PORTLAND / VANCOUVER

Urban Ecology & Conservation Symposium

18TH ANNUAL • MARCH 2, 2020

Thanks to the following photographers

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Top Row (left to right)

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Middle

Canada and Cackling Geese - Gregor Yanega, Forestry for the Birds

Bottom Row (left to right)

Melissodes Taraxacum - Erica Rudolph, Portland State University

Oaks Bottom Wildlife Refuge - Amy Chomowicz, City of Portland, Environmental Services

Adelante Mujeres Chicas Go Birding - Ali Berman, Portland Audubon

18TH ANNUAL

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Held at
Smith Memorial Center Ballroom
Portland State University
Portland, Oregon, USA
March 2, 2020

Organized by the
Urban Ecosystem Research Consortium (UERC)

Sponsored by

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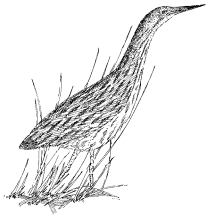
TABLE OF CONTENTS



Urban Ecosystem Research Consortium (UERC)
Portland, OR - Vancouver, WA Metropolitan Region

What is the UERC?
The UERC is a consortium of people from various universities and colleges, state and federal agencies, local governments, non-profit organizations and independent professionals interested in supporting urban ecosystem research and creating an information-sharing network of people that collect and use ecological data in the Portland/Vancouver area. Participants come from a variety of fields, including:

air quality	*environmental policy*	*hydrology*	*sustainable development*
climate change	*env. social sciences*	*land management*	*transportation*
conservation biology	*fisheries*	*land use planning*	*water quality*
ecology	*geology*	*land/watershed mgt.*	*wildlife biology*
economics	*GIS / modeling*	*plant ecology*	
env. design	*habitat assessment*	*social sciences*	
env. education	*habitat restoration*	*stormwater management*	

Mission Statement - To advance the state of the science of urban ecosystems and improve our understanding of them, with a focus on the Portland/Vancouver metropolitan region, by fostering communication and collaboration among researchers, managers and community members at academic institutions, public agencies, local governments, non-profit organizations, and other interested groups.

Goals and Objectives
- Provide direction and support for urban ecosystem research
- Create an information-sharing network within the research community
- Track and house available information
- Promote greater understanding of urban ecosystems and their importance

Organizers - The principal organizers span academic institutions, government agencies (city, regional, state and federal), private firms and non-profit organizations. Individuals from the institutions listed below currently serve on the steering committee. The diverse backgrounds and affiliations of those involved have allowed the UERC to bring together many important sectors of the natural resources community.

City of Portland
City of Vancouver
Metro
Portland Audubon
Portland State University
Reed College
U.S. Fish and Wildlife Service
Urban Greenspaces Institute

Web Site – The UERC web site can be found at **http://www.uercportland.org/**. There, you will find background and contact information, a link to sign up on the listserv, announcements about upcoming events, and full details about annual UERC symposia, including downloadable proceedings.

Listserv - Oregon State University hosts a listserv designed for members to share information and facilitate communication among those interested in urban ecology. Anyone can join by going to the UERC web site and following the link "Join Our Listserv."

Advocacy Statement - The role of the UERC is not to provide a political or advocacy platform, but rather to foster communication and collaboration by offering a forum for professionals to exchange and discuss information regarding urban ecology and its application to relevant fields.

2020 URBAN ECOLOGY & CONSERVATION SYMPOSIUM ACKNOWLEDGEMENTS

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FINANCIAL SPONSORS

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EVENT SUPPORT

We also wish to thank **Cornelia Coleman**, PSU, University Honors College, **Annie Toledo**, Metro Parks and Nature, and **Kelsey Kuhnhausen**, Portland Audubon, for their assistance and support for this event.

2020 Urban Ecology & Conservation Symposium
AGENDA

8:00 **REGISTRATION**

9:00 **WELCOME AND INTRODUCTION: Brendan White,** Conservation Partnerships Division Manager, US Fish and Wildlife Service

9:10 **OPENING KEYNOTE ADDRESS: Dr. Vivek Shandas**
Professor, USP and ESM; Director, Sustaining Urban Places Research (SUPR) Lab, Portland State University, Portland, OR; Chair, Portland Urban Forestry Commission
Beyond landscape legacies: Redlining, ecosystem services, and the work ahead

HABITAT, WILDLIFE, AND CONSERVATION			*Moderator: Carol Murdock, Business Practice Lead - Integrated Planning, Clean Water Services*
9:50	Leah Schrodt Rachel Fort	US Fish and Wildlife Service Oregon Zoo	The Oregon Zoo Partnership: A Model for Empowering Urban Wildlife Conservation
10:00	Brook Silver	US Fish and Wildlife Service	Tryon Creek fish monitoring
10:10	Adrienne Basey	Metro	Seeds for Change: Preserving oak prairie species for an unknown future
10:20	Joe Liebezeit	Portland Audubon	Portland Christmas Bird Count – An 80-year review of species trends (1938-2017)
10:30	Q&A		

10:40 **BREAK** *Raffle at 10:55*

HABITAT CONNECTIVITY FOR FISH & WILDLIFE			*Moderator: Amy Chomowicz, Stormwater Stewards Manager, City of Portland Bureau of Environmental Services*
11:00	Leslie Bliss-Ketchum	Samara Group	The Oregon Connectivity Assessment and Mapping Project (OCAMP)
11:10	Eric Butler	Portland State University	The ecosystem services of connectivity
11:20	Carole Hardy	Portland State University	A framework for incorporating ecosystem connectivity into urban planning for resilient cities
11:30	Martin Lafrenz	Portland State University	Mapping regional wildlife habitat connectivity
11:40	Q&A		

11:50 **LUNCH** *Raffle at 12:55*
You are invited to participate in a facilitated discussion or walking tour during the lunch break. Descriptions of the lunchtime offerings can be found on Page 7.

1:00	**AFTERNOON KEYNOTE ADDRESS: Dr. Ana M. Alvarez** Deputy General Manager, East Bay Regional Park District, Oakland, CA ***The intersectionality of diversity, equity and inclusion in the environmental movement***		
SOCIAL DIMENSIONS			*Moderator: Joe Liebezeit, Staff Scientist & Avian Conservation Program Manager, Portland Audubon*
1:40	Indi Keith	West Multnomah Soil & Water Conservation District	Whose land is our land? Race, place, and equity in western Multnomah County
1:50	Mary Santelmann	Oregon State University	Urban park visitor preferences for vegetation – an on-site qualitative research study in Portland, Oregon
2:00	Lori Hennings	Metro	Using wildlife fright information to inform trail planning
2:10	Erica Patterson	Community Member	Our wild neighbors: Exploring the connection between Portland's people and wildlife
2:20	Q&A		
2:30	**BREAK Raffle at 2:45**		
POLLUTION AND URBAN SOLUTIONS			*Moderator: Aaron Ramirez, Assistant Professor of Biology & Environmental Studies, Reed College*
2:50	Alix Danielson	Hood River Watershed Group	Oregon Pollutant Risk Database: A tool for supporting risk assessment of Oregon's water quality
3:00	Devan Rostorfer	Washington State Department of Ecology	From source assessment to water quality success: Implementing TMDL alternatives in southwest Washington
3:10	Tom Liptan	Green Infrastructure Consultant	Green infrastructure research - Ecoroof soil comparisons, 'which is the best'
3:20	Alex Bans	Portland State University	A seasonal study of ecoroof runoff quality and quantity and the associated drivers on a commercial building in North Portland, Oregon
3:30	Kathryn Forester	Herrera Environmental Consultants	D Avenue Green Street project: Methods for incorporating large trees, pollinator habitat, and native-dominant landscapes into an urban neighborhood
3:40	Q&A		
3:50	**CLOSING REMARKS: Lori Hennings**, Senior Natural Resource Scientist, Metro		
4:00 – 6:00	**POSTER SESSION AND SOCIAL** with Student Poster Award presented at 5:30		

POSTER PRESENTATIONS

Coordinator: Ted Labbe

Author(s)	Title
Aaron Anderson*^, Gail Langellotto (Oregon State University)	Which native plants should home gardeners grow for pollinators?
Stephanie Doorly*^, Samantha Gillette, Michael Murphy (Portland State University)	Urban nesting biology of a threatened subspecies of Willow Flycatcher (*Empidonax traillii brewsteri*)
Dylan Esmonde*^ (Portland State University)	A multi-scale assessment of urban streams and the influence of the urban environment on aquatic health and function
Kate Forester* (Herrera Environmental Consultants)	Carli Creek water quality and stream enhancement project
Gary Granger* (Portland Crow Roost)	Counting crows: Portland's urban crow roost by the numbers
Jen Hayes*^ (Oregon State University)	Pollinator preference for Pacific Northwest native plants and native cultivars
Jane Kleiner* (Nature + Play Designs)	Greening of schoolyards - Rebuilding nature at schools
Emma Kohlsmith*^ (Bureau of Environmental Services)	Stormwater treatment effectiveness of established bioretention facilities in Portland, Oregon
Gail Langellotto*, Isabella Messer (Oregon State University)	Garden bees of Portland
Jordan Leis*^, Nancy Broshot, William McCuen (Linfield College)	Soil characteristics in relation to urban tree mortality

Chuck Lobdell* (Johnson Creek Watershed Council)	Mitchell Creek restoration
Morgan McAllister*^ (Portland State University)	A pictorial guide to cavity nesting wasps of Portland
Erin McElroy*^ (Portland State University)	Understory species increase project
James Mitchell*^ (Portland State University)	Trail impact monitoring in Forest Park
Nadja Quiroz* (GreenWorks P.C.)	Overcoming barriers to ecological design: The researcher as socio-ecological coupler
Erica Rudolph*^, Stefanie Steele, Joshua Page, Diandra Diamond, Susan Masta (Portland State University)	A survey of the bees of Portland and their floral preferences
Sue Ryburn*, Jack Shorr, Susan Albright (Washington County Master Association)	From gravel to garden- Washington County Master Gardener Association education garden at PCC Rock Creek
Ashwin Sivakumar*^ (Flintridge Preparatory School), Alexis Mychajliw (La Brea Tar Pits and Museum, Hokkaido University)	Contextualizing avian species distribution models using Pleistocene fossil data
Fiona Smeaton*^ (Portland State University)	Habitat monitoring and restoration planning of urban pollinators: A planners' guide to effective management strategies
Jeffrey Smith*^, Olyssa Starry, Amelia Drake (Portland State University)	The effect of the urban heat mosaic on tree phenology
Stefanie Steele*^, Olivia Helback, Susan Masta (Portland State University)	Preferences of cavity nesting bees in Portland
Gregor Yanega* (Foresters for the Birds Project)	Songs, saws, and sustainability: Forestry for the birds comes to Washington County, OR

** Primary author, ^ Student presenter*

UERC 2020 LUNCHTIME CHATS AND TOURS

Grab your lunch and join a discussion with experienced peers from the world of urban ecology and environmental education. Or, go outside and take a guided tour or self-guided stroll around PSU's sustainable features. *Room numbers may change based on group size.*

1. **Connectivity in Urban Landscapes-Rm 327**
   Connectivity of various kinds is more important than ever as forces of change, both global and local, impact our landscapes. Come join us to discuss what connectivity means, why it matters and how to incorporate it into planning, design and resource management.
   Conversation leads: *Eric Butler, Carole Hardy, Cat de Rivera, Leslie Bliss-Ketchum*

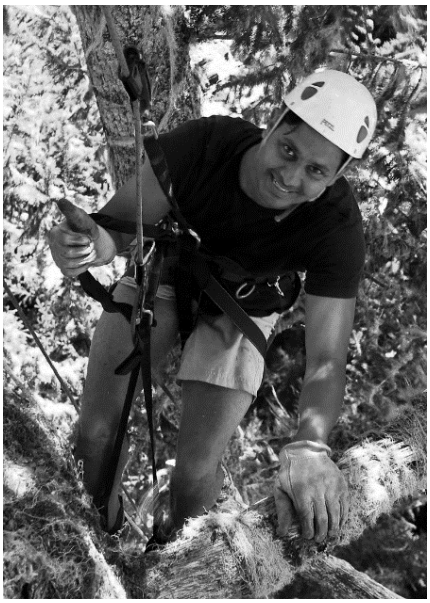
2. **The 2019 Metro "Nature for All" Bond Passed. Now What?-Rm 328**
   The $475 million Metro Nature for All bond was shaped by extensive community input before the vote. Now, after the vote, Metro will be soliciting additional community input to shape implementation. Find out more and discuss the "protect and restore land" component and how Metro is integrating racial equity and climate resilience.
   Conversation lead: *Jonathan Soll*

3. **Women in Science: Challenges, Opportunities and Resources-Rm 329**
   All women (cis/trans/gender/non-conforming) are invited to join this consciousness-raising conversation about building a successful science-based career. With the help of local organizations, attendees will discuss obstacles, opportunities and advocacy. Come learn about local mentoring and professional development opportunities.
   Conversation leads: *Laura Guderyahn and representatives from Women in Science, Women in the Environment and PDX Women of Color.*

4. **How Can We Build Diverse, Inclusive & Equitable Systems?-Rm 333**
   Across the environmental sector, organizations face a "green ceiling" with regards to diversity in the workforce. Many structures and programs may not account meaningfully for equity and inclusion. How can we overcome these patterns? Join us to exchange new ideas, strategies and lessons learned from our strategic planning and other efforts towards organizational change.
   Conversation Leads: *Indi Keith and Mary Logalbo*

5. **PSU Sustainable Features Tour with cultural & ecological stops**
   Meet your PSU guide at the stage.
   Tours leave promptly at 12:15 pm and return by 12:50 pm.

6. **Self-guided PSU Sustainable Features Tour**
   Stop by the registration desk to pick up a map of places to explore.



Morning Keynote Address

Dr. Vivek Shandas

Nohad A. Toulan School of Urban Studies and Planning
Portland State University,
Portland, Oregon

Beyond Landscape Legacies: Redlining, Ecosystem Services, and the Work Ahead

The landscapes we inherit are instrumental to the urban ecosystems we study, conservation policies we advance, and collaborations we create. Yet often overlooked is the historical 'lock in' that keeps us from making swift progress, particularly on massive challenges like climate change. By unpacking the ways in which we have changed the landscape through policies, plans, and programs -- even as far back as 100 years ago, we can begin to 'recenter' our conservation that ensure equitable and verdant cities. This talk will provide a framework for examining the role of historical planning policies -- specifically redlining -- current impacts on ecosystem services and community health, and provide practical guidelines for collectively advancing our conservation goals.

Biography

Vivek Shandas is a Professor of Climate Adaptation and the Director of the Sustaining Urban Places Research (SUPR) Lab at Portland State University. Dr. Shandas studies the effects of urban development patterns and processes on environmental health. By examining the assumptions about our built environment, Dr. Shandas supports communities in improving their adaptation from climate stressors, including extreme events such as urban heat, air quality, and stormwater. Dr. Shandas serves as Chair of the City of Portland's Urban Forestry Commission, and is a Principal at CAPA Strategies, LLC, a global consulting group that helps communities prepare for climate-induced disruptions.

Afternoon Keynote Address

Dr. Ana M. Alvarez
Deputy General Manager

East Bay Regional Park District
San Francisco Bay Area, California

The Intersectionality of Diversity, Equity & Inclusion in the Environmental Movement

An examination through social lenses of our conservation's culture and environmental movement will be presented to seize the opportunity for a new "us," a more diverse and equitable movement where everyone shares a sense of belonging. Intersecting social identities will be highlighted to debunk prevailing views about race and class, which have influenced the environmental movement throughout its history.

Biography

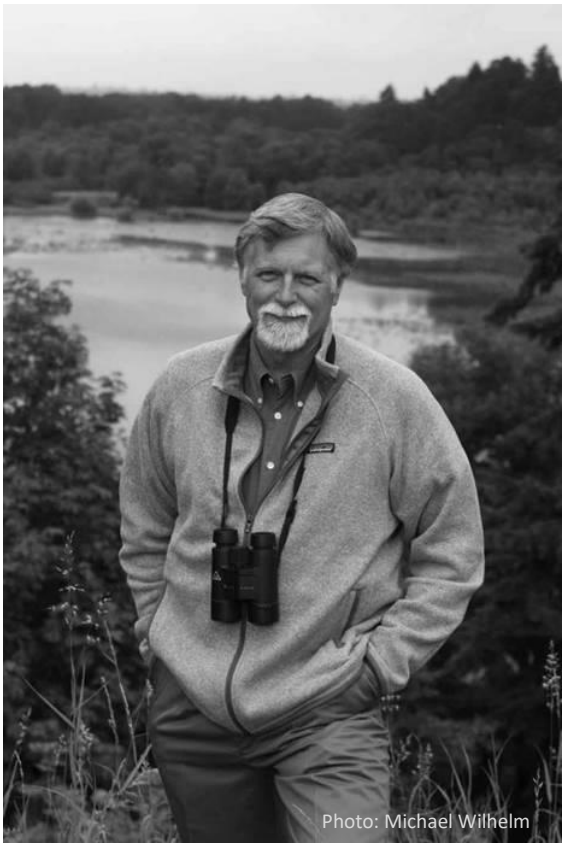
Dr. Alvarez serves as the Deputy General Manager of the East Bay Regional Park District, the largest local park agency in the United States with over 125,000 acres of parks and open space in Alameda and Contra Costa counties visited by 25 million people a year. Ana has over twenty years of proven leadership and executive experience in local and regional government in California.

She contributes to the national conversation on the role of parks today in addressing complex challenges such as climate change, density and demographical shifts in urban sprawl, as well as our relationship with nature as it pertains to conservation. She serves as the Co-Chair of the Board of Councilors that contributes to the stewardship of the world's largest university reserve system, the University of California's Natural Reserve System, comprised of a network of 756,000 acres of pristine ecosystems including 50 miles of protected coastal shoreline and 41 field research stations throughout California. She also serves as the Vice Chair of the San Francisco Bay Restoration Authority's Advisory Committee, helping to shape pathways to fund the protection, restoration and enhancement of the San Francisco Bay through the implementation of a nine-county parcel tax.

She holds a doctoral degree in policy, planning and development from the University of Southern California (USC) and a master's degree in public administration. Her doctoral dissertation focused on establishing climate change adaptation strategies for San Francisco's Parks, for which Mayor Ed Lee bestowed upon her San Francisco's Green Pioneer Award.

The 2020 Urban Ecology and Conservation Symposium is Dedicated to:

Mike Houck



After nearly two decades of service, Mike Houck is stepping away from the Steering Committee of the Urban Ecology and Conservation Symposium. Mike was one of the original cadre of urban natural resource professionals who founded the Urban Ecosystem Research Consortium (UERC) in 2001. An internationally recognized pioneer in the field of urban conservation, Mike was inspired by the explosion of cutting edge urban conservation research occurring in the Portland-Vancouver Metro Region and saw a need to bring the rapidly expanding urban conservation community together to share their work….quack

As with so many of his projects, Mike has filled many roles at UERC over the years: visionary, inspiration, leader and workhorse. However, perhaps his most visible and unique role has been that of "lead quacker" striking fear in the hearts of verbose speakers who dare trespass beyond (and occasionally before) the 8 minute timeframe allotted for presentations has expired, simply by raising a quackable stuffed duck in the air and threatening to hold forth….quack……quack

First as Portland Audubon's Urban Naturalist and later as founder and Executive Director of the Urban Greenspace Institute, Mike's contributions are written across our landscape, in the visions and plans that guide natural resource protection in our region and in generations of greenspace advocates that he has mentored. His many accomplishments include promoting a vision of a "urban wildlife refuge system" that would eventually evolve into the Urban Greenspaces System, advocating for the first and subsequent greenspace bond measures that have now generated more than three quarters of a billion dollars for greenspace acquisition, co-founding Coalition for a Livable Future which served as a pioneering model for advancing equity and promoting complete healthy communities, and co-founding The Intertwine Alliance which continues to unite greenspace advocates. Mike is always quick to share credit and note that "It is all about the relationships." Nineteen years of service to UERC stands as a testament to that ethic…quack…quack…Quack

After more than four decades advocating for nature, Mike wants to spend more time out in nature. We thank him for his service to UERC and while Mike is stepping away from his seat on the UERC Steering Committee, we have no doubt that Mike will remain a fixture in the front row of the UERC Symposium…….quack…quack…quack…Quack!

ABSTRACTS SUBMITTED

Which native plants should home gardeners grow for pollinators?

Aaron G. Anderson, Oregon State University, Email: andeaaro@oregonstate.edu
Gail A. Langellotto, Oregon State University, Email: gail.langellotto@oregonstate.edu

Many published pollinator-friendly planting lists lack empirical evidence to support recommendations. To address this, in 2017-2019, we screened 23 native Willamette Valley wildflowers. Plants were selected based upon their potential use in ornamental gardens, as well as anecdotal reports of attractiveness to pollinators. We included four exotic comparators known to be attractive to pollinators. Species were planted in meter-squared plots spaced six meters apart. Between April and October, we monitored pollinator visits, floral bloom phenology, and sampled insects from plots, weekly. We have early findings on the attractiveness of these wildflowers to bees. The most attractive plants varied between the three years, possibly due to differences in phenology and plant establishment. In 2017, four native wildflowers (*Solidago canadensis, Symphyotrichum subspicatum*, *Clarkia amoena* and *Gilia capitata*) were the most attractive flowers for bees, followed by the exotic Nepeta cataria. In 2018 and 2019, three of the six most attractive plants to bees were exotic species. However, this pattern was strongly driven by European honey bee visitation. When we limited our analysis to native bee abundance, the six most attractive wildflowers were all native species. Similarly, across all seasons native wildflowers attracted the highest native bee species richness. To address suitability for urban landscapes, we surveyed gardeners for how aesthetically pleasing they find these 27 plants. Additionally, we surveyed whether gardener preferences can be influenced by the ecological benefits that flower species provide. We found that after education on pollinator visitation, respondents viewed flowers as 40%-80% more attractive.

Keywords: Conservation biology, Habitat restoration

A seasonal study of ecoroof runoff quality and quantity and the associated drivers on a commercial building in North Portland, Oregon

Alex V. Bans, Portland State University, Email: abans@pdx.edu

Urban environments, with their vast swaths of impervious surfaces, increase the amount of nonpoint pollution that enter receiving freshwater bodies. This increase of pollution leads to concerning ecological management problems such as the urban stream syndrome. Green stormwater infrastructure (GSI), specifically ecoroofs, are increasingly being seen as a potential mitigator of these concerns in urban planning strategies. However, the literature suggests that ecoroofs might be sources of certain metals and nutrients, such as lead, copper, iron, total phosphorus and nitrogen. The goal of our in-progress study is to investigate and observe if these concerns hold true by the collection and analysis of metal and nutrient loading and dynamics of the run-off from an aged extensive ecoroof and the environmental variables that affect them. From August 2018 to present, the runoff events from the ecoroof and conventional roof have been collected with autosamplers and flow was measured with a flow meter. About 83 samples have been collected from the ecoroof and 127 samples have been collected from the conventional roof. Bulk deposition was collected every 2 weeks and environmental data was collected from a weather station located on the roof. With this information we hope to support the use of ecoroofs to reduce the urban footprint.

Keywords: Air quality, Hydrology, Land use planning, Land/watershed management, Sustainable development, Water quality

Seeds for Change: preserving oak prairie species for an unknown future

Adrienne Basey, Metro, Email: adrienne.basey@oregonmetro.gov

In 2016, Metro set a goal to document and preserve locally adapted, oak-associated herbaceous species and for three years we worked toward this goal by locating populations, documenting them, and collecting material for a herbarium and seed bank. What began as a master list of 708 species known to occur in a handful of sites became a target list of 72 species of conservation concern. We defined our seed and voucher collection protocols through a balance of science and practicality and set out to locate as many populations of our target species as possible. In all, we collected 178 vouchers which are housed at the PSU herbarium and 133 seed accessions stored in the Rae Selling Berry Seed Bank. Seeds may be stored for future restoration or reintroduction. In the process, we also gained unexpected insights into the health of our herbaceous plant populations which is already proving invaluable to future management decisions.

Keywords: Plant ecology, Conservation biology, Climate Change

The Oregon Connectivity Assessment and Mappping Project (OCAMP)

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Habitat loss and fragmentation represent the single greatest threat to biodiversity worldwide. The intensification of human development is so severe that planning for connecting species and processes between natural habitats has become a conservation imperative. The Oregon Connectivity Assessment and Mapping Project (OCAMP) is a multi-year, statewide, collaborative effort to analyze and map connectivity for a wide diversity of Oregon's terrestrial wildlife species. The project, led by the Oregon Department of Fish and Wildlife, Portland State University, and Samara Group, will advance priority conservation planning aimed at understanding and mitigating barriers to wildlife movement in Oregon. The fine resolution connectivity maps produced during the project will aid in statewide planning and prioritization for strategic conservation investments, species protection measures, siting of land use changes and development, targeted habitat restoration efforts, and transportation improvements, including reduction of wildlife-vehicle collisions. Here, we provide an overview of OCAMP and discuss how interested individuals and organizations can actively engage, by helping with species selection, providing technical expertise, sharing data, participating on teams to provide feedback on project progress, or reviewing draft products.

Keywords: Wildlife biology, Conservation biology, GIS / modeling

The ecosystem services of connectivity

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Connectivity is critical to maintaining ecological functions and benefits in human-modified landscapes, including urban areas. However, the literature on this topic has been limited by inconsistent terminology and methods, and largely omits human access to nature and its benefits as a form of connectivity. We build upon previous theory to present four distinct but interrelated categories of connectivity (habitat, geophysical, eco-social, and landscape) and use the Ecosystem Services framework to review the socio-ecological benefits which depend on them. There are also many overlaps, conflicts, and synergies among connectivity categories and their associated services and disservices. Identifying the services which arise from these four categories of connectivity, and how they interact, can help to maximize the benefits of connectivity, improve understanding of complex socio-ecological systems across disciplines, and develop more holistic decision-making processes.

Keywords: Land/watershed management, Economics, Land use planning

Oregon Pollutant Risk Database: a tool for supporting risk assessment of Oregon's water quality

Alix Danielsen, Hood River Watershed Group, Email: alexandra.eastman@gmail.com

Many DEQ/EPA and other agency lists of pollutants exist, however, most are very specific to a particular concern such as carcinogenicity. The Pollutant Risk Database was created by Alix Danielsen as part of her PSU Master's project in conjunction with Keri Handaly/City of Gresham as her community partner. The concept for this tool comes from Doug Mckenzie-Mohr - a leader in the social marketing field of behavior change. It is unique in that it looks at threats to humans, fish, and insects (part of the food chain for fish and food supply for humans) and creates an overall average risk score for toxicity. The end goal for this information is to aid decision-makers who are developing programs or campaigns to inform the public and/or business sources of major pollutants of concern in their waterways. The tool was also created to support the work of the Clean Rivers Coalition, working collaboratively on a Healthy Waters outreach campaign strategy for Oregon.

Keywords: Water quality, Environmental education, Environmental social sciences

Urban nesting biology of a threatened subspecies of Willow Flycatcher

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The Little Willow Flycatcher (*Empidonax traillii brewsteri*), a subspecies of Willow Flycatcher found in northwestern Oregon, is a declining population unit that is a Species of Concern for the U.S. Fish and Wildlife Service (USFWS). Its breeding status in Portland's greenspaces is unclear as previous surveys detected singing males without evidence of breeding. We thus conducted surveys and nest searches in 2019 (May through August) at Powell Butte Nature Park, Foster Floodplain Natural Area and Mason Flats to confirm breeding, and quantify nesting biology. The 17 nests found confirmed the presence of breeding birds. Clutch size averaged 3.3 eggs (2 to 4) and successful nests fledged an average of 2.4 young (2 to 3). After correcting for exposure time, 41% of nests fledged young. To evaluate whether the observed nesting productivity could sustain populations in Portland we simulated population growth using known values for adult (Sa = 0.610) and juvenile survival (Sj = 0.300) from the literature, with the additional assumption that females would make one renesting attempt if their first nest failed. Our preliminary analyses indicated that Portland's Little Willow Flycatcher population is likely in decline as the estimated growth rate ($\lambda = 0.810$) was well below that needed for replacement ($\lambda = 1.0$). To achieve replacement levels, nestling production must increase. Additional field work is needed to confirm the low nesting success, but to also determine renesting propensity of females that fail, identify causes of failure, and assess the impact of invasive vegetation on nesting success.

Keywords: Animal ecology, Conservation biology, Wildlife biology, Habitat assessment

A multi-scale assessment of urban streams and the influence of the urban environment on aquatic health and function

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The riparian areas along flowing waterbodies are sensitive environments that are closely linked to stream health and in the urban environment and riparian zones are often impacted by the pollutants, development and environmental alterations that occur in a city. For this study, I worked with the City of Portland to determine how the characteristics of the landscape in buffer areas (of varying widths) along urban streams influenced the overall health of the streams. I utilized stream health data (represented by macroinvertebrate IBI) that were collected from 59 randomly distributed stream monitoring sites located in Portland, OR and analyzed it in relation to 21 urban landscape characteristics that included variables relating to land use, impervious surfaces, vegetation, and urban infrastructure. Buffer areas were digitally generated around a 1-km stretch upstream of each monitoring sites with widths ranging from 15 to 500 ft. I used a random forest analysis algorithm to decide on the best combination of variables to use in regression models. Through a process of model refinement and analysis I determined that 200 and 500 ft buffer models were best used to analyze the data range. In the two final models, I found that the length of piped stream and the mean canopy height were the best predictors of stream health (R^2 mean of .567 between the two models). In both models, the piped stream length area was negatively correlated with stream health while a greater mean canopy height in the buffer area was positively correlated with stream health.

Keywords: GIS / modeling, Hydrology, Land/watershed management

D Avenue Green Street Project: methods for incorporating large trees, pollinator habitat, and a native-dominant landscape into an urban neighborhood

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The D Avenue project incorporated more than 40 rain garden facilities within an urban neighborhood where the community is highly involved in development and aesthetics are a major priority. Kate Forester was the lead landscape architect for this project and was part of an extensive community involvement process and worked closely with the City maintenance lead. The project prioritized the preservation of existing large trees, but also meandered the roadway in order to create bigger rain garden and planting areas that would allow large enough soil volumes for the addition of more native conifers within the urban right-of-way. The project utilized tree root barriers at road edges and adjacent to infrastructure. We also used structural soils under walkways to prevent sidewalk heaving and provide additional access for tree roots to adjacent soils. In addition, the planting palette and design focused on maximizing native vegetation, including strategic pollinator species, while using the City's preferred non-native species for low-maintenance edges and aesthetic accents. Climate adaptive planting strategies also included sourcing plants grown from seed and increasing species diversity within the planting corridor. This project provides innovative design strategies for protecting existing trees, introducing large tree species back into our urban right-of-way, and creating meaningful wildlife corridor opportunities with green street projects.

Keywords: Habitat restoration, Sustainable development, Water quality

Carli Creek water quality and stream enhancement project

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The innovative Carli Creek Water Quality Project filters harmful pollutants in stormwater runoff from surrounding industrial properties after decades without treatment before it reaches Carli Creek and the Clackamas River, the drinking water source for approximately 360,000 people. In 2012, Clackamas County Water Environment Services recognized the potential of the property to improve water quality and acquired the former farmland. Pollution in the creek exceeded standards for E. coli, copper, lead and other pollutants, threatening water quality, fish, and public health. The project restored 1,700 feet of in-stream habitat, reshaped the soils to form new wetland basins, and installed new pipe systems to funnel runoff to the site. Seventy thousand native plants were planted to capture pollutants, while 83 wood structures were installed to improve fish and wildlife habitat. The facility ensures a cleaner Clackamas River, protecting endangered fish and shows that a balance between nature and industry is possible. The project supports Clackamas County priorities, including: building a strong infrastructure; utilizing and investing in natural resources; and ensuring safe, healthy and secure communities.

Keywords: Water quality, Habitat restoration

Counting crows: Portland's urban crow roost by the numbers

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Communal roosting by American Crows has been documented since the early 1800s, predominantly as a rural phenomenon. Early American naturalists described winter roosts numbering in the hundreds of thousands. Roosts large enough to draw the attention of urban residents were rarely described until the 1970s. The natural history of Portland's urban crow roost probably began in early 2013 with the first eBird and media reports. Our observations and documentation of the winter roost of crows in downtown Portland began in the winter of 2017/18 with an initial casual observation of over 3,000 roosting crows. We subsequently developed a methodology for observing and documenting the roost's size, location, relative density, and other roosting behaviors. To date we have completed ≈100 observations made ≈1x/week, with fewer observations during the low point for the roost (May-August) when most crows are in their breeding territories. Our data include total census figures for each observation, the number of blocks and block faces with roosting crows, peak and average numbers by time and location, geographic distribution of the roost over time, and the presence of roosting crows with a 72-block area where roosting crows are hazed by Harris's Hawks from October through April each year. Our presentation will include photographic illustrations of our observation methods, examples of specific roosting locations and behaviors, and graphic representations of the collected data.

Keywords: Animal ecology, Environmental social sciences, Wildlife biology

A framework for incorporating ecosystem connectivity into urban planning for resilient cities

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Urban land-use planners are faced with competing and often conflicting demands for transportation, housing, safety and economic development but frequently lack the tools to integrate these with protecting environmental functions at the landscape level. Incorporating benefits from nature, or ecosystem services (ES), could help prioritize ecological connectivity, but ES are not often included in land-use planning because values are not readily available or lack credibility. However, failure to consider the benefits of ecosystem connectivity can result in increased fragmentation of habitats and ecological flows, especially in urban and urbanizing areas resulting in environmental inequities, loss of biodiversity and decreased human health. To address this we developed a novel, integrated framework, the Connectivity Services Framework (CSF), that combines the ES from four categories of ecological connectivity with benefit relevant indicators minimizing the need for monetary valuation of the ES. The CSF enables practitioners to integrate connectivity into urban planning via inclusive stakeholder engagement. It provides a method to identify and visualize multiple and overlapping benefits from connectivity management actions to aid in prioritizing initiatives. Unlike software tools that incorporate generalized ES values at a landscape level, the CSF guides a systematic approach to community-engaged land-use planning that prioritizes localized societal needs. We demonstrate application of the framework using two examples from Portland: 1) incorporating connectivity into Southwest Corridor Light Rail planning, and 2) prioritizing Metro Parks and Nature's projects that support multiple objectives of connectivity. The CSF can be used anywhere at any scale to facilitate land-use decisions resulting in more equitable and resilient cities.

Keywords: Land use planning, Habitat restoration, Environmental social sciences

Pollinator preference for Pacific Northwest native plants and native cultivars

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The American Society of Landscape Architects ranked native plants as the top landscape and garden trend in 2018 (83.3%), based upon projected consumer demand. Studies demonstrate increased consumer interest in and willingness to pay for native plants because of purported benefits to bees. Despite this interest, the native market remains relatively small; one limitation includes a lack of improved native cultivars ("nativars") that perform well in gardens. Some suggest that nativars do not support bees as well as wild-type native plants, but studies confirming these concerns have yet to be published in scientific journals. A dissertation on the topic has come out of the University of Vermont, but research has yet to address this question in the Pacific Northwest. This project seeks to understand pollinators' preference, if any, for native plant species and nativars. We selected 8 plant species that are native to Oregon's Willamette Valley, suitable for use in home gardens, and had 1-2 available nativar counterparts. Five replicates of each native and nativar, sourced from local and popular nurseries, will be planted in a randomized complete block across 120 $1m^2$ plots. Beginning in spring 2020, flower phenology, pollinator visitation, and difference in floral traits across species will be recorded. Our goal in this presentation is to solicit feedback in advance of our first field season. We hypothesize that nativars might draw bee visitation (relative to wild types) by increasing the visibility of plants to bees via increases in bloom size, bloom duration, and/or color intensity.

Keywords: Conservation biology, Habitat assessment, Plant ecology

Using wildlife fright information to inform trail planning

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In 2017 I completed a recreation ecology literature review that included information on various wildlife species' Flight Initiation Distance (FID), or the distance between a person and an animal at which point the animal flees. The review covered many topics at a higher level. To inform trail planning and publish a peer-reviewed journal article, I took a closer look at the FID literature and located numerous additional references. I will briefly summarize the updated findings and present several hypothetical scenarios in which we applied FID information to reduce recreational effects on wildlife while still providing quality visitor experiences in nature.

Keywords: Animal ecology, Conservation biology, Wildlife biology

Whose land is our land? Race, place, and equity in western Multnomah County

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West Multnomah Soil & Water Conservation District has resolved to pursue diversity, equity, and inclusion (DEI) as integral parts of our conservation mission. We face the challenge of doing so in a territory that has inherited roughly two centuries of legal, institutional, and economic factors that have inequitably distributed land and natural resources. By synthesizing existing historical scholarship in a literature review focused on western Multnomah County, we identified how barriers to property ownership for Native Americans, Asian Americans, Black Oregonians and other people of color were created and reinforced through the 19th and 20th centuries. These systemic barriers have consistently made this region's land and natural resources available to white communities while withholding them from communities of color, a pattern of inequity which persists today; the color of one's skin remains a strong predictor of whether one owns land in our district and of the environmental resources and hazards one shares a neighborhood with. In examining our own policies and activities, we found that the District's work has reflected and reproduced these patterns of racial segregation. By focusing our efforts on privately owned larger properties and the people who own them, we have been investing in and led by predominantly white communities while missing opportunities, needs, and voices present in historically diverse neighborhoods. These findings will inform the District's strategy as we build DEI into our next long-range business plan, and we hope that they may foster critical inquiries around race, land, and equity in our broader professional community.

Keywords: Economics, Environmental policy, Environmental social sciences

Stormwater treatment effectiveness of established bioretention facilities in Portland, Oregon

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Bioretention systems are commonly used to treat and detain stormwater runoff and help mitigate for many negative effects of urbanization. Despite the widespread use of bioretention systems, few field-based studies have assessed how these facilities affect water quality many years after installation. The goal of this project is to assess the pollution reduction effectiveness of lined bioretention facilities that have been in use and functioning for 4-8 years. To meet this objective, this project measured water quality characteristics of stormwater flowing into and out of seven facilities installed throughout Portland, Oregon during real storm events. Stormwater grab samples were taken over a 2-year period during the fall, winter, and spring. Results showed decreased concentrations of total suspended solids (TSS; 94%), ammonia (85%), total copper (59%), total zinc (80%), and dissolved zinc (41%). Results for dissolved copper indicated an overall increase in outflow concentrations of 23%, however variability between facilities was high. These results support other similar findings showing that TSS is effectively reduced by bioretention facilities, even after 4-8 years of use. However, based on this study, effective TSS removal by bioretention facilities does not necessarily equate to equally effective treatment of other pollutants, especially orthophosphate and nitrate, which increased in outflow from the bioretention facilities by 141% and 2070%, respectively. Results of this study indicate that additional research is necessary to determine the significance of the observed increase in nutrients, understand the underlying mechanisms, and test possible design modifications to improve nitrate and orthophosphate removal.

Keywords: Sustainable development, Water quality

Mapping regional wildlife habitat connectivity

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We developed a wildlife habitat connectivity map for the Oregon portion of the Regional Conservation Strategy boundary. To make this map we solicited species experts for the Northern red-legged frog (*Rana aurora*), American beaver (*Castor canadensis*), and Douglas squirrel (*Tamiasciurus douglasii*) in order to determine the salient habitat requirements for each species. We then created GIS models of each specie's probable distribution over the study area. The models are composed of landcover, maximum size of a canopy gap the animal will cross, maximum distance from water, aversion to development and much other data. The intention was to create a model that shows the spatial distribution of habitat as well as areas that are not habitat but through which the animal will travel and areas that are a barrier to the animal's movement. We used these models to create raster layers that depicted the permeability of the landscape to animal movement and then modeled movement pathways in Circuitscape, a program that uses circuit theory to determine how well a set of points are connected based on a resistance surface. We used all of the Metro managed properties as the anchors for the connectivity modeling. We ran the model for all three surrogate species and then combined the models into a map of regional wildlife habitat connectivity. This effort will be repeated in the next several years for an additional 30-40 species as part of a larger effort by OCAMP to map statewide wildlife habitat connectivity.

Keywords: Habitat assessment, GIS / modeling, Wildlife biology

Garden bees of Portland

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Gardens can provide forage and habitat to a diverse and abundant assemblage of garden bees. Although the garden bee assemblage has been described in several U.S. cities, a comprehensive accounting of Portland area garden bees has yet to be published. Each summer, from 2017-2019, we collected garden bees from 25 Portland area gardens using a combination of pan traps and hand-collection. With our 2017 and 2018 bees identified, we have collected 65 species or morphospecies. In this poster, we consider the ecological characteristics of these garden bees in the context of the resources that gardens may or may not provision for various native bee species.

Keywords: Conservation biology, Wildlife biology

Soil characteristics in relation to urban tree mortality

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Research in 1993, 2003, and 2013 showed high rates of tree mortality and low rates of recruitment (new trees) in Portland, Oregon's Forest Park. Three control sites in the Mount Hood National Forest were added in 2013; research from 2018 showed the control sites had significantly more live trees, and more seedlings and saplings than the urban sites. For the last three summers, we have been studying the soil at our sites to elucidate possible causes for the observed low rates of recruitment. Data from 2017, 2018, and 2019 have shown the control sites have significantly deeper O horizons, higher rates of soil respiration, and lower levels of electroconductivity (EC) than the urban sites. We believe changes to the soil may be related to the lack of recruitment in Forest Park.

Keywords: Plant ecology, Soil science

Portland Christmas Bird Count – An 80-year review of species trends (1938-2017)

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Since 1915, Portland Audubon has organized the Portland Christmas Bird Count (CBC), recruiting community scientists to identify and count all bird species within a 15-mile-radius circle around Portland. Results are contributed annually to National Audubon's database, which has provided critical information on the status of bird populations across the continent. We examine trends in bird numbers across 80 years (1938-2017) for 25 species using Portland CBC data. To conduct the CBC circle-level analysis we used statistical techniques originally developed by U.S. Geological Survey, Patuxent Wildlife Research Center, and National Audubon for region-wide population trends. Interpretation of findings at the scale of an individual CBC circle has limitations, as we can draw conclusions relevant only to the Portland CBC circle and only to the winter season. We control for effort but do not include other variables (e.g. temperature, changes in land-use, etc.) in the analysis. Of the species examined, 13 indicate an increasing trend, 10 a decreasing trend, and two remain stable. While these trends should be interpreted cautiously, they provide a window into Portland's "avifauna past" and provide perspective on how winter bird communities have fared for nearly a century. These findings can help us understand how local and regional conservation efforts have played roles in benefiting some species and, at the same time, what challenges may be making it difficult for other species to survive in Portland's dynamic landscape. This helps us to look ahead and more effectively plan conservation action for the future.

Keywords: Animal ecology, Conservation biology, GIS / modeling

Green infrastructure research - ecoroof soil comparisons, 'which is the best'

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Since the beginning of the ecoroof movement in Portland in 1996, soils have been considered the most important component of a successful ecoroof and indeed they are. Yet, to this date, little direct comparative research exists to distinguish between the available proprietary soil blends for vegetation health, rain management, energy insulation and other attributes. Starting in 2017 the LIVE Center began conducting such comparisons and the results are surprising and encouraging. This presentation will show the results, thus far comparing more than 20 different soils, focus is on rain management and vegetation health with preliminary attention to biodiversity.

Keywords: Soil science, Sustainable development, Conservation biology

Mitchell Creek restoration

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The Johnson Creek Watershed Council (JCWC) instream habitat program is focused on restoring salmon habitat and water quality and restoring fish access to these habitats, with emphasis on cold water tributaries. One such tributary is Mitchell Creek, which flows into Kelley Creek before joining Johnson Creek near the center of the watershed. Mitchell Creek is less than 2 miles in length, however it runs cold throughout the year and its headwaters in largely intact forest that is protected in perpetuity by Metro ownership. Since 2015, JCWC has been working with the Centennial School District to restore a 900' section of Mitchell Creek by removing 2 fish passage barriers and a 1 acre in-line pond. The pond, which monitoring has shown to increase water temperatures in Mitchell Creek by as much as 14 degrees Celsius, was created over 40 years ago when the property owner constructed an earthen track for racing horses and ATVs. This track also crossed Mitchell Creek in 2 locations, ultimately creating 2 fish passage barriers. The downstream culvert was perched, in that its inlet opening was higher than the creek flowing into it, which helped create the pond and contributed to downstream scour. The latter affected accessibility to fish moving upstream. The upstream culvert was undersized, and overly steep which served to scour the upper portion of the pond. Funding for this project was provided by the East Multnomah Soil and Water Conservation District, Oregon Watershed Enhancement Board, PGE/TNC, USFWS Willamette Valley Refuge Complex, mitigation funding and a new grant from Metro Nature in Neighborhoods to support revegetation efforts.

Keywords: Habitat restoration, Water quality, Wildlife biology, Land/watershed management, Fisheries

A pictorial guide to cavity nesting wasps of Portland

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The recent focus on pollinator declines along with community educational outreach has ignited support for pollinator conservation among the public. Public response includes an increase in conscious gardening, planting of native flora, reduction of pesticides in home gardens, and supplying nesting resources such as cavity nesting boxes in support of pollinators, with a focus on bees. However, cavity nesting resources are shared by solitary bees, wasps that parasitize them, and solitary wasps. It is important to educate the public about the presence and importance of these wasps that co-inhabit the nesting cavities that were installed for bees. Expanding the work of graduate student Stefanie Steele's survey of bee preferences for nesting cavities in the Portland Metro Area, this study seeks to identify the wasps that co-inhabit these nesting boxes as well their preference of cavity size. Wasps that were reared and emerged from nesting boxes in 2019 were photographed and identified. We found over 6 families of wasps were present among the over 300 wasps recovered. From these, we have created a pictorial key for the wasps we found in these nesting boxes.

Keywords: Environmental education, Animal ecology, Wildlife biology

Understory Species Increase Project

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Fostering a native understory herbaceous layer is key to enhancing overall forest habitat and species diversity; however, few land managers have the technical information or plant materials available to do so. This results in slow or non-existent herbaceous species reestablishment on many restoration projects. The Understory Species Increase Project (USIP) is a collaborative effort started by Portland Bureau of Environmental Services, Clean Water Services, and Metro that aims to fill this gap in resources by researching, developing, and amplifying diverse herbaceous species. The current stage examines which species might establish well by seed. Fifty-four trial plots were installed at seven sites throughout the Portland Metro area, selected as seeded or control treatments, and monitored to document species presence and cover. Wilcox tests on data from three years of monitoring supported the hypothesis that seeded plots demonstrate significantly higher rates of successful establishment of target species. This implies that restoration projects will be more successful in establishing native herbaceous species using a seeding technique than allowing natural regeneration alone to recover species in the short term of 1-3 years. Logistic regression from two years post seeding analyzed site-specific parameters of soil moisture, canopy cover, slope and aspect revealed that both slope and soil moisture had a significant effect on vegetative cover and presence. Together with treatment, these predictors account for approximately 35 percent of the variability observed in vegetated cover. This highlights the need for further research to determine what other environmental factors may be influencing herbaceous species establishment in revegetation projects.

Keywords: Habitat restoration, Plant ecology

Trail impact monitoring in Forest Park

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A recent study found "trails" to be Forest Park's most highly valued feature and estimated park usage near a half million annual visits (see Elliot et al., 2012 available at www.portlandoregon.gov/parks/article/31754). Unfortunately, many park trails weren't designed for such traffic as reflected by pronounced erosion, subsequent safety issues and avoidable ecological impacts. In response to these observations, Portland Parks & Recreation (PPR) managers have expressed interest in an objective trail impact assessment informed by recreation ecology to improve understanding of trail erosion causes and consequences. Published findings in other natural areas show that soil erosion accelerates as trail grade steepens, distance from drainage features increases and trail slope-alignment angles reach landform fall-lines (See Marion & Wimpey, 2017, Journal of Environmental Management, 189, 46-57). I am applying methods modified from previous studies to record these and other indicator observations at 120 randomly selected points in Forest Park, followed by rigorous statistical analyses. Results will provide baseline data and a template for future studies to predict soil loss, along with recommendations to help prioritize projects, inform environmental reviews and justify funding for trail system improvements.

Keywords: Land/watershed management, Land use planning, Habitat restoration, Soil science

Our wild neighbors: exploring the connection between Portland's people and wildlife

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The Urban Wildlife Information Network (UWIN) is a rapidly expanding, international effort to better understand the effect of urban density on wildlife across the U.S. and Canada. Originating eight years ago with the Lincoln Park Zoo in Chicago, IL, today 23 participating cities employ a standardized monitoring protocol that captures wildlife data using trail cameras placed along transects that span a gradient of urban density. Network cities have used the data collected to further research, inform local policy and engage community scientists as well as compare data across municipalities. Portland, Oregon is set to be the next member of the UWIN network. Over the last two years a collaborative effort between Portland State University, Portland Audubon, Samara Group and the Oregon Wildlife Foundation have laid the groundwork to add Portland to the UWIN map. The team has been working to establish camera monitoring transects that extend east and west of downtown Portland. To date 15 cameras have been deployed, documenting roughly 20 species including (coyote, skunk, racoon, and mule deer). The UWIN effort has also engaged PSU students, Audubon interns, and other community members enhancing local knowledge of urban wildlife and monitoring techniques. The team continues to make headway in adding cameras and monitoring locations with the ultimate goal of 30 sites. The UWIN program is a valuable addition to urban wildlife research both locally and internationally.

Keywords: Habitat assessment, Wildlife biology, Environmental education

Overcoming barriers to ecological design: the researcher as socio-ecological coupler

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As practitioners within the service sector, the role landscape architects play in increasing urban climate resilience is ultimately constrained by project purpose/scope, budget considerations, site boundaries, and client desires. Such factors vary greatly from project to project, but all projects share an incrementalist nature of being discreetly tied to "site." Additionally, designers are increasingly encountering maintenance barriers to ecological design since habitat-based aesthetics are often misaligned with perceptions of kemptness. Unlike the sciences and R&D-based design fields, the scale of landscape operations are often too large to prototype, thus making each built project is its own potential experiment. In the spirit of transdisciplinary work, I will explore opportunities where urban ecologists can couple early-on with designers to leverage research goals in developing research questions that guide the design of experimental "plots," monitor and collect performance-based data that provide crucial, missing feedback, generate lessons and/or best practices for future design projects and ongoing maintenance, and uncover the evidence necessary for communicating the importance of allocating, if not integrating, habitat and ecosystem services within project sites.

Keywords: Climate Change, Habitat assessment, Land/watershed management, Sustainable development

Update on Oregon's Japanese Beetle eradication program

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The Japanese beetle is an invasive insect pest that threatens Oregon, as well as the greater western United States. In 2016, the Oregon Department of Agriculture (ODA) detected a large infestation of 369 Japanese beetles in Washington County. Beetle establishment would result in residents, farmers, and land managers suffering severe damage to over 300 plant species, and the resultant increased usage of pesticides. In order to protect Oregon's agricultural economy and natural ecosystems, the ODA launched a multi-year eradication program targeted against this beetle. Our third year of treatment has recently concluded with the application of a granular larvicide - Acelepryn® G (Chlorantraniliprole), to the lawns and ornamental planting beds of over 8,000 residential and commercial properties. Communicating the complex invasive species issues with diverse members of the public, and gaining their consent to enter and treat their private properties, are the most challenging, but also rewarding aspects of this eradication effort. While the majority of residents have been very supportive of the project, successful engagement of those not so supportive of the project is an ongoing effort. Over the last 3 years of the program we have established connections in the community, encountered and overcome obstacles, learned lessons valuable for future efforts, and have had success in reducing the beetle's population. The Japanese beetle eradication program highlights successful methods and challenges in attempting to eradicate an invasive species, and demonstrates how ODA approaches eradications from an environmental, societal, and collaborative standpoint.

Keywords: Land/watershed management

From source assessment to water quality success: implementing TMDL alternatives in southwest Washington

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The East Fork Lewis River (EFLR) watershed is home to both the fastest growing city in Washington State, and five priority populations of ESA listed salmon and steelhead. The watershed has seen a 47% increase in human population since 2000, and provides recreation, timber, agriculture, and water resources for this rapidly growing region. The diversity of functions the watershed supports makes it a central focus of salmon recovery, water quality, and water quantity management in SW Washington. Currently, the EFLR is on Washington's polluted waters list for warm water temperatures and bacteria problems. In 2018, the EFLR Watershed Bacteria and Temperature Source Assessment was published to support water cleanup efforts. To develop and implement the plan, the EFLR Partnership was launched to collaborate with local, state, federal, and tribal governments, non-profits, watershed groups, and landowners. Over 50 partners from 30 organizations have engaged in Partnership activities. Today, there are multiple new projects and programs being developed and implemented in the watershed. Priorities for long-term implementation include addressing threats from septic systems, stormwater, and agriculture, and increasing riparian restoration in the watershed. This presentation highlights how: 1) Ecology developed a Source Assessment and Water Cleanup Plan for the watershed; 2) Ecology is implementing proactive nonpoint source investigation to find and fix sources of bacteria; and 3) Partners have developed a new pollution identification and correction program to comprehensively address failing septic systems and agricultural challenges in the watershed. This presentation will end with commentary on next steps for water quality collaboration in Clark County.

Keywords: Water quality, Land/watershed management, Environmental education

A survey of the bees of Portland and their floral preferences

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Urban gardens are increasingly being used for food production, often in our underserved urban communities, making the pollination service of bees in cities particularly relevant for local food production. However, native bees are in decline in large part due to habitat loss and pesticide use. In order to more effectively combat native bee decline in the Portland Metro Area, we must first gain an understanding of which native bees exist in this urban landscape. Additionally, we must understand which plants are being used most frequently by our native bees in order to more effectively direct conservation efforts. We surveyed the native bee species present in three regions of Portland over the course of three years. We found a wide diversity of native bees present, belonging to five different families and 20 genera. The data we collected indicates that the Portland bee fauna utilize a wide diversity of plant families and flower morphologies, regardless of the plant's native or non-native status. We hope to use this data to make recommendations to property owners and managers on how to provide habitat and resources for native bees to conserve these often-overlooked pollinators in the Portland area.

Keywords: Conservation biology, Wildlife biology, Habitat assessment

"From Gravel to Garden" - Washington County Master Gardener Association (WCMGA) Education Garden at PCC Rock Creek

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Located at the PCC Rock Creek (PCC-RC) campus, the WCMGA Education Garden is sited on 1/3 acre former gravel parking lot that, in 2018 was transformed into a beautiful garden with Waterwise, Pollinator & Insect Habitat, Fragrance and Small Conifer "Garden Classrooms." The garden also features Mason Bee Nesting Stations, Insect Hotels, overhead and drip irrigation and posted educational materials for visitors to learn while experiencing the garden. Formed from a unique partnership with PCC-RC, WCMGA demonstrates a range of sustainable gardening practices. The Landscape Technology (LAT) Program for the PCC system is based at the Rock Creek campus, allowing rich collaboration experiences with the PCC community, most notably the LAT Department faculty and students. WCMGA uses the hoop house, greenhouse, and classroom space for education and outreach. WCMGA has already developed active collaborations with groups with similar mission organizations - Tualatin Soil and Water Conservation District, Xerces Society, The Hardy Plant Society as a partial list. WCMGA offers classes that are free, open to the public focusing on sustainable gardening practices. Education topics for 2020 includes native bees, mason bees, beneficial insects, native plant landscaping, waterwise gardening, plant propagation, blueberry care and drip irrigation. Curriculum on topics of pollinators and spiders has been in development for local grade school children with additional modules to be developed in 2020.

Keywords: Habitat restoration, Sustainable development, Environmental education

The Oregon Zoo Partnership: A model for empowering urban wildlife conservation

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In 2016, the Oregon Zoo opened its award-winning Education Center, focused on small actions guests can take to have a big impact on wildlife. The exhibit space features the role small animals play in the environment, including the Western Pond Turtle Headstart program, and interpretive exhibits that inspire guests to get involved in helping wildlife and their habitats. Most importantly, the Center relies on an innovative partnership model to convey educational messages to its 1.6 million visitors. More than 25 conservation organizations provide engaging programming with activities for the zoo's diverse audiences. In conjunction with zoo volunteers, last year these partners held conservation conversations with over 60,000 guests. Of these partnerships, the most impactful is our deep and ongoing work with the U.S. Fish and Wildlife Service. A full-time Interpretive Specialist from the Service is embedded at the zoo and has worked closely with zoo staff since the Center opened. This partnership allows both organizations to engage visitors in a larger conservation story and leverages the resources each brings to the table. The presence of the Service provides visitors with enriched engagement, adding to their zoo experience and allowing the USFWS to reach an urban audience they would not otherwise reach. Notably, the partnership has extended outside of the Center itself into other programming, such as zoo camps, volunteer training, special awareness day events, and the collaborative creation of a new Pacific lamprey display.

Keywords: Animal ecology, Conservation biology, Environmental education, Environmental social sciences, Fisheries, Wildlife biology

Tryon Creek Fish Monitoring

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Tryon Creek is a relatively undisturbed urban watershed located in SW Portland, Oregon. The habitat is well suited for native fish; however, the lower portion of the stream is bisected by a culvert that runs under Oregon State Hwy 43. Since 2008, the U.S. Fish and Wildlife Service has worked with the City of Portland to assess the restoration response of fish species in Tryon Creek. Goals are to evaluate 1) fish community, 2) relative abundance, 3) residence time in the confluence habitat, 4) estimate the population abundance of trout species above the Hwy 43 culvert, and 5) investigate larval lamprey occupancy. We found the Tryon Creek confluence supports a community of native fish in various life stages including migratory salmonids (Chinook Salmon, Coho Salmon, and Steelhead Trout) during their juvenile life history stages. Since 2008, we have conducted seven abundance estimates of the Coastal Cutthroat Trout population above the Hwy 43 Culvert. Below the Boones Ferry Road Culvert, we estimate an average of 502 individuals with a density of 0.032 individuals/meter. Above the Boones Ferry Road Culvert and below the Maplecrest Drive Culvert, we estimate an average 92 individuals with a density of 0.028 individuals/meter. Multiple species of Lamprey (primarily larval Pacific Lamprey) have been found using Tryon Creek below the Hwy 43 Culvert but not above. Information collected from this assessment will aid the City of Portland in determining if the project is achieving desired function over time and provides a baseline before future culvert replacement takes place.

Keywords: Fisheries

Categorizing bird species based off response to Pleistocene climate variation

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This paper analyzes how extant bird species that have Pleistocene fossil records will respond to climate variation in future. We explore if using fossil data would give us a better understanding of their species distributions today and when projected into the future. Based on georeferenced Pleistocene museum fossil records, we create species distribution models and use them for forecasting distributions into the present and future. We then analyze how well the projected distributions using fossil data match with current distributions derived from eBird, Breeding Bird Survey, iNaturalist, and other data sources and identify new colonizations, extinctions, and persistence. We then use projections into the future to predict how the distribution will be altered in reponse to anthopogenic climate change over the next several decades. As an example, we perform model projections into the Pacific Northwest for our chosen avian species.

Keywords: Animal ecology, Climate Change, GIS / modeling

Habitat monitoring and restoration planning of urban pollinators: a planners guide to effective management strategies

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Loss of habitat is a major factor in the decline of insect pollinators. Much of this loss can be attributed to monoculture farming which is prevalent in Oregon. This approach to agriculture creates food deserts for native pollinators and presents dangerous exposures to pesticides. However, many untapped land sources in urban environments may be improved to support a diverse abundance of pollinators. In this study I wanted to understand what native bees and other insect pollinators were present at varied urban sites across Portland, Oregon, and what floral resources they utilized. I performed pollinator monitoring at 8 sites in the summer of 2019 with assistance from PSU and community volunteers. Using a variation of The Xerces Society Monitoring Protocol, which organizes bees into 10 morpho-groups, as well as setting collection cups (traps filled with soapy water), we collected pollinator floral preference data and insect specimens for identification. This information allowed me to analyze factors that may be supporting or hindering pollinator populations in these urban sites. I discovered that there are multiple different morpho-groups of native bees present at these sites. Many of these native bees as well as flies, wasps, and butterflies are utilizing floral species that are non-native and often invasive. I will create plant pollinator webs to visualize the phenology and floral preferences of observations from May through September. I will use this information to create a guidebook of restoration recommendations that will be applicable to land managers planning to create a pollinator habitat in urban settings.

Keywords: Habitat assessment, Plant ecology, Wildlife biology

The effect of the urban heat mosaic on tree phenology

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Due to the heterogeneity of the urban heat island, we can think of the variable influence of urbanization on air temperature as more of an urban heat mosaic. Climate change has caused a resurgence of interest in the way temperature affects how organisms, such as street trees, undergo cyclic changes in their life cycle. Such changes include budburst or, less commonly, timing of senescence. Little is known about how the urban heat mosaic could be affecting the phenology of different urban trees. Because street trees are one of the more prominent ecosystem engineers of the urban landscape, variable influences of temperature on tree phenology could impact urban ecosystem ecology and human health. This study is investigating the timing of senescence for *Acer macrophyllum* and *Acer platanoides* in Portland's hot and cool zones. So far, much has been learned about the methodology surrounding senescence. Data analysis is ongoing, but rates of leaf color change and timing of senescence will be compared for both species in different temperature zones. Further regression analysis will be conducted to determine the relative influences of different factors including moisture availability, diameter at breast height, tree height, soil compaction, and pit width on senescence timing and leaf discoloration. These results will clarify impact severity of the urban heat mosaic on phenology of *Acer* tree species, which will inform management practices of urban tree planting, support future research on urban forestry, and use of green space.

Keywords: Plant ecology, Climate Change, Land/watershed management

Preferences of cavity nesting bees in Portland

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Little is known about the diverse life histories of our many native bee species, although many are threatened by habitat loss through urbanization. For example, few studies have examined the role of nest height or cavity size in attracting our lesser known native cavity-nesting bees. To remedy this paucity of data, we set up cavity nest boxes across fourteen locations in the greater Portland area and erected wooden posts with nest blocks at 3 different heights (0.5, 1.5, and 2.3 meters). To accommodate a diversity of bee species, cavity diameters ranged in size from 3.0 to 10.0 mm. From these nests, we collected data to determine nest occupancy, nest diameter size preferences, and percent bee and wasp occurrence rates. The overall nest height occupancy rates greatly varied amongst the fourteen locations, but overall the 2.3 m height had the greatest percent occupancy. Although the bees and wasps from the nests collected in 2019 have not yet emerged we estimate that the nests will yield about 68% bees and 32% wasps. Lastly, the greatest occupancy rates were observed in the two smallest cavity diameters, 3.0 and 4.5 mm. Nesting preference data will be used to better inform residents of greater Portland how best to provide nesting habitat for cavity nesting bees, and the solitary wasps that use similar nesting sites.

Keywords: Habitat assessment, Animal ecology, Wildlife biology

Urban park visitor preferences for vegetation – an on-site qualitative research study in Portland, Oregon

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Urban parks provide numerous cultural and ecological benefits, but may not always meet visitor preferences. The purpose of this study was to better understand vegetation preferences and accessibility by performing on-site semi-structured interviews at 15 different parks of three general park types, using a case study in Portland, Oregon. We asked: How does vegetation in urban parks currently meet visitor preferences? The data include detailed descriptions of the participants' viewpoints provided during the interviews, which were coded for themes and patterns of meaning. Vegetation was often related to visitation, and across park types, visitors discussed trees, plant size, colors, and diversity as some of their favorite aspects of the vegetation. Trees were important for many visitors, particularly for their large size and shade in recreational-active use and multi-use parks. While the plants met many of the preferences of the park visitors, more than half of them recommended changes. Many visitors to recreational-active and multi-use parks described their desire for more flowers, color, middle growth/shrubs, and improved placement, while those in natural-passive use parks oftentimes preferred additional invasive/harmful plant removal. Some primary accessibility concerns were proximity, maintenance (e.g., of vegetation and trails), trail and path access, and relaxation opportunities. Management actions can integrate these vegetation preferences into park planning and maintenance to improve park experiences and accessibility for urban communities.

Keywords: Environmental social sciences, Land/watershed management, Plant ecology

Greening of Schoolyards - rebuilding nature at schools

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The Greening of Schoolyards projects provide the perfect setting to increase habitat in urban and suburban areas while meeting school goals for learning, play and wellness. Schools can create habitat pockets to expand the network for vital habitat for a variety of species, including kids.

Keywords: Animal ecology, Environmental education, Environmental social sciences, Habitat restoration, Land use planning, Wildlife biology

Songs, saws, and sustainability: Forestry for the Birds comes to Washington County, Oregon

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Migratory birds have been declining, in some cases rapidly, for the past 30 years due in part to loss of habitat and habitat fragmentation. Forestry for the Birds provides information connecting sustainable forestry management practices to the habitat needs and natural history of birds, creating an accessible way for private forest owners to "let forest forests function as forests and keep common birds common." The program brings together foresters, landowners, academics, non-profits, and state and federal agencies to find management solutions that support bird populations and promote sustainable forestry on working lands. This program has been funded in Washington County by the Tualatin Soil and Watershed Council from 2019-2022. Here we outline the goals of the program, its methods, and how to get involved.

Keywords: Conservation biology, Habitat restoration, Land/watershed management

AUTHOR INDEX

KEYWORD INDEX