October 19, 2021, 1:00 p.m. - 3:42 p.m.
via Zoom Webinar & Facebook Live

Symposium Schedule

Start	Speaker/Moderator	Topic
1:00	Moderator: Daniel Newberry (JCWC)	Introduction & housekeeping details
1:04	Moderator: Katie Holzer (City of Gresham)	Introduce speakers
1:05	Rebecca Talbot (Portland State University)	Spatial and seasonal variations of microplastic concentrations in Portland's freshwater
1:19	Adam Stonewall (USGS)	Assessing (chasing) turbidity and sediment in upper Johnson Creek
1:33	Daniel Newberry (JCWC)	Six years, seven culverts: Restoring fish passage in North Fork Johnson Creek
1:47	Arun Pallathadka (Portland State University)	Understanding beaver habitats using SETS framework in Johnson Creek, Portland
2:01	Moderator: Katie Holzer (City of Gresham)	Q & A session, Session #1
2:15	**BREAK**	**BREAK**
2:30	Moderator: Daniel Newberry (JCWC)	Welcome back
2:31	Moderator: Bruce Newton (JCWC)	Introduce speakers
2:32	Julia Bond (Portland BES)	Potential impacts of the Emerald Ash Borer in Johnson Creek
2:46	Jason Maxfield (Reed College)	Legacies of inequality: uncovering connections between historic socioeconomic inequality and urban forest health in Portland, OR
2:59	Julia Michaels (Reed College)	The biggest lab on campus
3:13	Max Lambert (Washington Dept. of Fish & Wildlife)	Stormwater ponds as toxic sinks or valuable habitat for amphibians?
3:27	Moderator: Bruce Newton (JCWC)	Q & A session, Session #2
3:41	Moderator: Daniel Newberry (JCWC)	End of Symposium

Speaker Bios

Julia Bond is an Environmental Specialist with the City of Portland's Bureau of Environmental Services. Julia's work focuses on evaluating water quality and watershed health in Portland's rivers and stream. She is responsible for environmental analyses, assisting in the implementation of regulatory activities and projects, and conducting technical water quality and natural resource evaluations related to stormwater and watershed health. Julia has a master's degree in Environmental Science with a focus in water resources, as well as a master's degree in Public Affairs.

Katie Holzer (Moderator) is a Watershed Scientist with the City of Gresham where she conducts studies of water quality in urban streams. She has a Ph.D. in Ecology from the University of California, Davis where she studied habitat values of urban stormwater ponds. enact positive change in the world that redefines our fundamental relationships with each other and the land.

Max Lambert recently began a position as senior scientist with the Washington Department of Fish & Wildlife where he leads a team studying a diversity of wildlife conservation and habitat restoration studies. Prior to this, he was a David H. Smith conservation postdoctoral fellow based out of UC Berkeley and in partnership with the City of Portland and City of Gresham. He completed his PhD at Yale University's School of Forestry and Environmental Studies and his BS in Wildlife, Fish, & Conservation Biology at UC Davis. Much of his research has focused on the impacts from and habitat value of urban, suburban, and agricultural environments.

Jason Maxfield is a senior research associate in the Ramirez lab at Reed College and the Digital City Testbed Center at Portland State University. He has a background in plant eco-physiology and research interests that include remote and novel detection of tree stress, and repurposing emerging digital data streams from sensor and surveillance technology for environmental monitoring. He has been a longtime resident of SE Portland, but recently relocated with his family to the Oregon coast.

Julia Michaels is a Visiting Assistant Professor of Biology at Reed College, where she shares her expertise in ecological restoration, plant community ecology, and multiscale biodiversity monitoring. Julia received her Ph.D. in Restoration Ecology from University of California, Davis. She currently teaches Restoration Ecology, a field course focused on applying ecological principles to the management of the Reed Canyon.

Daniel Newberry (Symposium organizer) has been the Executive Director of the Johnson Creek Watershed Council for the past 6½ years. 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. 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. He currently serves as a volunteer commissioner on Portland's Urban Forestry Commission.

Bruce Newton is a Director at the Johnson Creek Watershed Council. Now retired, Bruce was the Director of the West National Technology Support Center of the Natural Resources Conservation Service – an agency of the US Dept. of Agriculture. Prior to moving to Oregon,

Bruce worked at the US Environmental Protection Agency in Washington, DC, where he developed and managed national water quality programs.

Arun Pallathadka is a Ph.D. student in the Earth, Environment, and Society (EES) program at the Department of Geography at Portland State University. Arun received his bachelor's degree in Geography from Arizona State University (ASU). He earned a master's degree in geography and a graduate certificate in geographic information systems (GIS) from Portland State University (PSU). His research interests lie in urban climate change adaptation, urban flood vulnerability, and urban sustainability. As a fellow at NSF-funded UREx Sustainability Research Network, Arun has been studying urban flood vulnerability using the SETS framework. At PSU, he is a member of the Water as an Integrated System and Environment (WISE) Research Lab and Political Ecology & Resilience Lab.

Adam Stonewall holds a BS in Hydrology from the University of Arizona and a MSc in Forest Hydrology from the University of British Columbia. He has been with USGS since 2001. He is currently a hydrologist and the Surface Water Specialist with the USGS Oregon Water Science Center (OrWSC). He has been the Primary Investigator for Johnson Creek project with the OrWSC for about 10 years.

Rebecca Talbot is a master's student in the Department of Geography at Portland State University, and is advised by Dr. Heejun Chang. She received a B.A. in Psychology with a minor in harp performance from Kenyon College. After working as a research assistant at Washington University in St. Louis and completing one year of a graduate program in primatology at the Chimpanzee and Human Communication Institute in Ellensburg, WA, she became increasingly interested in contaminants that threaten water quality in freshwater environments. She is particularly interested in how these contaminants affect drinking water sources and human health.

Program Abstracts

Session #1

Spatial and seasonal variations of microplastic concentrations in Portland's freshwater (Rebecca Talbot)

Microplastics are a pollutant of growing concern, capable of harming aquatic organisms and human health. The majority of microplastics research to date has been conducted in marine waters, and little is known regarding the sources and delivery pathways of microplastics in urban rivers. Two watersheds in the Portland metro area representing an urban-rural gradient were selected to assess microplastic concentrations and potential links with land cover, flow rate, precipitation, and seasonality. Samples were collected from six sites along Johnson Creek and four sites along the Clackamas River, and sampling events occurred in both the dry and wet seasons. Microplastics were isolated on filter paper via lab procedures such as organic matter digestion, density separation, and vacuum filtration. Microplastics were identified using a Leica dissection microscope, and a subset of particles is currently being analyzed using spectroscopic procedures to determine polymer types. Statistics and GIS analyses are currently being conducted and will be used to describe variations in microplastics and identify landscape and hydrometeorological variables that are associated with microplastic concentrations. Greater microplastic concentrations are expected at sites adjacent to more urbanized, industrialized, and agricultural land covers. More microplastics are also expected in wet season samples,

particularly early in the season due to first flush effects. Microplastic concentrations may also vary between seasons due to hydrologic variables such as flow rate. The findings of this research can be used to inform management decisions regarding microplastic waste and identify hotspots of microplastic pollution that may benefit from remediation.

Assessing (chasing) turbidity and sediment in upper Johnson Creek (Adam Stonewall)
Sediment is associated with the five most frequent causes of stream impairment cataloged on the U.S. Environmental Protection Agency's 303(d) list. Excess sediment clogs storm drains and catch basins; reduces vision for aquatic invertebrates, resulting in diminished capability for finding food or avoiding predators; disturbs natural vegetation patterns; obstructs fish gills, leading to health issues; and transports and distributes pollutants.
The U.S. Geological Survey Oregon Water Science Center is coordinating a 4-year study of the mobilization and distribution of suspended sediment in the Johnson Creek Watershed. Three "roving" turbidity probes are used to record turbidity values throughout the watershed. The "rover" data are paired with sediment collection data to develop statistical relations between turbidity and suspended sediment. Data from two long-term turbidity probes and previous sediment collection efforts at those locations are used to develop similar statistical relations. Early results show that a disproportionate amount of sediment originates from the headwaters of the watershed. The results of this study would allow turbidity monitoring to act as a surrogate for sediment mobilization and help prioritize management decisions and outreach efforts to reduce the overall impact of sediment in Johnson Creek.

Six years, seven culverts: Restoring fish passage in North Fork Johnson Creek (Daniel Newberry)

How do we allocate scarce funding to maximize the benefit of restoring fish passage? Twenty years ago, watershed scientists focused almost exclusively on the length of stream channel opened. Yet cost varies greatly from barrier to barrier, so this must be factored in as well. In 2013 and 2014, Johnson Creek Watershed Council surveyed 274 culverts and found that about 75% of them posed some level of barrier to salmonid passage. Cost, number of miles of habitat opened and other factors were input into the APASS mathematical model to rank potential projects. As climate change accelerated, the Council modified this strategy to focus on streams with multiple high priority culverts that were also natural sources of cold water. We chose a strategy that opened up entire cold water tributary channels.

The first such tributary was the North Fork Johnson Creek. Seven culverts were identified for restoration in 2015. Three of these culverts were located on property owned by the East Multnomah Soil & Water conservation District, which addressed those barriers in 2016. The Council addressed the remaining four culverts between 2017 and 2021. The Council pioneered a low-cost culvert retrofit technology, the Flexi-Baffle on three of these culverts.

Understanding beaver habitats using SETS framework in Johnson Creek, Portland

Beavers are native to Oregon and can be found in abundance in the state's water bodies. The presence of dams is the most visible indicator of beavers. Although beaver habitats have been examined through various scientific lenses, a unified review using the social-ecological-technological systems (SETS) lens is still needed for an overall understanding of the impact humans and the environment have on beaver habitats. We explored the SETS characteristics of beaver habitats using SETS indicators and USGS data from four years of Beaver habitats along Johnson Creek. We attempted to answer the following research questions: Why do beavers

return to rebuild their dams in specific locations? How do beaver habitats relate to their surrounding SETS characteristics? The findings would demonstrate that ecological variables like tree canopy, elevation, and stream width are more important drivers of beaver habitat than social and technological factors.
This research better informs environmental practitioners in their future stream and wildlife habitat conservation and restoration efforts.

Session #2

Potential Impacts of the Emerald Ash Borer in Johnson Creek (Julia Bond)

The emerald ash borer (EAB; *Agrilus planipennis*), is a destructive and costly exotic forest insect in United States. A dietary specialist, EAB feeds and congregates almost exclusively on ash species (genus *Fraxinus* [Family: Oleaceae]). The initial detection of EAB in North America occurred in 2002, prompted by the abrupt and widespread mortality of ash trees in southeastern Michigan as well as Ontario, Canada. By 2018, just 16 years after initial detection, EAB had reached 35 US states and five Canadian provinces, leaving hundreds of millions of dead ash trees in its wake. While EAB has not yet been detected in the Pacific Northwest, there is a consensus among scientists and practitioners that its introduction is all but inevitable, posing a serious concern for the endemic Oregon ash (*Fraxinus latifolia*). Oregon ash is highly susceptible to EAB and will therefore be imperiled and potentially driven to extinction should EAB arrive and remain unmanaged.

Oregon ash is a common riparian species, particularly along the low-elevation streams of the Willamette Valley. While the loss of Oregon ash due to EAB would have an impact on riparian canopy and habitat of Johnson Creek, the extent of this impact is uncertain without an estimate of the existing Oregon ash abundance and distribution. The goal of this effort was to assess the abundance and location of Oregon ash along Johnson Creek and evaluate the potential impacts of canopy loss due to EAB and the implication for riparian shade.

Legacies of inequality: uncovering connections between historic socioeconomic inequality and urban forest health in Portland, OR (Jason Maxfield)

Because of unequal resource allocation, socioeconomic status of neighborhoods may be linked with the biological health of urban trees, and the ecosystem services trees provide. Our study investigates connections between urban forest health and neighborhood status in Portland. We present results from our first field campaign, measuring health status of four large urban tree species (Douglas fir, western redcedar, bigleaf maple, Norway maple) across several Portland neighborhoods, which include substantial current and historic socioeconomic differences and legacies of investment in trees, parks, and natural areas.

Our data show significant variance in abiotic conditions across neighborhoods, including large differences in temperature and access to water. We also measured substantial differences in canopy morphology, including significantly greater missing or dead canopy in neighborhoods with lower socioeconomic status, which may indicate increased risk to infrastructure from large branch loss, as well as challenges to expanding urban canopy in those neighborhoods.

However, we also recorded scorch damage to leaf and needle tissue from the unprecedented ‘heat dome’ event of 2021, and found impacts across all neighborhoods. Additionally, species adapted to more mild, mesic conditions, e.g. western redcedar, experienced greater impacts.

We will discuss these findings in context of future research objectives, including efforts to relate ground-based tree health information with satellite-based remote-sensing, with the goal of improving real-time, large-scale environmental monitoring of urban forests. We invite collaboration with researchers and natural resource managers, in order to improve future field campaigns and better understand the complex patterns of tree health across heterogeneous urban areas.

The Biggest Lab on Campus (Julia Michaels)

In this talk, we present the outcomes of an ongoing project–based field course at Reed College. In this course, students directly apply ecological concepts as they take on the role of ecological consultants for a portion of Reed Canyon that will be restored in the future. Working in small groups and interacting with local restoration professionals, students design and implement a monitoring plan to shed light on the patterns and processes that affect restoration potential at the field site. Methods include biodiversity monitoring, species behavioral observations, and soil and water quality testing. Students learn to collect and analyze the data in the context of setting management goals, identifying uncertainties and tradeoffs, and practicing adaptive decision making. This class effort has been synthesized into a management plan that will aid in the restoration of the site.

Stormwater ponds as toxic sinks or valuable habitat for amphibians? (Max Lambert)

Stormwater ponds are a common component of low impact development. These ponds are engineered to protect landscapes and streams by slowing water and settling out and removing sediments and other pollutants during storms. Although not always designed as habitat for wildlife biologists recognize that a number of species regularly use stormwater ponds. However, there is controversy over wildlife using stormwater ponds as habitat. Some argue that these ponds provide valuable freshwater habitat that doesn't otherwise exist because agricultural and urban land use has removed many natural wetlands. Others argue that, because these ponds collect pollutants from urban areas, they are toxic traps that harm wildlife. We used native red-legged frog (*Rana aurora*) embryos and tadpoles in a field experiment to explore this dilemma. We enclosed embryos and tadpoles in mesh enclosures embedded in a variety of stormwater ponds in Gresham and Portland. We replicated these enclosures in a series of natural, forested ponds within and near the cities as controls in our experiment. Our experiment showed that red-legged frog embryos and tadpoles survived just as well - if not better sometimes - in constructed stormwater ponds as in natural forested ponds. This is despite urban stormwater ponds harboring a diversity of pollutants that are largely absent from forest ponds. Although chemical pollutants certainly are not benefiting wildlife, some species like red-legged frogs appear to be relatively robust to the impacts of this pollution.