Fellow Ecologists and Water Resource Professionals:

This program agenda includes information about our keynote speakers and contributed presentations to our 2021 Annual Meeting of the Pacific Northwest (PNW) Chapter of the Society for Freshwater Science. The PNW Chapter began as the Northwest Biological Assessment Workgroup, a collaborative effort between State, Federal, Tribal, and academic bioassessment professionals in 1990. Our meeting this year is the 31st annual gathering of regional scientists to advance the understanding and practice of freshwater science in the Pacific Northwest. Thanks to each of you for your continued support and contribution to our Chapter!

To accommodate travel restrictions, social distancing, and community health response to COVID, we have elected to host a virtual meeting this year. Connections provided by an on-site meeting are important to all of us as is the health and well-being of our colleagues, presenters, and families. To maximize participation and support our community, registration fees were waived this year. We are optimistic that 2022 will provide the opportunity to meet and host an on-site meeting in Idaho. In the spirit of keeping us connected during these unprecedented circumstances, we have tried to advance our social media presence. We encourage you to visit or subscribe to our: Website, Facebook, Instagram, Linked In, or Twitter sites.

For the coming year, we are looking forward to advancing diversity, inclusivity, and equity goals. In the past year our steering committee began discussing approaches to improve participation by younger (student and early career), Black, Latino, Asian, Indigenous, and LGBTQ+ scientists. To support future DEI scholarships, please consider putting a bid into our silent auction (https://www.32auctions.com/SFS-PNW2021).

We are pleased to announce Guido Rahr (President & CEO, Wild Salmon Center) and Heather Bartlett (Deputy Director, Washington State Ecology Department) our keynote speakers this year. They both are on the forefront of research, science, education and policy! We are confident that our 2021 Annual Meeting will be an exciting and informative event that all will enjoy. We look forward to seeing you!

Sincerely,

Your 2021 Meeting Steering Committee At-Large

Bob, Rob, Chad, Jessie, Francine, Celeste, Oliver, Dorene, Sara, Mindy and David

Pacific Northwest Chapter – Society for Freshwater Science

Annual Chapter Meeting, October 26-28th, 2021

CONNECTION INFORMATION

SPEAKER PRACTICE SESSION

Speakers are invited to connect to our Zoom meeting platform on 10/25/2021 to practice working with our moderators and meeting technology. If you are interested in participating in our practice session, please click on the link below to register. As a safeguard to unexpected bandwidth limitations, speakers should consider sending their final presentation to the steering committee (via jdoyle@csumb.edu) by 10/22/21 by 5 pm PST so that moderators can advance the slides if needed.

MEETING GROUND RULES

Our 2021 meeting will be the second virtual event hosted by the Chapter. Please help our dialogue run smoothly by keeping your camera off and microphone muted unless you are presenting or asking a question. In addition, we encourage you to log off virtual networks to reduce interference and improve your connection experience. Each session will feature a facilitator, moderator, and of course our wonderful panel of speakers. Our facilitator will introduce and transition between speakers. Our moderator will post logistics and track questions in the chat box. Questions, thoughts, and observations should be raised in the meeting chat box. At the conclusion of an individual talk or session, the moderator will call on attendees to share their questions at which time the questioner may turn on their microphone (and camera if you choose) for the duration of the question. The moderator reserves the right to guide and take those actions necessary to facilitate a professional and collegial conversation.

Pacific Northwest Chapter – Society for Freshwater Science

Annual Chapter Meeting, October 26th- 28th, 2021

SCHEDULE AT GLANCE

Tuesday, October 26th

TIME	TOPIC	SPEAKER
12:45 pm – 1:00 pm	Welcome and Logistics	Bob Danehy & Rob Plotnikoff
1:00 pm – 1:45 pm	Stronghold Approach: The Key to Protecting Wild Salmon Watersheds Across the Pacific	Guido Rahr (Wild Salmon Center)
SESSION: Restoration		
2:00 pm – 2:20 pm	Aquatic ecosystem responses to the Holiday Farm Fire	Allison Swartz (Oregon State University), Dana Warren (Oregon State University)
2:25 pm – 2:40 pm	Integrating regional and local monitoring data and assessment tools to evaluate habitat conditions and inform river restoration	Francine H. Mejia (USGS), Jason M. Connor (Kalispel Tribe Natural Resource Department), Philip R. Kaufmann (USEPA), Christian E. Torgersen (USGS), Eric K. Berntsen (Kalispel Tribe Natural Resource Department), Todd Andersen (Kalispel Tribe Natural Resource Department)
2:45 pm – 3:00 pm	Removing the compost heaps: Anticipating the effects of dam removal on the Klamath River water quality and food web	Desiree Tullos (Oregon State University), Julie Alexander (Oregon State University)
BREAK ~ Start of Silent Auction!		
3:15 pm – 3:30 pm	Diversity and taxonomic composition of littoral macroinvertebrate communities in riverine lakes	Oliver Miler (NWIFC), Magdalena Czarnecka (Nicolaus Copernicus University) & Mario Brauns (Helmholtz Centre for Environmental Research – UFZ)
3:35 pm – 3:50 pm	Presence of *Juga plicifera* and *Gonidea angulata* in the Chehalis River drainage: Evidence for a former Miocene Columbia River channel.	Edward J. Johannes (Deixis Consultants)
3:55 pm – 4:10 pm	Newly arrived *Corbicula fluminea* clams and their potential interactions with native mussels, plants, and salmon in Lake Ozette, WA	David Cowles (Walla Walla University)

4:15 pm – 5:00 pm	Day 1 Wrap-Up Open Group Discussion (Diversity, Equity, and Inclusion Theme)	Bob Danehy & Celeste Searles Mazzacano

Wednesday, October 27th

TIME	TOPIC	SPEAKER
9:00 am – 9:15 am	Welcome and Logistics	Robert Plotnikoff & Chad Larson
9:15 am – 9:45 am	Addressing Diversity, Equity & Inclusion and Environmental Justice at a State Agency	Heather Bartlett (Washington State Ecology Department)
BREAK		
SESSION: Urban Streams & Salmon		
10:15 am – 10:30 am	Are salmon umbrella species for decomposition in Urban Streams?	Amanda Wik (Simon Fraser University)
10:35 am – 10:50 am	The effects of reed canarygrass (*Phalaris arundinacea*) on cold water streams of the Olympic Peninsula	Celia Thurman (10,000 Years Institute), Lara Hakam (10,000 Years Institute), Onyx Yskamp (10,000 Years Institute)
10:55 am – 11:10 am	Investigating potential urban stream deserts in the Spokane Watershed	Erin D. Dascher (Eastern Washington University)
FREEFORM LUNCH - Shirt Design (Mindy)		
SESSION: PNW Freshwater Mussels		
1:00 pm – 1:15 pm	An overview of freshwater mussel surveys in the Pacific Northwest and efforts toward development of a standardized visual survey protocol	Emilie Blevins (Xerces Society for Invertebrate Conservation)
1:20 pm – 1:35 pm	Found and lost: Discovery and subsequent loss of an imperiled freshwater mussel population from wildfire runoff	Andrew J. Lawrence (Colorado State University), Jacquelyn J. Hancock (U.S. Army Garrison Fort Hunter Liggett), Andrew L. Rypel (University of California – Davis), Laura A. Eliassen (Colorado State University)
1:40 pm – 1:55 pm	Restoration design for freshwater mussels	Laura McMullen (ICF), Janel Sobota (ICF), Celeste Mazzacano (ICF), Kevin MacKay (ICF)
2:00 pm – 2:15 pm	The continued search for freshwater mussels in the Lower Boise River	Colin Custer (City of Boise)

2:20 pm – 2:35 pm	Exploring biophysical linkages between coastal forestry management practices and aquatic bivalve contaminant exposure	Kaegan Scully-Engelmeyer (Portland State University), Elise F. Granek (Portland State University), Max Nielsen-Pincus (Portland State University), Andy Lanier (Oregon Department of Land Conservation and Development), Steven S. Rumrill (Oregon Department of Fish and Wildlife), Patrick Moran (USGS), Elena Nilsen (USGS), Michelle L. Hladik (USGS), and Lori Pillsbury (Oregon Department of Environmental Quality)
BREAK		
SESSION: Benthic Index of Biotic Integrity		
2:45 pm – 3:00 pm	Improvements in benthic macroinvertebrate integrity scores despite increased development: Implications for assessing the biological potential of streams	Kate Macneale (King County), Beth Sosik (King County)
3:05 pm – 3:20 pm	Mysteries of the (not so) Deep: Strange trends in stream benthos	Beth Sosik (King County) and Kate Macneale (King County)
BREAK		
3:30 pm – 3:45 pm	Day 2 Wrap-Up and Comments	David Wooster
3:45 pm – 5:00 pm	Virtual Social on Zoom	Francine Mejia & Dorene MacCoy

Thursday, October 28th

TIME	**TOPIC**	**SPEAKER**
9:00 am – 9:15 am	Welcome and Logistics	Jessie Doyle
SESSION:		
9:15 am – 11 am	Agency Updates	TBA
BREAK		
11:15 am – 12 pm	Biological condition gradient (BCG) models and thermal indicator analyses for macroinvertebrate assemblages in Oregon and Washington streams	Robert Plotnikoff (Snohomish County Department of Conservation and Natural Resources), Sean Sulllivan (Rhithron Associates, Inc), Bob Wisseman (Aquatic Biology Associates), and Shannon

		Hubler (Oregon Department of Environmental Quality)
CHAPTER BUSINESS LUNCH (12:00 pm – 2:00 pm) **End of Silent Auction at 1:30 pm!**		

Pacific Northwest Chapter – Society for Freshwater Science

Annual Chapter Meeting, October 26th-28th

PRESENTATION ABSTRACTS PROVIDED BY AUTHORS

Are salmon umbrella species for decomposition in urban streams? (Amanda Wik – Simon Fraser University)

Urban streams are prevalent across Vancouver, BC, and despite their heavily developed surroundings, most of these streams provide passage to Pacific salmon. While a history of degradation has caused declines in many populations, governments and local citizens are working to restore the habitat and passage for fish. Here, I ask whether salmon are umbrella species: can restoration on their behalf have broad-scale positive effects on resource flow through the entire stream ecosystem, represented by organic matter decomposition? I used a cotton strip assay and conducted habitat assessments on factors that may contribute to decomposition. I hypothesize that: 1) as urbanization increases, decomposition rates will be pushed higher or lower as compared to undisturbed sites; and 2) sites that are near restoration efforts on behalf of salmon will have more natural decomposition rates. However, I found that restoration effort does not explain substantial variation in decomposition. Instead, decomposition rate is influenced by watershed, site within a watershed, and flow structure. The amount of surrounding impervious surface negatively affects decomposition rates regardless of restoration status. Together, the results indicate that salmon are not currently effective umbrella species for ecosystem function in urban streams.

Exploring biophysical linkages between coastal forestry management practices and aquatic bivalve contaminant exposure (Kaegan Scully-Engelmeyer – Portland State University, Elise F. Granek – Portland State University, Max Nielsen-Pincus – Portland State University, Andy Lanier – Oregon Department of Land Conservation and Development, Steven S. Rumrill – Oregon Department of Fish and Wildlife, Patrick Moran – U.S. Geological Survey, Washing Water Science Center, Elena Nilsen – U.S. Geological Survey, Oregon Water Science Center, Michelle L. Hladik – U.S. Geological Survey, California Water Science Center, and Lori Pillsbury – Oregon Department of Environmental Quality)

Terrestrial land use activities present cross-ecosystem threats to riverine and marine species and processes. Specifically, pesticide runoff can disrupt hormonal, reproductive, and developmental processes in aquatic organisms, yet non-point source pollution is difficult to trace and quantify. In Oregon, U.S.A., state and federal forestry pesticide regulations, designed to meet regulatory water quality requirements, differ in buffer size and pesticide applications. We deployed passive water samplers and collected riverine and estuarine bivalves Margaritifera falcata, Mya arenaria, and Crassostrea gigas from Oregon Coast watersheds to examine forestry-specific pesticide contamination. We used non-metric multidimensional scaling and regression to relate concentrations and types of pesticide contamination across watersheds to ownership and management metrics. In bivalve samples collected from eight coastal watersheds, we measured twelve unique pesticides (two herbicides; three fungicides; and seven insecticides). Pesticides were detected in 38% of bivalve samples; and frequency and maximum concentrations varied by season,

species, and watershed with indaziflam (herbicide) the only current-use forestry pesticide detected. Using passive water samplers, we measured four current-use herbicides corresponding with planned herbicide applications; hexazinone and atrazine were most frequently detected. Details about types and levels of exposure provide insight into effectiveness of current forest management practices in controlling transport of forest-use pesticides.

The effects of reed canarygrass (*Phalaris arundinacea*) on cold water streams of the Olympic Peninsula (Celia Thurman- 10,000 Years Institute, Lara Hakam- 10,000 Years Institute, Onyx Yskamp - 10,000 Years Institute)

Reed canarygrass (*Phalaris arundinacea* L.; RCG) is a rhizomatous, invasive grass that rapidly and aggressively colonizes wetlands, floodplains, and riparian zones. While the impacts associated with reed canarygrass-invaded wetlands have been investigated and reported, little information is available regarding its effect on biota and habitats in the cold-water streams of the Pacific Northwest. Consequently, 10,000 Years Institute has established two study sites along salmon-bearing streams on the Olympic Peninsula that are currently infested with reed canarygrass.

We have collected water and air temperature, dissolved oxygen (DO), stream velocity, and vegetation data for two years at these study sites. After four years, we plan to treat the reed canarygrass and continue the study for another two years to assess response.

After the first two years of data collection, it appears that changes in flow, climate, and presence of beaver dams may overshadow any RCG-driven impacts on water quantity and quality, as no significant effect has been measured for stream temperature related to reed canarygrass infestation. We expect to see more significant results as this study continues and we can assess the impacts of removing reed canarygrass from these reaches.

Newly arrived *Corbicula fluminea* clams and their potential interactions with native mussels, plants, and salmon in Lake Ozette, WA (David Cowles – Walla Wall University Department of Biology)

The invasive Asian Clam *Corbicula fluminea* has been rapidly spreading along the shoreline of Lake Ozette since its first detection there in summer 2018. The clam, which can multiply to prodigious population numbers, seems to flourish best near the shoreline in areas of light silt mixed with gravel or cobble. These same areas in Lake Ozette appear to be optimal habitats for the WA-listed threatened *Lobelia dortmanna* (water lobelia or Dortmann's cardinalflower) plants and also major habitat for *Margaritifera falcata* and *Anodonta oregonensis* native mussels, US-listed endangered sockeye salmon spawning grounds, and quillwort. *Corbicula* is known to disturb the sediment by jostling and pedal feeding, and preliminary observations also suggest that periodic local mass die-offs of *Corbicula* may be associated with the wilting and die-off of nearby *Lobelia* plants.

Presence of *Juga plicifera* and *Gonidea angulata* in the Chehalis River drainage: Evidence for a former Miocene Columbia River channel (Edward J. Johannes - Deixis Consultants)

Geologic and geomorphic history resulting in the rearrangement of drainages has strongly influenced the faunal composition of Pacific Northwest rivers. For example, the Chehalis River is unique in having at least twice or more the number of fish species present compared to other coastal rivers in Washington and Oregon. One could argue that being the second biggest drainage in Washington State has had a hand in this. The presence of two freshwater mollusks suggests an alternate explanation. Other than the Chehalis River, the snail *Juga plicifera* is found only in the lower Columbia River and in its major tributaries Cowlitz, lower Willamette, and the mouth of Deschutes. The unionid clam *Gonidea angulata* has a more extensive range occurring in Washington, Oregon, Idaho, Nevada, California, and British Columbia but also mostly occurring in larger streams. Since both are large stream inhabitants, the possibility of a

stream capture as a way into the Chehalis River drainage is unlikely. Both the fish and mollusk occurrences in the Chehalis would be better explained if the Columbia once flowed through this drainage. Outcrops of Columbia River Flood Basalts in the Chehalis drainage support a Miocene occurrence for this former Columbia River channel.

Aquatic ecosystem responses to the Holiday Farm Fire (Allison Swartz - Oregon State University, Dana Warren - Oregon State University)

As wildfire becomes increasingly common and severe in forested landscapes in the west, riparian areas and streams within these forests are subject to potentially detrimental conditions for aquatic biota during fire, in subsequent wet seasons, and in summers post-fire if riparian canopies are burned. Removal of riparian cover can increase stream temperature, a key control on metabolic rates of biota, and can shift stream food webs towards autotrophic energy pathways. Here we evaluate wildfire impacts on aquatic ecosystems in western Oregon after a severe fire resulted in exposed streams. We leveraged pre-fire summer data from a previous study at six streams during 2018 and 2019. Three of the six sites burned, so we returned in summer 2021 to execute a replicated before-after-control-impact study design assessing impacts on stream temperature, chlorophyll-a, and populations of fish and salamanders. Preliminary findings indicate that, unsurprisingly, stream temperature and chlorophyll-a accrual increased, but surprisingly, we did not observe notable changes in abundance, biomass or condition of aquatic vertebrates due to fire. Findings suggest that as wildfires continue impacting forested landscapes, we can expect increases in temperature and basal food resources, but in the short-term, biomass and abundance of apex predators in headwaters may be unaffected.

Removing the compost heaps: Anticipating the effects of dam removal on the Klamath River water quality and food web (Desiree Tullos – Oregon State University, Julie Alexander – Oregon State University)

The Klamath River food web and water quality has changed as a result of dam construction and operation. The reservoirs seasonally store and release nitrogen and phosphorus delivered from upstream, as well as host substantial plankton blooms during the summer and contribute to disease risk from the pathogen C. Shasta. Removing the dams are expected to produce substantial changes to the project reach and downstream river, in part a result of pulse releases of nutrients with drawdown of the reservoirs and of the long-term increase in nutrient delivery in response to the removal of the nutrient traps. This presentation will synthesize existing data and knowledge about the current reservoir and river water quality and food web, and propose hypotheses about what the water quality, food web, and disease risk may look like post dam removal. It is expected that discussion of the hypotheses will result in corroborating some expectations, rejecting others, and identifying additional data sources and needs to understand the expected changes.

Diversity and taxonomic composition of littoral macroinvertebrate communities in riverine lakes (Oliver Miler – Northwest Indian Fisheries Commission, Magdalena Czarnecka – Nicolaus Copernicus Toruń & Mario Brauns - Helmholtz Centre for Environmental Research, UFZ)

Riverine lakes mark the transition between lentic and lotic freshwater systems and are characterized by a short water residence time. They typically occur in regions shaped by glacial processes, e.g. along the St. Lawrence River in Canada, in North-Eastern Germany and Northern Poland. Macroinvertebrate communities in riverine lakes are commonly affected by a multitude of human activities, i.e. invasive species, hydromorphological alterations and ship-induced waves. This high degree of alteration in most of these lakes complicates the description of reference conditions. We compared pristine riverine lakes in Poland with degraded German riverine lakes to delineate reference conditions and degradation classes based on littoral macroinvertebrate communities and assessment relevant macroinvertebrate metrics.

Pristine communities consisted mostly of native species, whereas degraded lakes had a high share of invasive Amphipoda. Moreover, pristine lakes were characterized by considerably higher overall taxonomic diversity and % densities and numbers of ETO (Ephemeroptera, Trichoptera, Odonata) and EPTCBO (Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, Bivalvia, Odonata) taxa compared to degraded riverine lakes. Our findings serve to calibrate and improve biotic assessment methods and develop appropriate conservation and management efforts for riverine lakes.

An overview of freshwater mussel surveys in the Pacific Northwest and efforts toward development of a standardized visual survey protocol (Emilie Blevins - Xerces Society for Invertebrate Conservation)

Native species of freshwater mussels occur across the Pacific Northwest region in a range of aquatic habitats. Although there are historic records documenting the waterbodies and watersheds in which mussels occur, recent survey efforts by an ever-increasing network of biologists, researchers, and community scientists have expanded the known distribution of these species. This basic distributional information has proved critical to understanding the conservation status of freshwater mussels, which, combined with freshwater snails, are among the most imperiled wildlife in North America. This presentation will provide an overview of historic survey efforts, as well as discuss more recent efforts by Xerces Society biologists and others to expand on the existing knowledge base. Visual surveys, as well as implementation of new techniques, such as eDNA, have served to locate previously undocumented mussel beds, as well as track changes in species' ranges. Recent collaborative efforts to develop a visual survey protocol for western species of freshwater mussels, with the intent to help standardize data collection, should also serve to improve status and trend analyses to support conservation efforts. These efforts, as well as remaining data gaps, will be discussed.

The continued search for freshwater mussels in the Lower Boise River (Colin Custer - City of Boise)

The City of Boise (City) recently discovered several populations of Western Pearlshell Mussels (*Margaritifera falcata*) in the Lower Boise River. The City sampling and monitoring team (SAM) began searching for the presence of mussels to provide background information for Idaho negotiated rulemaking for ammonia aquatic life criteria. After the presence of the mussels had been firmly established, the City has now shifted to a conservatory role. This role has included a monthly monitoring program and the aging of several specimens. The
SAM has also partnered with US Geological Survey (USGS) to analyze for mussel environment DNA (eDNA) in both the mainstem and tributaries of the Lower Boise River. The SAM is also working with the Fish and Wildlife Service to PIT tag mussels to collect data on recovery, growth and movement of mussels. With these partnerships and monitoring programs, the city hopes to understand the present mussel population, to keep them healthy and viable, as well as continuing the search for other mussel species.

Found and lost: Discovery and subsequent loss of an imperiled freshwater mussel population from wildfire runoff (Andrew J. Lawrence – Colorado State University, Jacquelyn J. Hancock – U.S. Army Garrison Fort Hunter Liggett, Andrew L. Rypel – University of California - Davis, Laura A. Eliassen – Colorado State University)

The effects of wildfire and subsequent hydric erosion on water quality and aquatic communities have been well documented. Increases in toxic contaminants and sedimentation following
wildfires generally reduce the fitness of aquatic organisms and have the potential to cause extirpations of local populations. Examples of the effects of wildfires on wild freshwater mussel populations are currently limited in the scientific literature. We surveyed a riverine pool population
of *Anodonta californiensis/nuttalliana*, documented fish species, and recorded river substrate

characteristics before and after an influx of wildfire runoff in Monterey County, California, USA. Our surveys before the runoff influx documented a relatively robust and reproducing population of mussels and three species of native fish (*Catostomus occidentalis mnioltiltus, Lavinia symmetricus subditus*, and *Ptychocheilus grandis*). We did not detect any live mussels during three surveys after the influx and only observed juvenile *Lavinia symmetricus subditus* and *Catostomus occidentalis mnioltiltus*. River substrate shifted to predominantly sand, and thalweg decreased from 1.77 to 0.2 m. Given the expected increase in wildfires in the western U.S. and in periodic heavy rainfall events in California, the potential for extreme levels of wildfire runoff in aquatic systems should be evaluated for at-risk species.

Investigating potential urban stream deserts in the Spokane watershed (Erin D. Dascher - Eastern Washington University)

Urbanization often results in the burial of streams and thus degrades and diminishes the river network within a watershed. The purpose of this study is to investigate the geography of potential urban stream deserts and their development within the Spokane Watershed. The Spokane Watershed drains an area of 17,039 km2 encompassing parts of northern Idaho and eastern Washington including the cities of Spokane and Coeur d'Alene. Potential urban stream deserts were identified using the National Hydrography Dataset (NHD), the U.S. Census Bureau's Urban Areas shapefile, and data from the National Land Cover Database (NLCD). Multiple iterations of the NLCD were then used to investigate how identified urban stream deserts have grown over time from 2001 to 2019. Twenty-three potential urban stream deserts were identified ranging in size from 7967 m2 to 66.18 km2, with the largest urban stream deserts were located along the I-90 corridor. Investigating changes through time, it appears the size of existing urban stream deserts are increasing and that increasing urbanization will continue to diminish the size and extent of the existing river network. Further investigation into where pre-existing streams have been buried as a result of urbanization can help inform management practices and stream restoration efforts.

Restoration design for freshwater mussels (Laura McMullen - ICF, Janel Sobota - ICF, Celeste Mazzacano - ICF, and Kevin MacKay - ICF)

Loss of quality habitat for freshwater mussels in the Pacific Northwest has contributed to the decline of mussel populations in recent decades. Channelization, bank hardening, changes in river flow and temperature regimes, changes in sediment regimes, and poor water quality all degrade potential habitat for freshwater mussels. Watershed restoration actions themselves can also cause challenges to freshwater mussel populations through stranding due to flow changes or diversions, sediment pulses, or trampling, among other actions. Also, many restoration practitioners in the West are unfamiliar with best practice mussel survey and translocation methodologies. While many watershed restoration programs in the Pacific Northwest focus on providing benefits to anadromous salmonids, few consider enhancing freshwater mussel populations a primary restoration goal. Here, we review the qualities of freshwater habitat that are associated with healthy freshwater mussel populations and present restoration treatments that could be integrated to provide multiple benefits for both salmonids and mussels.

Improvements in benthic macroinvertebrate integrity scores despite increased development: Implications for assessing the biological potential of streams (Kate Macneale - King County Water and Land Resources and Beth Sosik - King County Water and Land Resources)

Stream conditions in King County, WA, are generally improving, according to increasing benthic index of biotic integrity (B-IBI) scores. Of 125 sites sampled annually since 2002, B-IBI scores are significantly improving at 37 sites (30%) whereas no sites are significantly declining. Upward trends in B-IBI scores suggest conditions are improving despite increased urbanization within many of the basins. Although it is unclear what is causing these trends, the overall pattern suggests our expectations for streams across the

urban gradient may improve over time. Since 2002, the biological potential, described as the outer envelope of the classic wedge seen between biological condition and urban gradients, has shifted up significantly. The intercept has increased ~8 points on a 0-100 scale, although the slope has not changed. While this story is a hopeful one, we are faced with some of the same challenges that other urban stream ecologists face: teasing apart causal relationships in complex systems is difficult. This seems to be true even when the trends are going in the right direction.

Mysteries of the (not so) deep: Strange trends in stream benthos (Beth Sosik- King County Water and Land Resources and Kate Macneale- King County Water and Land Resources)

Over the last 20 years, we have observed benthic index of biotic integrity (B-IBI) scores trending up across streams in King County. To examine potential causes for this trend in scores, we began analyzing trends in the underlying benthic community. In the process we have observed strange patterns in an aspect not captured by B-IBI: community density. Between 2009 and 2012, we observed an unusual increase in abundance in our most cosmopolitan taxa across the region, followed by a precipitous decline. At the same time, corresponding shifts in our B-IBI scores were observed. In this talk we will discuss the curious pattern observed, how it may relate to B-IBI scores, and what may cause it.

Integrating regional and local monitoring data and assessment tools to evaluate habitat conditions and inform river restoration (Francine H. Mejia - USGS, Jason M. Connor -Kalispel Tribe Natural Resource Department, Philip R. Kaufmann - USEPA, Christian E. Torgersen - USGS, Eric K. Berntsen – Kalispel Tribe Natural Resource Department, Todd Andersen – Kalispel Tribe Natural Resource Department)

Restoring degraded rivers requires initial assessment of the fluvial landscape to identify stressors and riverine features that can be enhanced. We associated local-scale river habitat data collected using standardized national monitoring tools with modeled regional water temperature and flow data on mid-sized northwest U.S. rivers (30-60 m wide). We grouped these rivers according to quartiles of their modeled mean August water temperature and examined their physical habitat structure and flow. We compared local conditions in the Priest River, a river targeted for restoration of native salmonid habitat in northern Idaho, with those in other rivers of the region to infer potential drivers controlling water temperature. We found that the warmest rivers exhibited uniformly simplified physical structure, suggesting that thermal and physical degradation together may comprise a syndrome. The Priest River sites had approximately twice as many deep residual pools and incision that averaged twice that in the coldest rivers. Percentage fines and natural cover in the Priest were also more typical of the higher-temperature river groups. We found low instream cover and low levels of large wood both across the region and within the Priest River. This approach can help define attainable goals for management and restoration.