

**8th  
Annual**

# Johnson Creek

# Science Symposium



**Tuesday, October 17th, 2023**

**1:00 - 4:40 pm**

**Reed College**

**Performing Arts Building – Room 320**

**Parking Available in the West Lot**

[Map](#)

The Johnson Creek Science Symposium is a joint production of the Johnson Creek Watershed Council, Reed College and the Johnson Creek Interjurisdictional Committee. The Symposium co-organizers are Daniel Newberry, Noelwah Netusil and Katie Holzer.

## Schedule

1:00	Introduction & Welcome	Daniel Newberry, Johnson Creek Watershed Council
1:08	Session 1	Session Moderator: Noelwah Netusil, Reed College
1:11	Johnson Creek's Geologic and Geomorphic History	Nick Legg, Wolf Water Resources
1:24	Post-Restoration Re-Vegetation of Johnson Creek's Riparian Corridor	Luke Russell, Wolf Water Resources
1:38	Mapping a Path Forward in Urban Stormwater Restoration Projects	Elizabeth Brosig, Johnson Creek Watershed Council
1:51	Why didn't the salmon cross the road? Toxic tires and green stormwater infrastructure treatment	Katie Holzer, City of Gresham
2:04	Q & A, Session 1	
2:18	Session 2	Session Moderator: Katie Holzer
2:21	Flood Insurance Literacy and Flood Risk Knowledge: Lents and Powellhurst-Gilbert Neighborhoods	Noelwah Netusil, Reed College
2:34	Warming of the Willamette River, 1850–present: the effects of climate change and river system alterations	David Jay, Portland State University
2:47	Data-Driven Restoration – The Cedar Crossing Restoration Project	Nick Cook, OTAK
3:00	How do beavers affect native turtle habitat in Oregon?	Rodé Krige, Portland State University
3:13	Q & A, Session 2	
3:26	Break & Refreshments	
4:05	Panel Discussion: Vegetation Management in the Face of Climate Change	Jenn Cairo, Portland Parks & Recreation George Kral, Scholls Valley Native Nursery Hannah Schrager, Metro Damion Coe, Portland Bureau of Environmental Services
4:40	Closing Remarks, End of Symposium	

## **Session 1**

### **Johnson Creek's Geologic and Geomorphic History - Nick Legg**

Despite its history of development impacts, Johnson Creek's current condition and evolution is still influenced by geomorphic and geologic history over deep time. This history plays out over three major environments (reaches) along the creek, which each have distinct ages, stories, and characters. This presentation will develop this history over the watershed- and system-scales, to connect the diverse creek environments to management and restoration efforts of today.

### **Post-Restoration Re-Vegetation of Johnson Creek's Riparian Corridor - Luke Russell**

This presentation will review the vegetation response at the three restoration sites along Johnson Creek. Through time-lapse videos and remote-sensing analyses we will explore the ideal conditions for riparian vegetation to thrive. In short, the riparian vegetation prefers to grow within the zone of regular and frequent water table fluctuation, a function of watershed hydrology and site-specific geomorphic setting.

### **Mapping a Path Forward in Urban Stormwater Restoration Projects - Elizabeth Brosig**

Johnson Creek, like most streams with a significant urban component, experiences significant hydromodification and water quality degradation because of a high area of contributing impervious surfaces and land uses that deliver metals, hydrocarbons, and other pollutants to surface streams via the stormwater system.

In this presentation, Elizabeth will share the Watershed Council's stormwater prioritization and outreach project that focuses on prioritizing and identifying urban stormwater retrofit projects 1) on commercial and industrial tax lots in the watershed where implementing on-site stormwater infiltration projects is likely to have the greatest beneficial impact on the surface stream network, and 2) at the stormwater outfalls where end-of-pipe detention and other projects can have a significant impact on hydromodification and stormwater quality. Elizabeth will also share current stormwater project updates and opportunities to contribute to this work.

### **Why didn't the salmon cross the road? Toxic tires and green stormwater infrastructure treatment - Katie Holzer**

A large amount of effort has gone into improving habitat for salmon in the Johnson Creek watershed. Although salmon are returning, throughout the region coho are often found dead after a hard rain before they have spawned. After decades of research, a team in Washington identified the chemical which was responsible for these die-offs: 6PPD-quinone. It was newly described less than three years ago and is a transformation product from tires interacting with ozone. In the past few years much research has been conducted to better understand the prevalence, sources, and treatment of this chemical. 6PPd-quinone is found throughout Johnson Creek and its tributaries wherever they receive untreated runoff from roads.

Thus far, research has shown that runoff from high-traffic roads is the major source of this chemical to streams, although places such as crumb rubber turf fields appear to be additional

sources. Encouragingly, this chemical has been shown to be substantially reduced by treatment with green stormwater infrastructure such as planters, rain gardens, pervious pavement, and constructed wetlands. High-traffic roads are being targeted for retrofits to capture and treat runoff. Green stormwater infrastructure is required in all new construction in the Johnson Creek watershed. In addition to cleaning runoff, the constructed wetlands are providing neighborhood amenities and habitat for a variety of native wetland amphibians, dragonflies, and birds. As runoff is increasingly treated, the water quality in Johnson Creek will likely continue to improve, allowing coho and other species to enjoy the restored habitat.

## **Session 2**

### **Flood Insurance Literacy and Flood Risk Knowledge: Lents and Powellhurst-Gilbert Neighborhoods - Noelwah Netusil**

Flood costs are escalating due to climate change and increased development in hazardous areas. Flood insurance plays a critical role in financial recovery, but there is very little research on how well consumers understand flood insurance policies. Poor insurance literacy can lead to suboptimal risk management decisions and decrease welfare. This project presents some of the first evidence on homeowner flood insurance literacy from a survey of residents in Portland, Oregon. We find that while a basic understanding of general insurance terms is widespread, details about flood insurance policies are not well-understood and many respondents are unsure about the specific terms of their policy. We also find that the majority of respondents did not learn about their flood risk or the cost of flood insurance until after making an offer on their property.

### **Warming of the Willamette River, 1850–present: the effects of climate change and river system alterations - David Jay**

Ice skating on the Willamette River was a frequent winter activity in the 1850s and 1860s, and Portland harbor was frozen from about New Years Day to early March in the severe winter of 1861-1862. Obviously, the system has changed, but by how much and why? To answer these questions, we recovered data from multiple sources to produce a 140-year record of daily water temperature ( $T_w$ ) in the lower Willamette River, Oregon (1881–1890, 1941– present). These data and additional daily weather and river flow records from the 1850s onwards are used to develop and validate a statistical regression model of  $T_w$  for 1850–2020. The model simulates the time-lagged response of  $T_w$  to air temperature and river flow and is calibrated for three time periods: the late 19th, mid-20th, and early 21st centuries.  $T_w$  has trended upwards at 1.1°C per century since the mid-19th century, with the largest shift in January and February (1.3°C per century) and the smallest in May and June (about 0.8°C per century).

The duration that the river exceeds the ecologically important threshold of 20°C has increased from about 40 to about 60 d/yr. Cold-water days below 2°C have virtually disappeared, and the river no longer freezes. Since 1900, changes are primarily correlated with increases in air temperature ( $T_w$  increase of  $0.81 \pm 0.25^\circ\text{C}$ ) but also occurred due to alterations such as depth increases from reservoirs ( $0.34 \pm 0.12^\circ\text{C}$ ). Managed release of water affects  $T_w$  seasonally, with an average reduction of up to 0.56°C estimated for September. River system changes have

decreased the variability of daily minimum, increased thermal memory, reduced interannual variability, and reduced the response to short-term meteorological forcing (e.g., storms and heat waves). These changes fundamentally alter the response of Tw to climate change, posing additional stressors on fauna.

### **Data-Driven Restoration – The Cedar Crossing Restoration Project - Nick Cook**

The Cedar Crossing Restoration Project began conceptual design in 2018 and was constructed in 2022. Revegetation efforts are ongoing at the site, which now provides a front-row seat for Johnson Creek to act out its natural processes. The restored stretch of Johnson Creek had been locked in place by walls built during the Works Progress Administration (WPA) in the 1930s. This project aligned with BES' mission to serve the environment by restoring the reach and creating habitat for ESA-listed salmonids. We used data-driven design goals to steer the restoration towards measurable improvements at the site. To achieve this end, the project removed fill from the floodplain, removed the WPA wall entirely, and rebuilt vertical features in the streambed. The project added over 120 pieces of wood and added a side channel stocked with spawning gravels. The project also included 1D and 2D hydraulic modeling, which accurately predicted side channel engagement flows - verified when the wet season returned after construction in September 2022.

### **How do beavers affect native turtle habitat in Oregon? - Rodé Krige**

Oregon is home to two native turtle species: the northwestern pond turtle (*Actinemys marmorata*) and the western painted turtle (*Chrysemys picta bellii*). Both turtles are experiencing population decline and have been listed as Oregon Conservation Strategy Species with a status rating of "sensitive". Much of this decline has been caused by habitat loss and degradation due to urbanization. While there have been many studies focusing on habitat preferences of *A. marmorata* and *C. picta*, few of these studies have been conducted in the northern Oregon portion of these turtles' range. No studies concerning *A. marmorata* or *C. picta* have yet to examine how American beaver (*Castor canadensis*) could be affecting turtle habitat. By assessing beaver impounded ponds for turtle habitat requirements, this project adds a detailed analysis of potential turtle habitat in the Portland, OR area to the current body of literature. The results of this project would be applicable to more effective habitat conservation for *A. marmorata* and *C. picta bellii* and would also provide more information about how to effectively implement *C. canadensis* in a conservation and restoration framework.

The Johnson Creek Watershed has provided land essential for wildlife habitat and the research thereof. Many sites studied within this research are housed within the Johnson Creek Watershed. This research contributes to a greater understanding of water bodies and wildlife within the watershed. By providing management recommendations, this research has the potential to help the watershed achieve its wildlife conservation and habitat restoration goals.

## **Panel Discussion: Vegetation Management in the Face of Climate Change**

Panelists: Jenn Cairo, George Kral, Hannah Schragger, Damion Coe  
Moderator: Daniel Newberry

## Bios

**Elizabeth Brosig** is the JCWC Restoration Project Manager, she is providing leadership and guidance to the Council's restoration programs and managing implementation of specific Council restoration projects. She earned her B.S. in Environmental Resources Engineering from Humboldt State University and previously worked as a water resources engineer, specializing in fish passage and urban stormwater design.

Elizabeth is passionate about native plants and wildlife. She has volunteered with the Backyard Habitat Certification Program and built a Free Little Seed Library in front of her house. Elizabeth enjoys gardening, hiking, birdwatching, cooking, and reading with her husband Sean and their son Andrew.

**Jenn Cairo** has been Portland's City Forester since 2012 and public servant in natural resources management for over 25 years including Land Manager and Senior Natural Resources Manager for the New York City Watershed, and Region Manager for Oregon Parks and Recreation. As Portland City Forester she led implementation of the City's first comprehensive tree regulations; expanded the capacity, diversity and professionalism of the City's Urban Forestry program and spearheads improving forest services for low-income neighborhoods and communities of color.

Jenn earned a Bachelor of Science in Foreign Service from Georgetown University and worked in Central Europe before earning a Master of Public Administration from Syracuse University and a Master of Science of Forestry from the State University of New York. Originally from the Shawangunk Mountains of New York, Jenn spends her free time with family, friends and dogs among trees, as a volunteer land restoration leader, reading, practicing yoga, skiing, kayaking and generally playing outside. She is a certified arborist, municipal arborist and tree risk assessor.

**Damion Coe** is a Botanic Specialist III with the City of Portland's Environmental Services (BES) where he has been managing natural areas and restoration projects to improve watershed health since 1996. His current work focuses on stewardship of natural areas in the Johnson Creek watershed and serves as a subject matter expert with the planning, design and construction sections of BES to help ensure the ecological success of our natural areas. Damion has an Environmental Sciences degree from Portland State University.

**Nick Cook** is a water resources engineer at Otak, where he has worked on hydraulic modeling and restoration engineering projects for the last seven years. Nick's journey to his current career began in 2009 during the Great Recession working an odd job on a survey crew for a restoration project in North Carolina. He had a master's degree in civil and environmental engineering from George Mason University (2008) but determined that one more degree would allow a career pivot into an engineering career that would serve the environment. Nick earned a PhD in Biological Systems Engineering at Virginia Tech in 2015, then moved to Oregon to continue studying riverine environments at Oregon State as a post-doctoral researcher. In 2016, he joined Otak and has been working in riverine environments on fish passage projects, bridge and culvert replacement projects, floodplain studies, stream and wetland restoration projects, and estuarine restoration projects since.

**Katie Holzer** is a Watershed Scientist with the City of Gresham where she studies urban runoff pollution and stream habitat. She has a Ph.D. in Ecology from the University of California, Davis and serves on the Johnson Creek Watershed Council Board. She focuses her time on understanding how humans and wildlife can coexist in cities to mutually benefit each other.

**David Jay** earned his PhD in physical oceanography at the University of Washington in 1987. He has been a process scientist and has participated in management of the Columbia River and other coastal systems for 47 years. His research interests span a range of topics and scales including estuarine circulation and sediment transport, stratified flows and turbulent mixing, basin-scale hydrology, buoyant plumes, local and basin-scale tides, tidal analysis methods, sea level rise and coastal inundation, tidal river dynamics, coastal system comparison, climate and human impacts on coastal ecosystems, and coastal ecosystem science. Management issues he has been involved in include: New York Harbor-Newark Bay pollution problems, San Francisco Bay salinity intrusion, Pacific Northwest salmonid recovery, Columbia River navigational impacts and safety, Lower Columbia River sediment budget, and hydropower impacts and management in several systems. He has also served on the citizen advisory panel to the National Ocean Service. At Portland State University he has been leading the effort to establish a major research focus on Columbia River Basin processes and management, and on the science of water levels, tides and sea level. His experience in crossing disciplines and bridging the divide between basin hydrology and coastal processes in both science and management gives his research and management activities a unique perspective.

**George Kral** is a field forester and a regionally recognized expert in plant ecology of the northern Willamette Valley. He has worked in the field over 30 years managing Northwest riparian systems, upland forests, prairies and wetlands. Through this work, George has collected, processed, propagated and outplanted cones, fruits, seeds and seedlings of millions of native trees, shrubs and herbs and integrated these into the restoration and management of thousands of acres of wild and managed landscapes. George and his wife Sara own and manage Scholls Valley Native Nursery in western Washington County, where they grow about three million native plants every year, representing over 200 species. A focus of George's career has been the occurrence, proliferation and significance of hybrids in woody genera such as *Rosa*, *Crataegus*, and *Corylus*. George's primary research organism is the genus *Alnus* – its ecology, morphology, landscape genomics, migration history and recent climatic responses.

**Rodé Krige** is an undergraduate Environmental Science student at Portland State University. She grew up in Atlanta, Georgia and left home during her senior year of high school to train for a career as a professional ballet dancer. After two years of training, Rodé got offered her first professional contract and went on to have a 7 year career, which ended in Portland, OR. While dancing, Rodé enrolled in college part-time, which she then pursued full-time at Portland State University after retirement from her dance career. She is currently studying how beavers affect native turtle habitat in Oregon and plans to graduate in January 2024. Over the past two summers, Rodé received an opportunity to intern with Oregon Department of Fish and Wildlife. as well as U.S. Fish and Wildlife Service working on pollinator recovery in South Dakota.

**Nick Legg** is a Senior Geomorphologist and the Watershed Science Director at Wolf Water Resources in Portland. He is originally from Minnesota, attended UW-Madison for undergrad and Oregon State for his MS, both in geology. He has been working as a geomorphologist in the

Pacific NW since 2010 and enjoys helping people to demystify river systems to make more informed decisions at the interface of habitat, flooding, and stormwater concerns. Nick has been working on Johnson Creek's geomorphology since 2018 and is continually impressed by the depth of its history and its potential to be a connector for people, neighborhoods, and nature.

**Noelwah R. Netusil** is the Stanley H. Cohn Professor of Economics at Reed College. She is an environmental economist with expertise in non-market valuation and land economics with a focus on urban areas. Dr. Netusil is an editorial board member for Landscape and Urban Planning. She received her BS in Chemistry and Economics from Allegheny College in 1986 and her PhD from the University of Illinois-Urbana in 1992.

**Daniel Newberry** has been the Executive Director of the Johnson Creek Watershed Council since 2015. He has worked in watershed management since 1993, including serving as a hydrologist with both the Mt. Hood National Forest and the Hoopa Valley Tribe, as the Executive Director of both the Applegate River Watershed Council and the Siskiyou Field Institute, and as an independent consultant designing/implementing stream restoration projects and strategic planning for many Oregon watershed councils. He holds a B.A. in Physics from Middlebury College and a Masters of Forest Science from the Yale School of Forestry and Environmental Studies.

**Luke Russell** is a river scientist bridging the gap between hydrology, geomorphology, and ecology. He studied applied geosciences and natural resource management at UW-Seattle before joining the King County River and Floodplain Management Section. Since 2020, he has been working for Wolf Water Resources in the Portland area on a variety of restoration design, monitoring, and planning projects.

**Hannah Schragger** arrived in the Pacific Northwest before she could form memories. After her youth in the Columbia River Gorge, she set off to survey the terrain between Port Angeles and Port Orford. Her professional credentials include government scientist, rainforest ringleader, and now native plant propagator for the greater Portland region. Exploring native plants, stewarding them, and supporting others in doing so, is how Hannah hopes to foster resilience and connectivity in her community. She currently serves as Portland Metro's Native Plant Materials Scientist.