, fiscal administration, grant writing, project management, watershed-wide restoration, and environmental education. She also brings with her a fierce passion for the Earth and a love of working with the community. Prior to joining the Marys River team, Holly was the Executive Director of Friends of Deckers Creek based in West Virginia, and she also previously worked for National Geographic Education and The Hunger Project UK. Holly is a graduate of the West Virginia University Geography and Political Science Departments.

Ingrid Timboe (Alliance for Global Water Adaptation)

Ingrid Timboe (WRGP '16) is the Policy Director at the Alliance for Global Water Adaptation (AGWA), where she works with the UNFCCC, countries, cities, and other stakeholders to integrate climate-resilient water management into national policy instruments. She also co-hosts the ClimateReady podcast with Alex Mauroner. Ingrid holds a Master's of Science Degree in Water Resources Policy and Management, focused on transboundary waters, and a Bachelor of Arts Degree in International Affairs.

Poster Sessions

DAY 1 & 2

#	Poster Title	Name	Affiliation
PP1	Population Characteristics of Pacifastacus Leniusculus (Dana 1852) in Tryon Creek, Oregon	Kyla Schmitt	University of Oregon
PP2	Assessing the Resilience of Agricultural and Hydrological Systems in the Umatilla River Basin to Climate Change-Induced Droughts	Sudip Gautam	Oregon State University
PP3	Aerobic Cometabolism of 1,4-Dioxane, cis-Dichloroethylene, and 1,1,1-Trichloroethane by Polyvinyl/Sodium Alginate Hydrogel Beads Co-encapsulated with Rhodococcus rhodochrous ATCC 21198 and Slow-Release Growth Substrates TBOS and 2TBOS: Column Studies	Kestrel Bailey	Oregon State University
PP4	Improving Rural Access to Clean Water: Lessons from the Rural Nurture Initiative, ÄôS WASH Project in Nigeria	Damilola Olajubutu	Oregon State University
PP5	Sixty-five years of sediment export from small, steep, forested watersheds: effects of floods, forest harvest, forest regeneration, and wildfire	Charles Wright	Oregon State University
PP6	Streamflow response to snowpack variability in the Kenai Peninsula and Prince William Sound regions of Southcentral Alaska	Dean Anderson	Oregon State University
PP7	Using Wastewater-Based Epidemiology to Monitor Diseases in Communities Across Oregon	Benjamin Cao-Minh	Oregon State University
PP8	The Effects of Wildfire on the Spatial Variability in Soil Hydraulic Conductivity	Cedric Pimont	Oregon State University
PP9	Plant-mediated hydraulic redistribution: a valve controlling watershed solute transport?	Alex Redlins	Oregon State University

Poster Sessions

DAY 1 & 2

#	Poster Title	Name	Affiliation
PP10	What is the Signal of Extreme Temperature Events in Headwater Streams and How Do These Signals Impact Coho Salmon Spawning?	Sara Windoloski	Oregon State University
PP11	SARS-CoV-2 Wastewater Concentration and Public Health Indicator Correlation Analysis for Washington County	Anirudh Bhatia	Oregon State University
PP12	Longevity of Large Wood Restoration Success to Improve Coho Salmon Habitat: A 2D Modeling Approach	Maddie Maffia	Oregon State University
PP13	Drivers of Carbon Concentration and Character Through a River Network Following a 2020 Oregon Wildfire	Katie Wampler	Oregon State University
PP14	Drivers of Carbon Concentration and Character Through a River Network Following a 2020 Oregon Wildfire	Justine Obiazi	Oregon State University
PP15	Using GIS to supplement hydrologic data in coastal headwater streams	Megan Duncan	Oregon State University
PP16	Patterns of diversity in adult aquatic insects from intermittent and perennial streams at the H.J. Andrews Experimental Forest	Tatiana Latorre	Oregon State University

Oral Sessions

DAY 1: 1:40-3:30

#	Time	Presentation Title	Name	Affiliation
OP1	1:41p	Individual based modeling of Stage 0 treatment on juvenile Chinook	Aleah Hahn	Oregon State University
OP2	1:52p	Spatial Divergence of Overlapping Narratives of Glacier Retreat and Salmon Declines in Washington State	Jenna Travers	University of Oregon
OP3	2:03p	Large wood hydraulics: Using structure from motion to estimate flood depths	Michal Tutka	Oregon State University
OP4	2:14p	Biological Treatment of BTEX and MTBE Contaminated Water with Rhodococcus rhodochrous ATCC Strain 21198	Juliana Huizenga	Oregon State University
OP5	2:25p	What is the impact of forest harvesting and wildfire on soil properties and water quality? Observations from a western Oregon watershed after compound disturbance	Kate McCredie	Oregon State University
OP6	2:36p	Relationship between isotope ratios in precipitation and streamflow across watersheds of the National Ecological Observation Network	Zach Butler	Oregon State University
OP7	2:47p	Importance of including underflow in hyporheic models	Paige Becker	Oregon State University
OP8	2:58p	Kiwa Spring	Autumn Pruett	Central Oregon Community College
OP9	3:09p	Machine Learning Approaches on Floodplain Roughness and its Seasonal Variation	Gabriel Barinas	Oregon State University
OP10	3:20p	The Effects of Physiography on Flow Paths and Water Storage in a Mountainous Catchment	Zachary Perry	Oregon State University

Oral Sessions

DAY 2: 9:00-10:50

#	Time	Presentation Title	Name	Affiliation
OP11	9:01a	Channel evolution in fine grain sediments during reservoir drawdowns	William Nuckoles	Oregon State University
OP12	9:12a	Drivers of Relative Streamflow Contributions and Flow Paths in Mountainous Headwater Streams	Jaime Ortega	Oregon State University
OP13	9:23a	Runoff, Rangelands, and Ruminants: Quantifying the Water Quality Impacts of Manure Application in Oregon	Pierce McClendon	Oregon State University
OP14	9:34a	Exploring groundwater resource vulnerability and water security in Quintana Roo, Mexico.	Maria Iglesias-Thome	Oregon State University
OP15	9:45a	Building WUI Water Distribution Resilience; Reflections on Adaptive Capacity following the Camp and Tubbs Wildfires	Eliza Amstutz	Oregon State University
OP16	9:56a	Engaging Agricultural Landowners in Fish Habitat Restoration on Private Land: The Role of Trust in a “Tough Case”	Laura Duffy	Oregon State University
OP17	10:07a	Basins of Opportunity and Ranges of Scenarios: Pathways to Transformation in the Chewaucan	Henry Pitts	Oregon State University
OP18	10:18a	Establishing fluvial silica regimes and their stability across the Northern Hemisphere	Keira Johnson	Oregon State University
OP19	10:29a	Predicting Pipe Diameter of Water Distribution Networks with Machine Learning	Jason Poff	Oregon State University

Poster Presentation Abstracts

PP1: Population Characteristics of Pacifastacus Leniusculus (Dana 1852) in Tryon Creek, Oregon

Author(s): Kyla Schmitt

Pacifastacus leniusculus (Dana 1852) is a freshwater astacid native to the Columbia River basin and widely introduced throughout Europe. Though P. leniusculus populations have been well-studied abroad, where their presence is of critical concern, far fewer publications have examined these crayfish within their native range, where they play keystone roles in freshwater ecosystems and risk out-competition by exotic crayfish. The goal of this study was to characterize the morphology of P. leniusculus populations in a small Oregon creek,ÄîTryon Creek,Äîand the surrounding habitat conditions via surveying in June,ÄìSeptember 2022. These surveys confirmed that Tryon Creek remained pre-exotic-invasion, with a mean P. leniusculus density of 0.08 m-2. The two-year P. leniusculus survivorship approximation was 46%, though there was nearly one injured appendage for every two Tryon Creek crayfish. Branchiobdellidan distribution was widespread and more common than not in crayfish larger than 68 cm TL; coloration was also associated positively with maturity ($p < 0.01$). Crayfish struggled to navigate culvert habitats, and juveniles tended to reside gregariously ($p < 0.01$).

PP2: Assessing the Resilience of Agricultural and Hydrological Systems in the Umatilla River Basin to Climate Change-Induced Droughts

Author(s): Sudip Gautam and Meghna Babbar-Sebens

The resilience of a multi-stakeholder, socio-ecological system such as the Umatilla River Basin (URB) is complex and dynamic. The adaptive nature of different components of the river basin helps reorganize the system to a new state after perturbances such as droughts. Previous research, based on future climate projections, has shown that URB is susceptible to more frequent and severe drought events in the future. This study assesses the state of the drought resilience indicators in URB, identified using the Resilience Alliance's Practitioners Workbook and conceptual model for the resilience of URB, and provides an approach toward quantifying them. Quantitative and qualitative indicators of the resilience of the agricultural and hydrological systems in URB have been considered. Resilience indicators are quantified for the historical period (1981 ,Äì 2010) and RCP 4.5 as well as RCP 8.5 scenarios of the mid-century period (2030 ,Äì 2059). Resilience indicators are categorized into six categories: pressure, predictability, natural capital, economic capital, social capital, and risk attitude. The indicators are computed at two levels: zonal level and basin-wide. Results indicate a decrease in resilience indicator values for natural and economic capitals in the northwestern part of URB in future scenarios compared to the historical period. This might be of concern as that part of the basin has mixed land use dominated by irrigated agriculture and consists of population centers Umatilla and Hermiston. Spatial variability in the values of drought resilience indices within the zones illustrates multiple levels of climatic stresses and responses from the agricultural and hydrological systems. Categorizing drought resilience indicators into different categories helps us understand the drivers of resilience in the river basin and provides guidance for drought mitigation, planning and management efforts to enhance the long-term resilience of the basin to climate change-induced droughts.

PP3: Aerobic Cometabolism of 1,4-Dioxane, cis-Dichloroethylene, and 1,1,1-Trichloroethane by Polyvinyl/Sodium Alginate Hydrogel Beads Co-encapsulated with Rhodococcus rhodochrous ATCC 21198 and Slow-Release Growth Substrates TBOS and 2TBOS: Column Studies

Author(s): Kestrel Bailey and Lewis Semprini

Mid-latitude montane systems are experiencing shifts in the timing, amount, and type of precipitation. Increasing air temperature encourages earlier snow melt and extends growing seasons. In addition, sub-alpine regions in the Western United States are experiencing conifer stand encroachment into aspen stands. These external drivers may impact the watershed hydrodynamics and carbon fluxes. Multiple studies suggest that soil organic carbon (SOC) is more stable in soils beneath aspen stands than conifer stands, so a shift in vegetation could directly influence local carbon budgets, soil formation processes (e.g., aggregate stability), and chemical weathering fluxes. It is proposed that differences in microbial activity and community diversity may explain the differences in SOC stability. Rooting patterns and moisture preferences of the two vegetation types may also dictate the water available for SOC decomposition and alter chemical weathering fluxes from the soil and bedrock. Given that underlying lithology controls the minerology and texture material that moves into the soil zone we also focus on how changes are either amplified or reduced across varying lithologies. This research hopes to explore whether chemical weathering of underlying bedrock is more impacted by SOC dynamics or hydrodynamics beneath aspen and conifer that grow over granite or sandstone bedrock. It is hypothesized that the granite bedrock with the highest stable SOC and least moist soils will be the least weathered, while the sandstone bedrock with the least stable SOC and most moist soils will be the most weathered. To test this hypothesis, cation exchange capacity and dissolved CO2 in pore waters, which may be proxies for SOC content and the mineralization of C, will be measured at various depths. These measurements will be used to build a reactive transport model and we will assess the sensitivity of chemical weathering fluxes to varying SOC and hydrologic dynamics associated within aspen and conifer stands.

PP4: IMPROVING RURAL ACCESS TO CLEAN WATER: LESSONS FROM THE RURAL NURTURE INITIATIVE,Äôs WASH PROJECT IN NIGERIA

Author(s): Damilola Olajubutu, Agboola, H. O., Adeleye, J. I., Oladimeji, A. A. and Ogunnubi, O. D.

Water is a fundamental human right that is important for achieving the Sustainable Development Goals (SDGs), particularly SDG 6: clean water and sanitation. Equitable water access must be guaranteed to promote good health, sanitation, and hygiene in all countries. In 2018, 60 million Nigerians were living without access to adequate drinking water, and the country's Water, Sanitation, and Hygiene (WASH) sector was deemed to be in a state of emergency. Rural residents lack access to appropriate, affordable, and locally made technology to meet their WASH needs. The Safe Rural Water Project of the Rural Nurture Initiative (RNI), which was implemented in Agele village, Ibarapa East LGA, during the COVID-19 pandemic, deploys bottom-up approaches to rural water infrastructural development. In this paper, we used the social construction theory and advocacy coalition framework to assess and draw lessons from the organization,Äôs activities targeted at increasing water access and improving hygiene among rural and at-risk communities in Nigeria. Using qualitative interviews and focus groups with different stakeholders, we conclude that the timely implementation of RNI's water project intervention was instrumental in improving portable water facilities during the pandemic and pivotal to promoting local participation and ownership of community projects. It is recommended that sustainable rural water policies that encourage community project ownership be promoted to address water challenges in rural Nigeria.

PP5: Sixty-five years of sediment export from small, steep, forested watersheds: effects of floods, forest harvest, forest regeneration, and wildfire

Author(s): Charles Wright

Bedload – the material rolling, sliding, or saltating along the stream bed – is a key indicator of landscape erosion, but few studies document multi-decade patterns of bedload export and its relationship to landscape disturbance. This study took advantage of long-term measurements of bedload export from five headwater catchments in the steep, forested H.J. Andrews Experimental Forest. Bedload was measured annually in sediment basins in five monitored catchments ranging in size from 9 to 101 ha over the period 1957 to present, and bedload samples were collected in 2020, 2021, and 2022. The study examined how annual bedload export volume and bedload characteristics were related to disturbances including logging, floods, debris slides, and wildfires. In the 1950s, all five catchments were dominated by mature and old-growth forest regenerated after wildfire in the early 1500s and mid 1800s. Bedload export volume was related to peak flow magnitude in unlogged catchments (WS02, WS09) in the period before wildfire (2020). Bedload export volume increased following clearcutting of mature and old-growth forest (WS01, WS10) or patch cutting with roads (WS03) in the 1960s and 1970s, and after the 2020 wildfire (WS01, WS02, WS09). Surveys of stream channels of WS09 and WS10 in summer 2022 revealed that in-channel wood in WS09 (unlogged) stored nearly eight times more sediment than in WS10, where logging in 1975 and debris flows in 1986 and 1996 had removed large wood and depleted sediment storage in the channel. Average annual bedload export from WS09 (9 ha, burned) increased from 0.093 m3/ha before wildfire to 0.768 m3/ha after wildfire, while bedload export from WS10 (10 ha, unburned) was 0.031 m3/ha after wildfire. Physical characterization (particle size analysis, loss on ignition, and color analyses) of bedload samples from WS09 (burned) and WS10 (unburned) indicate that wildfire disturbance, post-fire mortality, unloading of sediment stored in channels, and hillslope ravel processes increased transportable organic (litterfall) and mineral material (root-throw) in bedload exported from burned catchments.

PP6: Streamflow response to snowpack variability in the Kenai Peninsula and Prince William Sound regions of Southcentral Alaska

Author(s): Dean Anderson, Mary Santlemann, and Rebecca Flitcroft

Accelerated climate change in northern high-latitude regions is altering temperature and precipitation patterns that affect the hydrology of streams in places like the Kenai Peninsula and Prince William Sound regions of Southcentral Alaska. The Chugach National Forest (CNF) is developing a climate change monitoring plan to inform adaptive management about climate induced shifts across the landscape. A component of their plan focuses on shifts in streamflow. For example, current climate trends are expected to result in decreased snowpack levels, mostly at elevations lower than 1500m, that will shift the dominant source of streamflow from snow to rain. In this study, the response in streamflow to snowpack variability was examined for unregulated streams in this region. Observations of spring snowpack, air temperature, and precipitation from nine snow telemetry stations were used to relate winter snowpack levels and summer precipitation to the magnitude and timing of spring freshet and summer low flow observations at 18 USGS streamgage stations. Using principal component analysis (PCA), the magnitude of spring freshet (snowmelt-generated high flow in spring) and summer low flow and the timing of spring freshet were found to be strongly correlated with winter precipitation and spring snow water equivalent. These results suggest that these variables could be useful for detecting change in the dominant source of streamflow. PCA results for the timing of summer low flow found a strong negative correlation with winter air temperature and summer precipitation. Although winter air temperature is a key determinant of snowpack levels, the negative correlation with summer precipitation decreases the effectiveness of this variable for detecting streamflow response to snowpack variability. In addition, a longitudinal streamflow monitoring pilot study is being conducted on the CNF along Glacier River Tributary. This study first explores the feasibility of using stage height rather than discharge to evaluate certain key hydrometrics as a less resource intensive method for monitoring streamflow. Secondly, it explores the variation in patterns of streamflow between streams of different order to determine whether there is any evidence that lower-order streams may be more sensitive to effects from climate change than higher order streams.

PP7: Using Wastewater-Based Epidemiology to Monitor Diseases in Communities Across Oregon

Author(s): Benjamin Cao-Minh

Oregon State University and the Oregon Health Authority, has used wastewater-based epidemiology to characterize the prevalence, transmission, and distribution of COVID-19, Influenza, and RSV across the state of Oregon. Compared to other infectious disease surveillance methods, wastewater epidemiology presents many advantages, including unbiased representation of the local community, cost effectiveness, and avoidance of testing fatigue. Starting in September 2020, the program has processed nearly 15,000 samples from over 40 cities. The concentration of the virus RNA in the wastewater is determined through RNA extraction and digital droplet PCR. In addition, the COVID-19 RNA is sequenced to determine variant type. Here we overview the statewide wastewater surveillance program, its processes, and its value to public health through the monitoring of infectious diseases.

PP8: The Effects of Wildfire on the Spatial Variability in Soil Hydraulic Conductivity

Author(s): Cedric Pimont and Kevin D. Bladon

Wildfires alter hydrologic processes in forested watersheds, including infiltration and runoff generation. Post-fire decreases in soil infiltration capacities can influence the timing and magnitude of peak flows, annual water yields, and delivery of sediment and nutrients to streams. However, post-fire changes in infiltration capacity may vary with burn severity and its influence on soil structure and water repellency. Although infiltration rates generally decrease post-fire, little is known about how it varies spatially across catchment topography and with burn characteristics. This presents a challenge when modelling and predicting post-fire watershed responses. The goal of this study is to quantify unsaturated soil hydraulic conductivity (K) at a high resolution (100s of sites) across both a burned and unburned watershed in the Oregon Cascades. In the unburned watershed, we expect that K will be variable across space; however, we expect there will be some spatial correlation with topography. Comparatively, in the burned watershed, we expect that soil hydraulic properties will have a stronger relationship with burn severity, overwhelming the topographic influences on hydraulic conductivity. During summer 2023, we will quantify K across both a burned (Double Creek) and unburned (Captain Creek) watershed. Double Creek burned in the 2022 Cedar Creek fire, which spanned over 50,000 hectares of the Willamette and Deschutes National Forests. We will quantify K using mini disc infiltrometers. In addition, we will characterize ground cover, soil texture, soil water content, and organic matter content from each sampling point. We will also develop spatial models by relating field data to burn severity, elevation, topographic wetness index, upslope accumulated area, and other spatial data layers. The model results will improve our understanding of the interaction between burn severity, topography, and soil hydraulic properties following fire, which will improve efforts to model post-fire watershed effects at broader spatial scales.

PP9: Plant-mediated hydraulic redistribution: a valve controlling watershed solute transport?

Author(s): Alex Redlins, Pamela Sullivan, Kamini Singha, Holly Barnard, Emily Graham, and Rahila Yilangai

Plants passively move water around in the subsurface from wet to dry soil via their roots in a process known as hydraulic redistribution. Soil moisture is an important regulator of microbial activity, organic matter decomposition, biogeochemical cycling, and soil properties. This passive redistribution of soil water may have important implications for a soil‚Äôs carbon carrying capacity, nutrient exchange, and soil structure, particularly in water-limited environments such as the Mediterranean climate of the Western United States. Our project seeks to elucidate the relationship between hydraulic redistribution, soil nutrient dynamics, and soil properties through a multi-year study which will combine data from a controlled greenhouse experiment with in situ data collected from two adjacent hillslopes at the HJ Andrews Experimental Forest; one which is known to experience hydraulic redistribution, and one which experiences little to no hydraulic redistribution. Recent work has revealed two types of ecohydrologic function associated with high and low hydraulic redistribution among the hillslopes of the Andrews Forest. Where trees have access to groundwater, moisture in the upper soil profile increased by nearly 2% daily. In contrast to this, hillslopes where tree access to groundwater is inhibited experience a daily moisture increase in the upper soil of <0.5%. Both types of ecohydrologic function have been documented on two adjacent hillslopes in the Andrews Forest. Our study will build on existing techniques for the identification and quantification of hydraulically redistributed water by combining transpiration and physiological measurements of trees with new geophysical methods for mapping the magnitude, location, geometry, and flow paths of near surface water. In conjunction with these techniques, we will be quantifying soil carbon pools via data collection of soil respiration and soil-carbon chemistry analyses. Furthermore, the classification of soil physical and hydrologic properties will be done through field and laboratory methods. Combined, this data will help us understand how surface vegetation influences subsurface

PP10: What is the Signal of Extreme Temperature Events in Headwater Streams and How Do These Signals Impact Coho Salmon Spawning?

Author(s): Sara Windoloski

Coho salmon are a threatened, cold-water species that rely on specific temperature and discharge cues within headwater streams to signal the onset of their upstream migration and spawning season. While there have been many research efforts aimed at quantifying the impact of climate change on coho migration and spawning cycles, little has been examined into the impact of climate extremes on these cycles. This research will answer two questions:1) what environmental conditions are required to produce extreme heat events in headwater streams, using coho,Äôs biological stream temperature threshold of 18 degrees Celsius, and 2) do these extreme stream temperature events alter coho spawning patterns.

My hypotheses to be tested are: 1) In years with extreme high temperatures, such as in the 2021 heat dome event in Oregon, elevated headwater stream temperatures will have an increase of the same magnitude as the heat event.

2) In years where these heat events occur, the redd construction season will be shortened.

To analyze my hypothesis, my research question can be examined in three parts:

1) How can we classify fish-relevant extreme years? To determine fish-relevant extreme years, PRISM temperature data along with stream temperature and discharge data from three gauges along the Smith River will be analyzed in R Studio with the ClimPACT2 software package along with a Gaussian distribution to calculate the indices for extreme weather years. These extreme weather indices will then be compared to the thermal tolerance and discharge range of coho to determine whether these extreme years would impact coho behavior in headwater streams.

2) How do extreme years with low flows and high temperatures impact redd construction season length of coho within the Smith River tributaries? Annual coho salmon surveys in the Smith River will be plotted in an ichthyograph to visually examine if the migration patterns from 2016-2022 were shortened when compared to the control from 2010-2016. Pearson,Äôs

PP11: SARS-CoV-2 Wastewater Concentration and Public Health Indicator Correlation Analysis for Washington County

Author(s): Anirudh Bhatia

Wastewater-based epidemiology (WBE) can help public health professionals better understand trends in COVID-19 cases in their community. As a surveillance method, WBE provides information on trends without sampling bias or sampling fatigue. Understanding how wastewater acts as a COVID-19 indicator within different contexts (e.g., high/low vaccination, high/low testing, etc.) is essential to adequately inform public health preparedness measures. COVID-19 viral concentrations were determined from influent samples to four wastewater treatment plans in Washington County between September 2020 and the present. These population-weighted averages of concentrations were correlated to public health metrics of clinal cases, test positivity, vaccinations, hospitalizations, and deaths for the county. The four facilities collect wastewater from over 95% of Washington County residents. The results of these correlations will be presented.

PP12: Longevity of Large Wood Restoration Success to Improve Coho Salmon Habitat: A 2D Modeling Approach

Author(s): Madelyn M. Maffia and Catalina Segura

Coho salmon abundances in Coastal Oregon watersheds have significantly declined since predevelopment conditions primarily due to the creation of undesirable stream characteristics for juvenile fishes during high flow conditions. Large wood (LW) additions have been a heavily practiced restoration mechanism used to improve native fish habitats. However, we lack information regarding LW's long-term benefits. We used a field-calibrated hydraulic model, Nays2DH, to evaluate hydraulic conditions relevant to acceptable fish habitat 2 to 6 years post LW restoration in three alluvial fish-bearing tributaries of the Siletz River in Coastal Oregon, USA. Acceptable salmon habitat was assumed when flow velocity was slower than the critical swim speed of the juvenile Coho fish (v_{crit} = 0.5 m/s) and stream bed refuge was stable represented by the likelihood of entrainment of the median size sediment particles in the stream bed. We observed that the maintenance of the initial benefits of the restoration effort estimated in an increase in the acceptable fish habitat of around 30% appears to depend on the original orientation of the LW pieces and the size of the stream relative to the size of the logs below the bankful flow.

PP13: Drivers of Carbon Concentration and Character Through a River Network Following a 2020 Oregon Wildfire

Author(s): Katie Wampler, Kevin D. Bladon, David Donahue, Karl Morgenstern, and Allison Myers-Pigg

In 2020, the Holiday Farm wildfire burned approximately 18% of the McKenzie River subbasin, which is the source water for ~200,000 people. Wildfires can substantially alter water quality, which has fueled concern about drinking water source quality following the Holiday Farm fire. Post-fire, the greatest water treatment challenges are often due to elevated turbidity and dissolved organic carbon (DOC). These water quality parameters are also critical to the health of aquatic ecosystems. Past studies have illustrated variable responses of DOC after fire; thus, it is important to improve our understanding of the underlying drivers of post-fire DOC changes. To do this we are collecting 131 water samples across the McKenzie subbasin four times during the year to capture variation in streamflow conditions. Samples will be analyzed for DOC concentrations and excitation emission matrices (EEMs) to describe the source, size, and aromaticity of the carbon molecules. During an early fall storm, two years post-fire, we did not find evidence that burn severity impacted DOC concentrations. However, we did observe that more severely burned areas had higher ratios of humic like to fresh organic matter suggesting that while the carbon concentrations may have recovered to pre-fire levels, the types of organic in the system remain affected by the fire. Next, we will develop spatial stream network (SSN) models to identify drivers of carbon concentrations and character. Additionally, the models will enable use to predict carbon concentrations and character along the stream network at a high spatial resolution (~100 m) and identify hotspots, which may facilitate future high temporal studies. Overall, we hope to better understand the mechanism of carbon transport to streams after wildfire, which will help us create better models describing post-fire conditions. Understanding how wildfire alters DOC is critical to preserve aquatic ecosystem health and source water quality.

PP14: Human Response to Different Methods of Uncertainty Visualization used for Development of Climate-resilient Watershed Conservation Plans

Author(s): Justine Obiazi, Meghna Babbar-Sebens, and Kristen Macuga

Researchers have devised numerous graphical methods of visualizing uncertainty, but the human response to these visuals is difficult to quantify due to several behavioral factors that cannot be completely and easily recorded, as shown by previous research studies. For example, inaccurate insights from the misinterpretation of uncertainty can lead to poor judgment by decision-makers. Further, previous research on the visualization of asymmetric in the performance of conservation practices in a watershed found that visualization of asymmetry can influence decisions preferred by end-users and test users. This study will utilize two visual aids, namely box plots with error bars and generalized line plots with uncertainty color ranges, to comprehend how humans respond behaviorally when presented with a display showcasing a conservation plan spanning a period of 0-50 years. The uncertainty in stream temperature fluctuations by the changing climate and mitigated by the riparian stream buffer will be investigated for the Umatilla River Basin, as the case study for this research. We expect that the research results from users,Äô experiments will help us identify which different visualization aids are effective in helping decision-makers make riparian buffer choices that improve the resilience and sustainability of stream temperatures in a changing climate.

PP15: Using GIS to Supplement Hydrologic Data in Coastal Headwater Streams

Author(s): Megan Duncan

Headwater streams are considered vulnerable to the impacts of climate change due to their small size and high sensitivity to changes in local hydrologic variables. Hydrologic variables such as precipitation type and precipitation patterns are expected to become altered as the climate continues to change. Watersheds located in the Oregon Coast Range are classified as rain-dominated systems. With precipitation patterns as a main driver for hydrologic processes, headwaters located in this area are especially subject to change. To effectively prepare for these changes it is crucial to understand how headwater streams have responded to changes in the climate in the past, to estimate their future responses. Discharge models require diverse data types and high-resolution hydrologic data. Datasets for small headwater streams tend to be limited due to their remote locations. Using various spatial methods such as tools that ArcGIS provides can supplement missing data. This study employs a range of GIS techniques to assess the topography, land use, soil types, and hydrological features of two watersheds in the Coast Range (The North Umpqua Watershed, and the Upper Lobster Creek Watershed). Some techniques included the generation of digital elevation models, the delineation of watershed boundaries, and the classification of land use using satellite imagery. GIS can be a successful tool in providing necessary hydrologic data for modeling discharge in headwater streams.

PP16: Patterns of diversity in adult aquatic insects from intermittent and perennial streams at the H.J. Andrews Experimental Forest, Oregon

Author(s): Tatiana Latorre, Ivan Arismendi, Sherri L. Johnson, and Emily Giordono

The number of intermittent streams, defined as those with no flow during part of the year, has increased worldwide in the last decades due to climate change. Changes in flow status can impact aquatic subsidies to terrestrial systems and have been overlooked in the literature. In this study, we contrast insect emergence and biodiversity from two intermittent and two perennial streams flowing into Lookout Creek at the H.J. Andrews Experimental Forest during two periods (2003-2004 versus 2022). A series of emergence traps were set up to collect adult aquatic insects during dry season. We measured additional covariates, including temperature, substrate composition, and canopy cover. Collected insects were preserved in ethanol and identified under the lowest taxonomic possible level. Preliminary findings suggest that stoneflies such as Alloperla and Malenka, mayflies such as Hetageniidae, and caddisflies as Dolophiloides persist in intermittent and perennial streams during the two sampling periods. Future efforts will include the identification of others groups sensitive to desiccation and the relationship between the duration of water flow and the emergence of adults during the dry season.

Oral Presentation Abstracts

OP1: Individual based modeling of Stage 0 treatment on juvenile Chinook

Author(s): Aleah Hahn, Desiree Tullos, and Steve Railsback

The South Fork McKenzie (SFM) river in the Oregon Cascade range became single threaded and incised following construction of Cougar Dam. In 2018, 1 kilometer of the SFM was modified to the Stage 0 condition, reflecting the expected pre-disturbance conditions for the benefit of ESA-listed Chinook. This method raised the incised channel to the geomorphic grade line, reconnected historic side channels, increased floodplain connectivity, and distributed large wood throughout the reach. This study examines Stage 0 treatment habitat changes for spawning adults and rearing juveniles through the application of the individual-based model inSALMO. Changes in hydraulics, food availability, and water temperatures will be applied to inSALMO between a treated and untreated site. The simulation results will examine the mechanisms through which changes in these habitat characteristics impact juvenile Chinook growth rates and relative abundances across water years and reservoir releases. Hydraulic profiles of depth and velocity were collected in both the treated reach and an untreated upstream section. Early results suggest the increased area of the Stage 0 reach provides a greater quantity of food and more diverse depths and velocities, resulting in increased rearing time and larger ocean-bound juveniles. Given the diversity of Stage 0 sites, quantitative results from SFM may not be generalizable to all Stage 0 projects. However, the model results can provide insight to future projects regarding the mechanisms by which Stage 0 can produce larger and more juveniles.

OP2: Spatial Divergence of Overlapping Narratives of Glacier Retreat and Salmon Declines in Washington State

Author(s): Jenna Travers

Climate change is threatening both glaciers and salmon in Washington with extinction, putting the state,Äôs economy, culture, and ecosystems at risk. However, the overlapping climate issues are framed and understood differently throughout the state which affects policy and climate action. This study analyzed 115 media sources from four main stakeholder categories to determine a) which narratives are the most prevalent, b) how these narratives are shaped by factors like stakeholder identity and geographic location, and c) how narratives of overlapping climate emergencies differ from narratives of a single crisis. The study found that while a common narrative did exist, the geographic location of a stakeholder was a key factor in shaping diverging narratives. It also found that narratives of overlapping climate emergencies were more likely to diverge than those of a single crisis and could be used to transform pessimistic climate narratives into actionable, hopeful narratives. As climate change worsens, understanding how climate narratives are created and shaped will become increasingly important for understanding stakeholder conflicts, effective climate campaigns, and how people view themselves within these crises.

OP3: Large wood hydraulics: Using structure from motion to estimate flood depths

Author(s): Michal Tutka, Desiree Tullos, Catalina Segura, and Maddie Maffia

Large wood (LW) is a common element of many river restoration projects because it produces critical pool and riparian habitats and attenuates erosive peak flows. In practice, the design of LW is limited by a lack of mechanistic tools for predicting how LW features (e.g. porosity, orientation, frontal area, flow area, wetted perimeter) will affect flow depths and velocities. This project aims to understand how submerged LW features impact flow depths and velocities as well as which LW features have the greatest effect on hydraulic resistance (represented as roughness coefficients, Manning,Äôs n and Darcy f). Analysis involves integrating data derived from structure from motion (SfM) meshes of eight log jams in the Coastal Range, Oregon, USA, with varying channel span, log placement, and orientation with a topographic survey over a range of depth and discharge observations. Analysis is underway ,Äì greater drag and higher roughness coefficients are expected at jams with logs oriented orthogonal to the flow, spanning the channel, and/or at low relative submergence due to increased form resistance. Except in cases where channel-spanning logs are encountered with stage, the relative influence of log jams on hydraulic resistance is expected to decay exponentially with degree of submergence. This study aims to provide (1) a more accurate approach to quantifying jam features, (2) insight on the relative importance of physical features on flood depths in natural settings, and (3) practical value for better designing, prioritizing, permitting, and implementing LW projects.

OP4: Biological Treatment of BTEX and MTBE Contaminated Water with Rhodococcus rhodochrous ATCC Strain 21198

Author(s): Juliana Huizenga and Lewis Semprini

The ability of the pure culture Rhodococcus rhodochrous ATCC Strain 21198 (21198) to degrade the prevalent environmental contaminants benzene, toluene, ethylbenzene, and xylenes (BTEX) along with a common co-contaminant methyl tert-butyl ether (MTBE) was investigated. Isobutane, 1-butanol, and 2-butanol were selected as non-toxic substrates to grow 21198 and compare their impact on 21198,Äôs contaminant degradation activity. Individual contaminants as well as mixtures of BTEX and BTEX with MTBE were tested with resting cells to assess the impacts of mixtures on microbial degradation, as these compounds typically exists as mixtures in the environment. Growth tests were conducted with BTEX and MTBE as sole carbon and energy sources to distinguish between metabolic and cometabolic transformation of contaminants. Growth tests in the presence of BTEX and MTBE were also conducted to determine which growth substrate best supports simultaneous microbial growth and transformation of BTEX and MTBE. All contaminants were able to be degraded by 21198 with varying rates and extents of degradation observed. Contaminant degradation was supported by isobutane, 1-butanol, and 2-butanol, with isobutane grown cells exhibiting the highest activity and 1-butanol grown cells exhibiting the lowest activity towards the contaminants. However, in conditions where BTEX and MTBE were present during microbial growth, 1-butanol was found to be the ideal substrate for supporting concurrent growth and contaminant degradation, as 21198 rapidly grew on this substrate. Contaminant degradation was found to be a combination of metabolic and cometabolic processes, as benzene and toluene were identified as novel growth substrates for 21198. This work demonstrates that 21198 is capable of transforming mixtures of BTEX and MTBE effectively when grown on a variety of growth substrates.

OP5: What is the impact of forest harvesting and wildfire on soil properties and water quality? Observations from a western Oregon watershed after compound disturbance

Author(s): Kate McCredie, Kevin D. Bladon, and Thomas H. DeLuca

The impact of large, high severity wildfires on soil health and stream water quality remains poorly understood, in part, due to the lack of tightly controlled, landscape scale experiments that integrate the effects from fire and land use activities. In 2020, the Archie Creek fire burned ~53,230 ha of forested land in Oregon, with ~77% at moderate to high severity. The burn area included the Hinkle Creek watershed, an intensively managed Douglas-fir (Pseudotsuga menziesii) plantation, which was previously studied from 2002‚Äì2011 to investigate the effects of forest harvesting on streamflow and water quality. We are leveraging the existing study sites to compare pre-harvest, post-harvest, and post-fire nitrate (NO3-) and suspended sediment in streams. We are also quantifying the effect of fire on saturated hydraulic conductivity, soil nitrogen (NO3-, NH4+, potentially mineralizable N), and active soil carbon to understand the mechanisms driving the in-stream responses. We applied a chronosequence study design across a matrix of forest harvesting to disentangle the potential variability in fire effects. In 2021, we began collecting stream water samples at six of the historic locations. Within the riparian zones, we collected soil cores (0‚Äì5 cm) for soil hydraulic properties and soil samples (0‚Äì15 cm) for nutrient analysis at ~60 sites. Historically, stream NO3- did not vary substantially in harvested catchments; the average concentrations were 0.15 ¬± 0.03 (SE) mg L-1 during pre-harvest and 0.18 mg L-1 ¬± 0.02 during post-harvest. However, preliminary results from our post-fire study indicate a substantial variation among streams, with post-fire concentrations ranging from 0.16 ¬± 0.04 mg L-1 to 1.46 ¬± 0.15 mg L-1. Interestingly, we have also observed a ~56.4% reduction in soil NO3- and a ~62.6% reduction in soil NH4+ between year one and year two after the fire. Critical questions remain about the timing and legacy of nutrient pulses after wildfire and results from this study will help disentangle the effects of pre- and post-fire land management actions on water quality and soil health.

OP6: Relationship between isotope ratios in precipitation and streamflow across watersheds of the National Ecological Observation Network

Author(s): Zach Butler, Stephen Good, Catalina Segura, Marja Haagsma, and Huancui Hu

The timescales associated with precipitation moving through catchments and into rivers and streams reveal hydrological processes that are critical to understanding water's pathways within hydrologic systems. Measurements of environmental stable water isotope ratios (δ2H and δ18O) have been used to study hydrologic connectivity by examining how incoming precipitation tracers become stream discharge, yet measurements constraints have limited macroscale evaluations. In this observation driven study across North American biomes within the United States National Ecological Observation Network (NEON), δ18O and δ2H stable water isotope samples of incoming precipitation (δP) and surface water discharge (δQ) at sites co-located within 20km were examined. Established methods to understand NEON stable water isotope data were applied to three primary objectives. The first, looking at the data's relation to the local meteoric water line (LMWL) and local stream water line (LSWL), thereby understanding the line condition excess (lc-excess) between δP and δQ. The second, taking the δP and δQ data to apply seasonal cycle fits to calculate young water fractions (Fyw). The third, using the δP and δQ with the information from the Fyw to calculate mean transit times (MTT) based on a gamma convolution model. Through the three objectives, we can use the capability of NEON data with additional data availability via downscaled ensemble δP data. We synthesize the isotope metrics, Fyw, and MTT estimates with catchment and model characteristics within the study across North America. Some correlations are found, but it is difficult to ascertain documented correlations due to the large study area. This implies many Fyw and MTT correlations should be considered site or area specific. The isotope data presented using the LMWL/LSWL, lc-excess, estimates of Fyw, and estimates of MTT presented here can help constrain a variety of water related processes within NEON study sites.

OP7: Importance of including underflow in hyporheic models

Author(s): Paige Becker, Saubhagya Rathore, Scott Painter, and Adam Ward

Underflow in the hyporheic zone is an intermediate-scale flow that spans multiple features and reaches of a stream. However, uncertainty exists regarding the importance of underflow for transient storage and nutrient processes in current field methods and some modeling frameworks. This study aims to answer where and when underflow matters and how to tractably incorporate it in large-scale models. To do this, we use a lagrangian based multiscale stream-corridor transport model implemented in the Advanced Terrestrial Simulator (ATS), coupled with PFLOTRAN for reactions. We compared multiple model setups with different levels of underflow representation including uniform discretization and discretization that honors turnover points. Leveraging shapefree transit time representation in ATS, we studied impacts of using local vs global transit times. Preliminary results show that incorporation of the underflow is important for longer time scales (days) as well as for nutrient cycling such as denitrification. These findings are important for future modeling and field campaigns and suggest the need for incorporating underflow in studies of river corridor exchange.

OP8: Kiwa Spring

Author(s): Autumn Pruett

Kiwa Spring is a non-flowing spring about five miles west of Sunriver, Oregon, and 11 miles south of Bend. My spring monitoring class, G298, has monitored this spring since 2019, because it seems like it was of some importance in the past. When water is present, we measure the temperature and specific conductivity. I researched its history to understand if it was a reliable source of water in the past. I found that it was significant enough to be tested in 1987, that it had some soil research on it in 1956 due to the logging in the area, that there is a large drainage basin just below it, and that there is a spring box attached to it. Kiwa spring is hardly mentioned in any historical text, even though there are all these signs pointing to it being once important. Possible reasons for the drying of the spring may include; the water table lowered due to drought, the groundwater exiting somewhere else, or the logging in the area altering the water table. This research is ongoing and more crucial than ever because our climate is drastically changing, and reliable sources of fresh water for the plants, animals, and humans inhabiting this earth are becoming more scarce. Future steps of this project include researching how logging affects springs and the extent of drought in the local area.

OP9: Machine Learning Approaches on Floodplain Roughness and its Seasonal Variation

Author(s): Gabriel Barinas, Stephen Good, and Desiree Tullos

Floods pose a significant threat to our society, and accurately predicting their magnitude remains a challenge due to the lack of spatially distributed floodplain roughness values. Floodplain roughness is influenced by vegetation characteristics such as structure, density, and cover. While flood modeling techniques rely on constant or approximated values, seasonal changes in vegetation canopy cover or biomass density can impact floodplain roughness. In this research, we aim to leverage remote sensing technologies and machine learning techniques to predict floodplain roughness values. We use a floodplain roughness dataset derived from USGS field measurements in combination with vegetation data collected by NASA's Global Ecosystem Dynamics Investigation (GEDI) to identify spatiotemporal variations in floodplain roughness characteristics. By analyzing the GEDI data, which includes vegetation height, leaf area, biomass, and other land cover characteristics, we will develop an empirical modeling approach that can provide season-specific floodplain roughness values and give insights into their relationship with vegetation structure. This approach will allow us to create high-resolution maps of floodplain roughness values across the continental United States, where flood modeling is often done with approximations or constant values. The results from this work are expected to refine our understanding of how water flows over vegetated surfaces, which would allow for a significant improvement in our capacity to assess and respond to extreme events such as hurricanes, storms, and cyclones. Additionally, our approach is able to be applied to other regions of the world, providing valuable insights into floodplain behavior, and improving global disaster management capabilities.

OP10: The Effects of Physiography on Flow Paths and Water Storage in a Mountainous Catchment

Author(s): Zachary Perry and Catalina Segura

Many mountainous regions rely on snowmelt for water supply. As climate change reduces the reliability of snowpack in these regions, we must work to improve our understanding of how water is stored and when it will be released. Understanding the mechanistic link between terrain physiography and the movement/storage of water in the landscape is critical to make sound predictions of variations in water supply. For this analysis, we are using water stable isotopes (WSI) ,Äì a tool that helps us understand spatial and temporal variability in flow paths. We incorporated WSI in surface water samples collected in four synoptic campaigns over two years. Samples are collected across high elevation headwater streams (600,Äì1200m) in the HJ Andrews Experimental Forest, Western Oregon, USA. The spatial/temporal trends in WSI combined with LiDAR derived metrics of topography will be used to infer differences in storage/movement across the landscape. Preliminary results demonstrated that localized variations in WSI occur within a <1km2 area between catchments underlain by similar geology, but with different surface features. We have also observed that many headwater catchments show complex relationships between elevation and isotopic composition, suggesting that the sources of baseflow are not directly controlled by seasonal precipitation. Our results indicate that variability in landscape disturbance legacies as well as terrain moisture levels controls much of the variation in WSI patterns. By using Spatial Stream Network Models, we can evaluate how well topographic parameters (slope, roughness, soil depth) and moisture (seasonality) explain the variability in WSI. Improving our understanding of these water dynamics will help inform water resource availability in the face of a changing climate.

OP11: Channel evolution in fine grain sediments during reservoir drawdowns

Author(s): William Nuckoles and Desiree Tullos

Very few large dams taller than 15 meters storing large volumes of fine sediment have been removed worldwide. This lack of empirical data has limited our ability to predict the timing and volume of sediment release during dam removal or drawdown operations, which can have significant implications for dam infrastructure and downstream ecosystems. Channel evolution in fine grain sediments following dam removal often proceeds with more complexity than existing conceptual models, but our ability to update these models is limited by the lack of real-world data. This study will determine how the dominant erosional process (lateral, vertical or knickpoint) changes over time during reservoir drawdowns. The study site will be the Klamath River, where, in 2024, three large dams will be removed. Collectively these dams store nearly 15 million cubic yards of mostly (~85%) fine sediment and represent the largest dam removal project in the world. Their removal will be an unprecedented opportunity to study the interactions between engineering and geomorphology that drive sediment dynamics in reservoirs. The Yurok Tribe will perform drone (UAS) surveys throughout the drawdown to collect aerial imagery and LiDAR data. We will use Structure from Motion (SfM) photogrammetry to calculate the volume of sediment eroded by each process between survey flights. It is hypothesized that variability in erosion processes will be linked to bank saturation, rate of base level lowering and flow velocity. Because outflows will be regulated by infrastructure capabilities, channel evolution is expected to be dependent on the inflows the reservoirs receive during drawdown.

OP12: Drivers of Relative Streamflow Contributions in Mountainous Headwater Streams

Author(s): Jaime Ortega, Catalina Segura, Pamela Sullivan, and Renee Brooks

Headwater streams are the most abundant in the stream network of almost all catchments. These small tributaries are critically important as water sources and solute to downstream systems. Despite their recognized importance, few studies have focused on understanding the variability of their influence on downstream flow conditions. In this study, we quantified the annual discharge contribution of five tributaries (Cold, McRae, Mack, Nostoc, and Longer Creek) to Lookout Creek (main tributary), a 64 km2 basin in the H.J. Andrews Experimental Forest, Oregon, USA. Our analysis is based on weekly stream and precipitation samples collected and analyzed for major cations (Ca, K, Mg, Na, Si, Al, and Sr), anions (Cl, SO4, and NO3), and water isotope ratios. Preliminary results based on samples collected year-round showed a wide range of isotope ratios across tributaries. Yet, Cold Creek exhibited remarkably stable values, contributing most of the flow (>65 %) to Upper Lookout Creek during the summer months. Cold Creek also has the highest solute concentrations of Mg, Na, Ca, and K, compared to the other investigated streams. In contrast, the Al and Sr concentrations were lower in Cold Creek compared to the rest. These results indicate that the chemical variability across streams will be an effective tool for separating water sources and discharge contributions. We will use two and three-end member analysis and concentration-discharge relationships to unveil the spatial and temporal variability in flow paths. Additionally, the spatial variability in unit-area discharge will be used to quantify seasonal streamflow contributions. Our study is relevant in understudying the spatial variability of water availability in streams in the rainfall-snow transition zone as this region continues to migrate up in elevation because of climate change.

OP13: Runoff, Rangelands, and Ruminants: Quantifying the Water Quality Impacts of Manure Application in Oregon

Author(s): Pierce McClendon

The use of livestock manure as a soil amendment and fertilizer is commonly held up as a sustainable approach to rangeland management. Particularly in areas with high amounts of dairy and dairy cattle production, such as the Willamette Valley in western Oregon, these organic fertilizers have the added benefit of locality ‚Äì thus making them more sustainable through a decreased transportation energy demand. Further, the use of manure decreases the energy demand brought about by the creation of synthetic fertilizers. These environmental benefits, the decreased energy demand from Haber-Bosch fertilizer synthesis, and the crop health and yield benefits brought about by bovine manure application are driving factors in the popularity of cattle manure as fertilizer in the Willamette Valley. Despite its popularity of use, however, the water management aspects of cattle manure application are less studied, especially as it pertains to runoff and infiltration water quality. Of particular concern are the nitrogen (N) and phosphorus (P) levels in both infiltrate and runoff, as well as the relative infiltration and runoff rates and total suspended solids (TSS) within each of these volumes. To study these parameters, standard soil pans will be created with uniform bulk density and soil texture using representative soils for Oregon dairy production. These pans will then be treated with various solid- and liquid manure application rates and subjected to three rainfall events on seven-day increments. The resulting infiltrate and runoff quantities will then be analyzed for N and P content, alongside TSS.

OP14: Exploring groundwater resource vulnerability and water security in Quintana Roo, Mexico

Author(s): Maria Iglesias-Thome, Jenna H. Tilt, Julia A. Jones, and Logan A. Kary

Declining water quality and increasing water scarcity may affect Quintana Roo and the coastal communities that depend on water as a natural resource. Development along the Caribbean coast of Mexico has drastically increased in the past 40 years. The booming tourism industry has dramatically increased demands on local water supplies. This industry provides 87% of the total GDP for the state and is estimated to consume 202 million cubic meters of freshwater yearly. Quintana Roo is part of the Yucatan Peninsula platform, a flat karst formation, which results in a lack of surface water systems and a diverse network of caves, through which groundwater flows, eventually discharging into the ocean. The Yucatan peninsula aquifer system is a Sole Source Aquifer (SSA) and supplies over 90% of the drinking water and freshwater used by communities across the region. Coastal karst aquifers are extremely vulnerable to degradation, contamination, and depletion. It is unclear how patterns of water use by tourism and subsequent urban development may be depleting groundwater quantity and/or degrading groundwater quality and how these changes are affecting water availability for local communities and ecosystems in Quintana Roo. This research will (1) describe physical sensitivities and social vulnerabilities as they relate to groundwater, (2) evaluate how water scarcity is an issue at different scales and as a function of biophysical, socioeconomic, and social-ecological system resilience, (3) identify and understand how different stakeholders play a role in water decisions through social networks (4) examine how coastal communities that rely on water for their livelihoods may be affected by ongoing changes in water resources in the region.

OP15: Building WUI Water Distribution Resilience; Reflections on Adaptive Capacity following the Camp and Tubbs Wildfires

Author(s): Eliza Amstutz and Jenna Tilt

Recent wildfires in California and Oregon caused significant damage to water distribution systems which resulted in water that was contaminated with benzene and other volatile organic compounds. With recurring wildfires in the western US and beyond, post wildfire recovery efforts provide a lens into long-term vulnerability reduction, particularly in Wildland Urban Interface (WUI) communities. Few studies have looked at adaptive capacity of WUI communities using pre- and post-fire demographic data. Applying the Adaptive Capacity Framework for Wildfire, developed by Paveglio et al.(2009), to Paradise and Santa Rosa, California allows us to compare local adaptive capacity (AC) and response equity between two WUI communities. Using the mixed methods approach and Sequential Exploratory design, we organized focus group stakeholder workshops in Paradise and Santa Rosa, the locations of the Camp(2018) and Tubbs(2017) fires. Following the workshops, a thematic qualitative analysis of AC indicators between the two communities was completed to inform a subsequent quantitative spatial analysis. This analysis uses the Social Vulnerability Index derived from the Environmental Evaluation Modeling System Wildfire Vulnerability Explorer to investigate the underlying drivers of AC. Using backflow prevention devices (which were subsidized post-fire for low-middle income households) as a proxy for measuring AC to water contamination, we explored household and parcel characteristics of where these devices were installed pre- and post-fire and whether these characteristics aligned with population sensitivity measures. We found differences in the drivers of AC between the two communities and emergent themes, including wildfire experience, living situation, and mistrust, directly informed the spatial analysis.

OP16: Engaging Agricultural Landowners in Fish Habitat Restoration: Pathways and Barriers

Author(s): Laura Duffy and Hannah Gosnell

The conservation community has long recognized the critical role that agricultural landowners play in efforts to improve fish and wildlife habitat in order to recover threatened and endangered species. In many rural areas dominated by agricultural working landscapes, government agencies like the U.S. Fish and Wildlife Service (USFWS) struggle to gain the trust of ranchers and farmers, a prerequisiste for successful federally funded habitat restoration projects, and coordinate habitat restoration across property lines. This project aims to identify barriers and pathways to fish habitat restoration on agricultural lands, drawing on theories associated with trust and collaborative conservation. Findings draw on interviews with practitioners across the U.S. who have had success engaging private landowners in habitat restoration; and a case study of landowner attitudes in the Upper Klamath Basin along the California-Oregon border in the western U.S. where two species of sucker fish with cultural importance to the Klamath Tribes are listed under the Endangered Species Act. The project aims to inform USFWS efforts to invest over $100m in restoration funds on private lands. In this presentation, we report on preliminary results from this study, which have implications for efforts to improve working relationships between agricultural landowners and government agencies and implement a landscape scale approach to fish habitat restoration.

OP17: Basins of Opportunity and Ranges of Scenarios: Pathways to Transformation in the Chewacan

Author(s): Henry Pitts

Lake Abert is a hypersaline lake situated within Lake County, Oregon, sandwiched between the towns of Paisley and Lakeview. Designated as an Important Bird Area by the National Audubon Society, the lake has hemispheric importance as a stop on the Pacific Flyway as it provides critical habitat for shorebirds migrating south in the fall. Primarily fed by the Chewaucan River, Lake Abert periodically goes dry. Previous analyses of the region state that the lake went dry in the summer of 1924, and continued to experience drying events through the summer of 1937 and during particularly dry years. After the occurrence of drying events in 2021 and 2022, ranchers, environmental groups, and other interested parties participated in an initial assessment report funded by the state. This followed a series of formal letters sent to various state agencies and the governor's office requesting support. The initial report recommended the formation of a collaborative governance structure to address issues in the basin, which could be funded through House Bill 3099. This funding could be used for formalized mediation and facilitation processes, as well as continued data collection.

Future work in the basin will include logistical support and background research throughout the establishment and initial meetings of the collaborative. Thesis work outside of my role within the collaborative will likely focus on the tribal rights within the basin, specifically as they pertain to Lake Abert and the overall Chewaucan Basin.

OP18: Establishing fluvial silica regimes and their stability across the Northern Hemisphere

Author(s): Keira Johnson

Fluvial transport of silicon (Si) from land to oceans plays a critical role in controlling marine primary production and carbon sequestration. Biogeochemical and hydrological processes, as well as climate and land use, dictate the amount of Si exported by rivers. Understanding Si regimes – the annual timing and magnitude of Si concentrations – can help identify processes driving Si export. We analyzed Si concentrations from over 200 stream sites across the Northern Hemisphere to establish distinct Si regimes, and evaluated how often sites move between regimes over their period of record. We observed five distinct regimes across diverse stream sites, with nearly 80% of sites exhibiting multiple regime types over their period of record. Our results indicate greater variation in Si seasonality and stability than previously recognized, and highlight the need to identify intra-annual variations in Si cycling across ecosystems when examining drivers of Si exports to global oceans.

OP19: Predicting Pipe Diameter of Water Distribution Networks with Machine Learning

Author(s): Jason Poff, Dr. Sammy Rivera

Water distribution network models are invaluable tools used by water utilities for optimization, maintenance, master planning, and resilience analyses. Unfortunately, missing data or insufficient resources can make it impossible to create or maintain these models. This study will be a first step toward using data analytics and machine learning models to fill in missing data and create complete realistic models of water distribution networks so that these tools are available for every community. This research focuses on improving a machine learning model to predict pipe diameter in water distribution networks with topological and geospatial features. Water distribution networks from Kentucky are being used to explore many possible features and find the ones that are most useful across them all. At this current state, average node closeness centrality, average node base demand, connection to terminal node, and distance to closest source are among the most important features. Additional geospatial features like the type of road that parallels the pipe and building count along the pipe will be added. The random forest algorithm is currently the best performing model and can predict the diameter class of each pipe with 74% accuracy, with all pipe diameters being split into 5 different classes. The split into classes can be justified by running the models with random variation of pipe diameter within each class and seeing how the Todini index for resilience changes. This is still being explored, but in most cases the resilience index does not change significantly through many simulations. There is an ongoing effort to resolve a bias toward 6-inch pipes in our data and optimize both the pre-processing of the data with methods like principle component analysis and the hyperparameters of the differing machine learning algorithms to find the best approach. This study helps lay the groundwork for building uncertainty-aware dynamic models of water distribution networks.