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Cover photo credits:

Top Row (left to right)

Young girl during Reading in the Wild Program – Perry Piller, City of Vancouver Water Resources Education Center

Immature Bald Eagle, Oaks Bottom Wildlife Refuge – Mike Houck, Urban Greenspaces Institute

Showy Milkweed – Danny Kapsch, City of Portland Environmental Services

Great Blue Heron in Flight – Mike Houck, Urban Greenspaces Institute

Middle

Whitaker Ponds – Amy Chomowicz, City of Portland Environmental Services

Bottom Row (left to right)

Monarch Butterfly – Amy Chomowicz, City of Portland Environmental Services

Portland Christmas Bird Count – Ali Berman, Audubon Society of Portland

Northern Shovelers – Mike Houck, Urban Greenspaces Institute

Beaver Eating Himalayan Blackberry – Mike Houck, Urban Greenspaces Institute

17TH ANNUAL

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Held at
**Smith Memorial Center Ballroom
Portland State University
Portland, Oregon, USA
February 11, 2019**

Organized by the
Urban Ecosystem Research Consortium (UERC)

Sponsored by

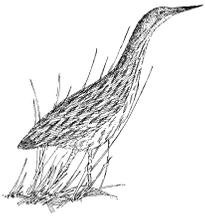


Metro



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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:

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

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.

Audubon Society of Portland
City of Portland
City of Vancouver
Metro

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.

2019 URBAN ECOLOGY & CONSERVATION SYMPOSIUM ACKNOWLEDEMENTS

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FINANCIAL SPONSORS

Audubon Society of Portland
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Clean Water Services
Metro
Port of Portland
Portland State University, Institute for Sustainable Solutions
Urban Greenspaces Institute

EVENT SUPPORT

We also wish to thank **Cornelia Coleman**, PSU, University Honors College, **Annie Toledo**, Metro Parks and Nature, and **Brooke Porter**, City of Vancouver, Water Resources Education Center, for their assistance and support for this event.

2019 Urban Ecology & Conservation Symposium

AGENDA

8:00 REGISTRATION

9:00 WELCOME AND INTRODUCTION: Mark McLellan, Vice President of Research, Portland State University

9:10 OPENING KEYNOTE ADDRESS: Dr. Celeste Searles Mazzacano
 Owner and principal scientist, CASM Environmental, Portland, OR
Tiny but compelling voices: What insects can tell us about restoration and recovery

COMMUNITY PARTNERSHIPS AND ENGAGEMENT *Moderator: Cory Samia, Water and Wetlands Educator, City of Vancouver*

- | | | | |
|--------------|-----------------------------------|---|--|
| 9:50 | Jennifer Devlin
Ping Khaw | City of Portland Bureau of Environmental Services,
PKS International | Effective outreach to vulnerable and underserved communities through Community Engagement Liaisons (CELs) |
| 10:00 | Rebecca McLain
Antonia Machado | Institute for Sustainable Solutions,
Clean Water Services | Exploring the relationship between collaborative partnerships and outcomes: An in-depth look at the Tree for All Program |
| 10:10 | Carole L. Hardy | Portland State University | Portland's Forest Park is economically undervalued therefore its management underfunded: A call for public private partnerships to conserve forest function and protect human health |
| 10:20 | Lauren E. Bennett | Oregon State University | Understanding the gaps between interest and knowledge of bee pollinators |

10:30 Q&A

10:40 BREAK *Raffle at 10:55*

URBAN FOREST AND VEGETATION MANAGEMENT *Moderator: Ted Labbe, Policy and Program Director, Urban Greenspaces Institute*

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|--------------|--------------------|-----------------------------|--|
| 11:00 | Aaron G. Anderson | Oregon State University | Influence of water availability on native wildflower phenology and pollinator attractiveness |
| 11:10 | Michelle L. Talal | Oregon State University | Plant community composition patterns in urban parks of Portland, Oregon |
| 11:20 | Alexander Staunch | Mosaic Ecology | Exploratory noxious weed survey of the Middle and Upper Columbia Slough watersheds |
| 11:30 | Janelle St. Pierre | Portland Parks & Recreation | Documenting change in an urban forest restoration project |

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. Robert Michael Pyle

Writer, biologist, and independent scholar
The extinction of experience revisited

CLIMATE CHANGE AND DESIGN *Moderator: Brendan White, Conservation Partnerships Division Manager, U.S. Fish and Wildlife Service*

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|-------------|-----------------------|----------------------|---|
| 1:40 | Jason A. King | Greenworks PC | Design for climate: An interdisciplinary approach |
| 1:50 | Aaron R. Ramirez | Reed College | Hydraulic vulnerability of native trees is increased by urban heat |
| 2:00 | Natalia S. Ortiz Luna | University of Oregon | Designing hydro-logical community resilience |
| 2:10 | Laura E. McMullen | ICF | Interaction of climate change with restoration action maturation in an urban environment: Impacts to salmon habitat |
| 2:20 | Q&A | | |
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2:30 BREAK *Raffle at 2:45***BEAVERS AND WATERWAYS** *Moderator: Sean Gordon, Institute for Sustainable Solutions, Portland State University*

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|-------------|------------------|---------------------------------|--|
| 2:50 | Katie A. Holzer | City of Gresham | Who does it best? Engineers vs. beavers in a stormwater treatment facility |
| 3:00 | Noah Jenkins | Johnson Creek Watershed Council | Dam, it's hot in here! Human- vs. beaver-constructed dams and stream temperature |
| 3:10 | Janine M. Castro | U.S. Fish and Wildlife Service | Streams without biology: How physics inadvertently usurped river restoration |
| 3:20 | Mae Saslaw | Portland State University | Mixing of the Willamette and Columbia Rivers across Sauvie Island, Oregon based on stable isotopes ($\delta^{18}\text{O}$ and δD) of surface water |
| 3:30 | Chris Prescott | City of Portland | Urban impacts on the biological health of Portland streams |
| 3:40 | Q&A | | |
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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
Eric Butler*, Carole Hardy, Brandon Hadzinsky (Portland State University)	Recommendations for ivy management in Forest Park
Michelle Delepine* (West Multnomah SWCD), Jay Yungerman (Portland Community College), and additional co-authors	Pacific Northwest Garlic Mustard Working Group – Highlights from 2017-2018 collaborations
Gary Granger*, Rebecca Provorse	Census of American crows (<i>Corvus brachyrhynchos</i>) during nocturnal roosting in downtown Portland, Oregon in 2018: Quantity, density, and distribution over time
Ali Grove* (Portland State University)	Green roof plant coverage and height vary by season and morphotype, but not substrate depth
Carole Hardy* (Portland State University)	Portland's land managers and academic researchers partner in the launch of a central data repository for Portland's natural area research
Sarah Hartung*, Luke Johnson (Environmental Science Associates)	Lessons learned from monitoring streaked horned larks at airfields in the Willamette Valley and Puget Sound – Implications for future airport projects
James Holley* (Portland State University)	Investigation of factors limiting age class diversity in native turtles in the Willamette Valley, Oregon
Kevin Huniu* (City of Portland Bureau of Environmental Services)	The Columbia Slough sediment program - Reducing contamination and long-term risk in Portland's hidden gem
Gail Langellotto*, Isabella Messer (Oregon State University)	Garden bees of Portland

William McCuen*, Nancy Broshot (Linfield College); Austen Bassler (Oregon City High School)	Survivorship and growth of seedlings and saplings in urban forests
Olivia Morgan* (Ash Creek Forest Management)	Shared space: Can landscaping influence homeowner attitudes about conservation and stewardship?
Ashwin Sivakumar* (Flintridge Preparatory School), Joe Liebezeit (Audubon Society of Portland), Jared Kinnear (Clean Water Services)	A study of avian population response after habitat restoration using remote sensing and community science bird observation data
Stefanie Steele*, Erica Rudolph, Susan Masta (Portland State University)	Survey of the native bees of Portland State University
Michael Vermeulen* (Portland State University)	Providing for birds in our neighborhoods: Relationships between bird communities, front yard habitat, and neighborhood-scale landcover
Hailey Wallace*, Dr. Marion Dresner (Portland State University)	Assessing the relationship between floral blossom density, type and floral visitation activity of bees in SE Portland involving community scientists
Lindsey Wise* (Institute for Natural Resources - PSU)	iMapInvasives 3.0 - New features and improvements

* *Primary author*

UERC 2019 LUNCHTIME CHATS AND TOURS

Grab your lunch and join 1 of 4 discussions with experienced peers from the world of urban ecology and environmental education. Or, if you want to get outside, take a guided tour or guide yourself around PSU's sustainable features. *Please note: Room numbers may be changed based on group size.*

1. Beyond Invasive Plants: an All-taxa Approach-Room 327

Invasives 2.0, The City of Portland's updated Invasive Strategy, takes an all-taxa approach. What species are you concerned with? How do we protect natural assets in the City and the region while adapting to changing ecosystems? Let's discuss the invertebrates, fungi and other non-native organisms that might be of concern now and in the future.

- Conversation Leads: *Dominic Maze and Toby Query, City of Portland Bureau of Environmental Services*

2. Greening of Schoolyards-Room 328

Partnerships with local school districts offer opportunities for increased habitat conservation throughout our communities. The Greening of Schoolyards initiatives in the Portland-Vancouver area are adding not only vegetable and sensory gardens, but also native habitat gardens and landscaping for many species including pollinators, birds and small mammals.

- Conversation Lead: *Jane Tesner Kleiner, RLA, nature+play designs*

3. Be a Part of the Big Picture: Regional Conservation Strategy-Room 329

Does your work fit into the bigger picture? Find out what's going on with the Intertwine Regional Conservation Strategy, ask questions, share what your organization is doing, and make suggestions for ways to further integrate the strategy into practical projects.

- Conversation Leads: *Bruce Barbarasch, Tualatin Hills Park & Recreation District & Jonathan Soll, Metro*

4. Challenges and Successes of Community Science Programs-Room 333

From a quick Eco blitz to longer term monitoring of rare species, amphibian egg masses, beavers, lamprey and other fauna and flora, community science opportunities are many in our region. Community science helps volunteers make connections with the land differently from other kinds of educational events. Find out what makes a program successful, how the data are used, and the challenges of organizing these experiences.

- Conversation Leads: *Adrienne Moat, Johnson Creek Watershed Council; Megan Garvey and Kacy Woodley, The Wetlands Conservancy; Katy Weil, Metro & Bill Weiler, Sandy River Watershed Council*

5. PSU Sustainable Features Tour (including cultural and ecological features)-Meet your PSU guide at the stage. Tours leave promptly at 12:15 pm and return by 1 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

Celeste A. Searles Mazzacano, Ph.D.

Entomologist

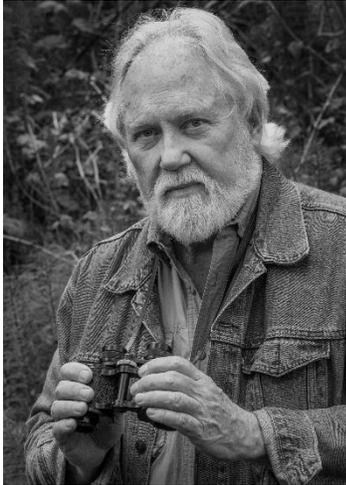
CASM Environmental, LLC, Portland, Oregon

Tiny but compelling voices: What insects can tell us about restoration and recovery

Insects and other invertebrates provide ecosystem services that are vital for successful restoration and habitat recovery, but their myriad roles are often overlooked and few groups have been studied thoroughly. Urban environments have unique ecologies. Responses of insect populations to restoration and management can raise considerations for projects targeted toward other groups as well as impact the ultimate success of those projects. This talk will discuss ways in which insects and other invertebrates can inform urban restoration; present case studies in urban systems; highlight common themes across different projects; and end with some thoughts about how insects can help us build better cities for both people and wildlife.

Biography

Celeste Searles Mazzacano is the owner and Principal Scientist at CASM Environmental LLC, where her work focuses on insects, freshwater mussels, and other invertebrates. Her research and teaching has taken her from river bottoms to tree canopies and from universities to fish & wildlife agencies, non-profits, and independent consulting as she works to investigate and preserve insect species, characterize their impacts on habitats, and develop management plans that protect the overall ecosystem. As an educator, she strives to impart her almost excessive enthusiasm about the insect world to others and engender a greater awareness and appreciation of their functions. Because urban areas provide opportunities for increased human/insect interaction with potential for both positive and negative outcomes, in the last decade she has focused additionally on insects and other invertebrates as urban wildlife that can both provide benefits for, and receive benefits from, human city dwellers.



Afternoon Keynote Address

Robert Michael Pyle, Ph.D.

Writer, Biologist, and Independent Scholar

Gray's River, Washington

The Extinction of Experience Revisited

Nearly forty-five years ago, I posited a cycle whereby local extinctions lead inexorably to deeper disaffection with the elements of diversity in our surroundings, and thus, through disconnection, to apathy, noninvolvement, and still further losses. I called this dire process "the extinction of experience," and I predicted that it would prove particularly severe and effective in and around cities, where most people live and where diversity retreats daily. Lately, in light of the sixth extinction crisis, nature deficit disorder, and climate change, I have been re-evaluating the extinction of experience today. To what extent has it panned out? To what degree does it still operate? And how and where has it been stemmed? Here I will report from the field on the current look and import of this much-adopted hypothesis, and on the surprising degree to which the cities themselves can be designed and managed to function as its most effective antidote.

Biography

Writer and lepidopterist Bob Pyle dwells, writes, and studies nature along a tributary of the Lower Columbia River. His twenty-two books include *Wintergreen*, *The Thunder Tree: Lessons from and Urban Wildland*, two collections of poems, *Butterflies of the Pacific Northwest*, and *Magdalena Mountain*, a novel. His books have received a Guggenheim Fellowship, the John Burroughs Medal, two National Outdoor Book Awards, three Washington Book Awards, and many other distinctions. After taking his doctorate in conservation ecology from Yale University, he worked for the government of Papua New Guinea on giant birdwing butterfly conservation. In 1971 he founded the Xerces Society for Invertebrate Conservation, now the largest pollinator protection team in the world. Bob has taught place-based writing from Tasmania to Tajikistan, and been Kittredge Distinguished Visiting Writer at the University of Montana. A pioneer in urban wildlife conservation, he received a Distinguished Service Award from the Society for Conservation Biology. Bob is a Senior Fellow of the Spring Creek Project at Oregon State University, and has been named an Honorary Life Fellow of the Royal Entomological Society.

ABSTRACTS SUBMITTED

Influence of water availability on native wildflower phenology and pollinator attractiveness

Aaron G. Anderson, Oregon State University, Email: andeaaro@oregonstate.edu

Lucas Costner, Oregon State University, Email: costnerl@oregonstate.edu

Gail Langellotto, Oregon State University, Email: gail.langellotto@oregonstate.edu

In 2017 and 2018, we performed a field study screening 23 garden-friendly, native Willamette Valley wildflowers (and four exotic comparators) for their attractiveness to pollinators. Flower phenology and pollinator visitation differed between the two seasons. There was a marked difference in both flowering timing and duration. The 2017 peak bloom began an average of 17.7 days later than 2018, and ceased 27.7 days later. Thus, the length of 2018 peak bloom was 10 days shorter on average, and ended a month earlier. We hypothesize that these differences are due to water availability. In 2017, we irrigated to ensure perennial establishment, while in 2018 we did not irrigate. Furthermore, in 2017 the region received 2.83 inches of rain across May-August, whereas in 2018 there was only 0.87 inches of rain in May-August. This may have accelerated flowering and attenuated its length. These phenological differences may have implications for the abundance and species-richness of attracted pollinators. In 2018, flowers opened earlier and for a shorter duration on average. However, across our timed pollinator counts we observed more native bee visitors per observation. When considering native bees, *Gilia capitata*, *Madia elegans*, *Aster subspicatus*, *Eschscholzia californica*, and *Solidago canadensis* attracted the greatest bee abundance in 2017. In 2018, *Eschscholzia californica*, *Aster subspicatus*, *Phacelia heterophylla*, *Solidago canadensis*, and *Clarkia amoena* were the most attractive to native bees. During our 2019 field season we will irrigate half the plots, to address both temporal variation and the impact of irrigation on bloom phenology and attractiveness.

Keywords: Habitat restoration, Plant ecology, Wildlife biology

Understanding the gaps between interest and knowledge of bee pollinators

Lauren E. Bennett, Oregon State University, Email: bennelau@oregonstate.edu

Gail Langellotto, Oregon State University, Email: Gail.Langellotto@oregonstate.edu

Recent research has shown a gap between the public's interest in new pollinators and the public's understanding of bees and their needs. This study examines public knowledge and validation of bee pollinators through a survey consisting of questions that ask the respondent to identify bees, rank flowers in terms of bee foraging resources, identify individual contributions to pollinators' resources at home or in a community garden, and state values for pollinators. The goal of this effort is to highlight potential gaps in interest and understanding to allow educators and scientists to more efficiently target these gaps in knowledge to better provide resources for bee pollinators.

Keywords: Environmental education, Environmental social sciences

Recommendations for ivy management in Forest Park

Eric P. Butler, Portland State University, Email: ebutle2@pdx.edu
Carole Hardy, Portland State University, Email: hardycar@pdx.edu
Brandon M. Hadzinsky, Portland State University, Email: bmh5@pdx.edu

Forest Park faces numerous major ecological stresses, demonstrated in part by the significant lack of late-successional tree recruitment and invasion by ivy (*Hedera* spp.) and other invasive plant species. While ivy removal and revegetation has been a focus of restoration efforts, limited resources and unanswered questions about the impact of ivy and ivy removal on this ecosystem present an opportunity for re-evaluating restoration goals and techniques. Leveraging past and current ecological research on Forest Park and similar urban ecosystems, we evaluate Forest Park's current ecological health compared to the restoration goals of managing to an old-growth reference site, the role of ivy, present an Integrated Pest Management (IPM) framework for deciding when and how to treat ivy within the Park, and discuss possibilities for post-treatment revegetation as a tool for building resistance to ivy reinvasion and re-establishing a self-regenerating forest ecosystem.

Keywords: Habitat restoration, Land/watershed management, Plant ecology

Streams without biology: How physics inadvertently usurped river restoration

Janine M. Castro, U.S. Fish and Wildlife Service, Email: janine_m_castro@fws.gov

The foundations of river restoration science rest comfortably in the fields of geology, hydrology, and engineering. Lane's stream balance equation from the mid-1950s taught us that there is a dynamic equilibrium between the amount of stream flow, the slope of the channel, and the amount and caliber of sediment. The Manning's equation, circa 1890, still influences most stream restoration projects designed today. Inherent in that famous equation are the variables of slope and hydraulic radius, and the ever-confounding roughness coefficient (n). Biology, while completely absent in the stream balance equation, makes a cameo appearance in the Manning's equation buried in the roughness factor. Arguably, two of the most influential equations that have shaped contemporary river restoration design left out the power of biology. This would not be a problem if we were designing and implementing river restoration in a Precambrian world, a world where green algae and fungi are the major biological players, but in today's environment, biology cannot be ignored. This talk will provide an overview of, and underpinning science for, the Stream Evolution Triangle (SET) in which biology is included on an equal basis with geology and hydrology as a driver of stream morphology. The SET broadly integrates concepts geology, hydrology, and biology, and includes improved understanding of potential morphological "stream states" at the reach scale following both natural and anthropogenic disturbances.

Keywords: Geology, Hydrology, Habitat restoration

Get connected: Lessons shared from the PNW-Garlic Mustard Working Group

Michelle Delepine, West Multnomah Soil & Water Conservation District, Email: michelle@wmswcd.org
Jay Yungerman, Portland Community College, Email: jyungerman@gmail.com

Garlic mustard (*Alliaria petiolata*) is an ODA-listed class B noxious weed and threatens many types of ecosystems west of the Cascade Range, as well as riparian corridors east of the Cascades. Starting in 2014, a self-organized collaboration called the Pacific Northwest Garlic Mustard Working Group has brought together invasive plant managers from across Oregon, Washington, and British Columbia to share observations, best management practices, prevention techniques, survey methodologies and outreach strategies across the region. This has resulted in developing shared outreach and prevention products, a cross-jurisdictional Integrated Pest Management (IPM) strategy, regional maps, and a collaborative understanding of management practices and survey gaps. The presentation will address landscape-level management principles, convey the latest integrated pest management solutions for garlic mustard, and highlight methods for starting a working group to tackle natural resource goals across broad geographies.

Keywords: Habitat restoration, Land/watershed management, Plant ecology, Water quality

Effective outreach to vulnerable and underserved communities through Community Engagement Liaisons (CELs)

Jennifer Devlin, City of Portland Bureau of Environmental Services,
Email: jennifer.devlin@portlandoregon.gov
Ping Khaw, PKS International, Email: pingkhaw0604@gmail.com

In 1993, The Oregon Health Authority (OHA) issued a Fish Advisory regarding the consumption of fish from the Columbia Slough. Historically, the Slough was a dumping ground for slaughterhouse, industrial, and chemical waste. These practices resulted in contamination of sediment and fish accumulated with PCB, pesticides, metals, and other pollutants. As part of the Columbia Slough Sediment Program, the City of Portland (City) provides education and outreach regarding the Fish Advisory under Intergovernmental Agreement between the City of Portland and Department of Environmental Quality (DEQ). Results from the most recent fish tissue sampling event by The Columbia Slough Sediment Program demonstrated the need to identify vulnerable and underserved communities that may utilize the Slough for subsistence fishing. The City contracted with Community Engagement Liaisons (CELs) from targeted refugee and immigrant communities [Cambodian, Vietnamese, Russian, Latino/Latinx, African (Liberians, Congolese, Ghanaians, Swahilians, Nigerians, Somalians), Pacific Islanders (Micronesians, Samoan, Fijian, Hawaiians, Tongans)] to: 1) obtain information on current fishing and fish consumption practices; 2) provide education on reducing risk from eating fish; 3) develop outreach plans; and 4) provide feedback to the City on effective education practices and messages. CELs are English-fluent, City trained civic activists and respected elders or members in their respective communities. This presentation will discuss valuable insights and lessons learned from the CELS into vulnerable and underserved communities in the Slough and in developing new Fish Advisory educational materials.

Keywords: Environmental education

Observations of American Crows (*Corvus brachyrhynchos*) during nocturnal roosting in downtown Portland, Oregon: Quantity, density, and distribution over time

Gary Granger, Community member, Email: amoroscines@gmail.com

Rebecca Provorse, Community member, Email: cardiomegaly@gmail.com

Rural roosts in excess of 100,000 American Crows have been documented in North America since the early 1800s. Within the past 50-60 years roosts numbering in the tens of thousands have become increasingly common in urban areas. However, despite the long documented history of such roosts, no studies have been found documenting the behavioral details of crow roosts across time. In Portland, Oregon, anecdotal reports of crows roosting in the downtown area began within the past decade. In January 2018 a systematic observation of the Portland Crow Roost was done with the initial goal to create a time-series record of roost behavior, followed by goals of educating citizens and scientists about urban roost dynamics, and ultimately fostering appreciation of the phenomenon and reducing perceived crow-human conflicts. Approximately one square mile of the downtown area, covering 13 miles of gridded streets, was regularly surveyed in order to conduct a census and record the density and locations of roosting birds. Counts were done with a modified double-sampling estimating method by one or two observers. A total of 47 surveys were completed between January 6, and December 28, 2018. The highest census was 13,740 on Dec. 28. Of the approximately 300 blocks within the survey area, crows were found to have roosted on over 100 of the blocks at some point during the year.

Keywords: Wildlife biology, Conservation biology

Green roof plant coverage and height vary by season and morphotype, but not substrate depth

Ali Grove, Portland State University, Email: agrove@pdx.edu

To gain understanding of the beneficial services provided by ecoroofs, I measured plant species percent cover and height, across three substrate depths on an ecoroof located on a local big-box store over three seasons. The ecoroof species composition is composed of three different morphotypes (sedum, grass, and herbaceous) and was planted evenly across the three substrate depths. Key findings show that substrate depth does not affect percent cover, while season and morphotype do, along with plant height.

Keywords: Plant ecology, Sustainable development

Portland's Forest Park is economically undervalued therefore its management underfunded: A call for public private partnerships to conserve forest function and protect human health

Carole L. Hardy, Portland State University, Email: hardycar@pdx.edu

Over 5,100 acres of forested land exists within the city boundaries of Portland, one of the largest urban forests in the US. Highly disturbed from past logging, fires and urban encroachment, Forest Park is a novel ecosystem without antecedent or reference. Pressures from recreational demands, encroaching development, invasions of non-native species and unpredictable impacts from rising temperatures and extreme rain events pose additional threats to the future health of this forest system. Like many urban forests, funding for ongoing management and restoration of this land is often deprioritized in municipal budgets. Lack of well-functioning markets for non-use ecosystem services, lack of credible values, lack of capitalization of restoration and management expenses, and lack of revenue from public parks are chronic issues. Forest Park exists on Portland's balance sheets as an expense – not a high value asset. A significant body of emerging research documents the health benefits derived from urban parks based on dose and proximity. With the emergence of value-based health care, a new socio-economic framework for valuing urban natural areas is needed. Presented is a Nature-Benefit Pathway model for Forest Park and other urban natural areas which associates the value of forest features and functions to health outcomes. Additionally, this is a call to Portland area businesses and municipal governments to partner in the design of a sustainable economic funding model for the conservation and active management of Forest Park and other natural areas in Portland to protect human health.

Keywords: Environmental policy, Economics, Habitat restoration

Portland's land managers and academic researchers partner in the launch of a central data repository for Portland's natural area research

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For decades academic researchers have collaborated with city land managers and ecologists to design and conduct research in Portland's unique natural areas like Forest Park, Riverview, and Mt Tabor (to name a few) recognizing the opportunity to study the dynamics of these novel ecosystems. As disturbances to these natural environments continue to build, complicated by the moving target of changing climates, understanding the management techniques that will result in sustainable self-generating natural areas is an ongoing and critical challenge as we strive to maintain the livability of Portland. Organized by the Institute of Sustainable Solutions, data sets and research studies conducted within Portland's natural areas over the past thirty years are being compiled on a searchable open-source platform leveraging the Institute of Metropolitan Studies' NODE (Northwest data exchange) system. The data will be open for analysis to students, faculty, city ecologist and other interested researchers, building on the research that has been conducted, and jointly identifying areas of study needed to inform active adaptive management practices. Current research priorities identified include: lack of tree regeneration, impact of ivy and ivy removal, vertebrate and invertebrate studies on restored areas, and revegetation strategies. As the coordinator of this partnership, this is an open invitation to participate in and help shape this initiative. A demonstration of the NODE platform and a preview of the Portland Natural Area portal will be shared.

Keywords: Plant ecology, Environmental education, Habitat restoration

Lessons learned from monitoring Streaked Horned Larks at airfields in the Willamette Valley and Puget Sound: Implications for future airport projects

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Streaked Horned Larks (SHLA) have an affinity for wide-open spaces with little or no tree cover, which includes several regional airports in the Willamette Valley and Puget Sound. Their status as a threatened species can add complexity and prolong the schedule of maintenance projects during the SHLA breeding season. In collaboration with airport managers and U.S. Fish and Wildlife staff, ESA biologists have surveyed for and monitored SHLA at local airfields in support of runway rehabilitation and other necessary maintenance activities. We describe lessons learned including: 1) Is it better to compress construction schedule then restrict equipment access to avoid impacts to sensitive streaked horned lark habitat?; 2) How to maximize field observations using GIS and iPad tablets; 3) What is considered “harassment” during construction and how do we best assess “take”?; and 4) What avian deterrents worked or didn’t work during construction? SHLAs rely on periodically disturbed grassland for nesting, and airports contribute, for better or for worse, to their current habitat range and essential life functions.

Keywords: Transportation, Animal ecology, Conservation biology

Investigation of factors limiting age class diversity in native turtles in the Willamette Valley, Oregon

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Lack of appropriate nesting areas for turtles due to habitat loss is potentially limiting population recruitment at many sites in Oregon. Two species of native turtles, Western painted turtles (*Chrysemys picta bellii*) and Western pond turtles (*Actinemys marmorata*), were once very common in the Willamette Valley of Western Oregon. Extensive habitat loss of nearly half the area of the historic Willamette River floodplain has led to concern about the remaining population size and their listing as sensitive in the Oregon Department of Fish and Wildlife Oregon Conservation Strategy. Data collected and compiled by the Lower Willamette Native Turtle Working Group over the past 10 years indicates that there is a lack of age class diversity in turtles at many sites in the growing Portland Metro region with only adults observed at many locations. Streams in these urban and suburban areas are often highly channelized and groomed to use their banks as public parks, housing or agriculture. It is hypothesized that these land use alterations have left remnant populations of adult turtles in habitat suitable for mature, long-lived animals, but likely without access to appropriate nesting areas and/or adequate juvenile brood habitat leaving little opportunity for successful recruitment of younger age classes into the population. Nesting surveys will be conducted in the spring and summer of 2019 at 20-30 sites of known turtle habitation for evidence of turtle nesting activity to determine if lack of nesting habitat or lack of successful nests are the major limiting factor in population recruitment.

Keywords: Habitat assessment, Wildlife biology, Conservation biology

Who does it best? Engineers vs. beavers in a stormwater treatment facility

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What do you do when beavers drastically change the hydrology in a multi-million dollar, highly-engineered stormwater treatment facility? Conduct a study! The City of Gresham constructed the 13-acre Columbia Slough Regional Water Quality Facility in 2009 to treat stormwater runoff from 880 acres of mostly industrial land use before it enters the Columbia Slough. In 2014, beavers moved into the facility and built an extensive network of dams on the engineered terraces and berms which substantially altered the stormwater residence time, flow path, and composition of vegetation. To determine what affect these dams had on the pollutant removal capability of the facility, samples were collected for 30 water quality constituents at the inlet and outlet of the facility during 12 storms with and without the dams. We found that pollutant removal was greater when the beaver dams were present than when they were absent. Heavy metals, which are regulated pollutants in the Slough, were reduced twice as efficiently when dams were present. From our observations during storms, the increased removal seems to be related to the dams' ability to slow down water, allowing sediment to drop out, as well as filtering through the mud, sticks, and vegetation of the dams themselves. We have learned that beavers can show up and alter our engineered designs, but adapting management of facilities to meet water quality goals doesn't always require leaving things in "as-built" condition.

Keywords: Water quality, Sustainable development, Animal ecology

The Columbia Slough Sediment Program: Reducing contamination and long-term risk in Portland's hidden gem

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The Columbia Slough is a 19-mile urban waterway with about a dozen miles of side channels. Historically, the watershed contained a vast system of side channels, lakes, ponds, wetlands, and numerous streams covering the floodplain of the Columbia River between the mouths of the Willamette and Sandy Rivers. The watershed and waterways have been drastically altered over the years and have been heavily degraded by urbanization, including agricultural, residential, and industrial development, flood control activities, and road and culvert construction. The waterway provides wildlife and essential fish habitat for salmonids, excellent opportunities for recreational paddling and birding, and is used by recreational fishing people. Since 1993, the City of Portland (City), Bureau of Environmental Services (BES) and the Oregon Department of Environmental Quality (DEQ) have studied the Columbia Slough Watershed and have implemented actions to reduce discharges of pollutants and improve sediment quality. Early studies and subsequent follow-up investigations indicate widespread, low-level contamination throughout the Slough's sediments with a few isolated areas of higher contamination. Fish tissue in the Slough is also impacted by industrial chemicals. DEQ's 2005 Record of Decision (ROD) provides a watershed wide framework for addressing contamination of sediments within the Columbia Slough. This talk will provide an overview of BES' Columbia Slough Sediment Program and the actions it is taking to reduce contamination and long-term risks in the Slough.

Keywords: Water quality, Land/watershed management

Dam, it's hot in here! Human- vs. beaver-constructed dams and stream temperature

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Stream temperatures in Johnson Creek and its tributaries often violate the standard established by Oregon DEQ for rearing salmonids (18°C). Staff from the Johnson Creek Watershed Council (JCWC) and the City of Gresham sought information on what contribution to this might be coming from inline ponds, and whether pond type (human- vs. beaver-made) would affect this. JCWC placed HOBO temperature loggers up- and downstream of eight private, human-made ponds, located throughout the watershed, in summer 2018, and took episodic field measurements of temperature in the ponds themselves; City of Gresham staff did the same for both human- and beaver-constructed ponds over several years. We found all human-made ponds for which we could make a determination increased stream temperature; the difference was as much as 9°C. Beaver ponds, by contrast, either had no effect, or, in some cases, resulted in cooler temperatures downstream. Both pond types showed thermal stratification, based on field measurements, with even shallow depths (0.5m) as much as 1°C cooler than surface temperature. In several cases, stream temperatures above human-made ponds were consistently below the DEQ temperature standard, while downstream temperatures exceeded the standard for much of the study period. Human-constructed inline ponds appear to contribute significantly to temperature Total Maximum Daily Load (TMDL) violations in the Johnson Creek watershed; inline beaver ponds may have a net positive effect on temperature.

Keywords: Animal ecology, Hydrology, Water quality

Design for climate: An interdisciplinary approach

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Climate change is the biggest issue facing our planet. There is an urgency to act as designers and planners, and landscape architects have a key role to play in developing solutions that can be integrated into our projects. The dilemma we face is incomplete understanding of the key issues, a lack of clarity about how our work has negative and positive impacts, and the best ways to use our skills and tools in green infrastructure and regenerative design to tackle climate issues. By developing an interdisciplinary approach to this work, we can expand our role as designers by employing solutions that are effective, and grounded in research. Furthermore, scientists and researchers can find outlets for research with real-world applications and impacts. There is a renewed focus on these issues, and landscape architects need to shift their focus to investigate how designs can aid in mitigating the impacts, and can contribute solutions that can have significant benefits. This session uses Drawdown (Hawken, ed.) as a framework to map out the key solutions that are necessary for global change, and explores how to act locally to create benefits. It also links practice to research through exploration of evidence-based design solutions and ways science informs design. Through case studies, we can reveal actions, metrics, and strategies that can be integrated into all project types, and create a dialogue about challenge and opportunities, empowering landscape architects and scientists with information and actions to bring positive change to our communities and the world.

Keywords: Climate Change, Land use planning, Sustainable development

Garden bees of Portland

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Gardens are known to contain a diverse and abundant community of bees, which suggests the value of gardens for bee conservation. To date, we do not have a species-level bee list for Oregon gardens. We thus sampled 24 Portland Metro area gardens for bees, in the summer of 2017-2018. Thus far, the 2017 bees have been identified to species. The 2018 samples are still being curated in the lab. The ecological characteristics of each bee species will be determined from an array of natural history resources, and the area of each garden allocated to turf/hardscape/flower beds has been estimated, to glean insights about the quality of habitat offered by Portland area gardens. We will sample gardens once more in 2019, and will perform more detailed analyses of within-garden and landscape level characteristics.

Keywords: Wildlife biology, Conservation biology

Survivorship and growth of seedlings and saplings in urban forests

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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. To determine if the lack of young trees was an urban phenomenon, we added three control sites in the Mount Hood National Forest in 2013. Last summer, seedlings and saplings were measured at all sites in Forest Park, the Ancient Forest Preserve, and at the control sites. Seedlings are trees less than 2m tall, and saplings are trees greater than 2m tall but having a diameter at breast height (dbh) of less than 10cm. The 2018 data was compared to that collected in 2013. We measured dbh of saplings and the basal area for seedlings, as well as the tree height and the height of the lowest living branch. In 2018, the control sites had significantly more live trees, more coniferous trees, more shade tolerant trees, and more seedlings and saplings. We also found that the seedlings and saplings in 2018 had a greater diameter at the control sites than the urban sites. We found significantly more dead trees in 2018 than 2013 in Forest Park. Some data that was collected has yet to be analyzed.

Keywords: Conservation biology, Plant ecology

Exploring the relationship between collaborative partnerships and outcomes: An in-depth look at the Tree for All Program

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In 2017, The Intertwine Alliance, Clean Water Services, and the Tualatin River National Wildlife Refuge (TRNWR) embarked on a project with PSU's Institute for Sustainable Solutions to assess the benefits of collaborative partnerships and identify the factors contributing or hindering their success. The project focused primarily on the Tree for All (TFA) program in the Tualatin River Watershed. Over the course of six months, our team examined three restoration projects in depth, including the Rural Landowners Incentives Program and restoration efforts in the Jackson Bottom Wetlands Preserve and the Fanno Creek Greenway area. Mini case studies of restoration efforts by the TRNWR, the City of Tualatin, and the Tualatin River Watershed Council rounded out the study. These collaborative projects provided multiple benefits that encompassed improved ecological conditions over much of the Tualatin River Watershed, mental health benefits associated with connecting community volunteers with nature, educational opportunities for schools and their students, and lower green space maintenance costs. Our results suggest that these partnerships enabled the participating organizations to more effectively achieve their goals. Although some restoration would have occurred in the Tualatin River watershed without the presence of a collaborative partnership network, it would have happened more slowly and at a smaller scale. Training materials that draw on the lessons learned and which are aimed at helping conservation organizations develop or strengthen collaborative partnerships in the Portland-Vancouver Metro area are under development.

Keywords: Environmental social sciences, Habitat restoration, Land/watershed management

Interaction of climate change with restoration action maturation in an urban environment: Impacts to salmon habitat

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A number of salmon utilize Portland's urban waterways including Chinook and Coho, and steelhead trout. The City of Portland has implemented and planned numerous aquatic, riparian, and stormwater restoration actions to improve habitat for salmonids and other natives; and Portland is the first city to receive Salmon Safe Certification. We conducted an independent evaluation process as part of the certification to evaluate effects of restoration actions on habitat for salmonids in the context of an urban environment and climate change. We engaged a multi-party process to incorporate empirical data, spatial analysis, expert knowledge, and mathematical modeling into a holistic evaluation of city-wide aquatic habitat restoration actions. We utilized a spatially-explicit ecosystem model to evaluate impacts of past and future restoration under current and future conditions, including the impacts of increased stream temperature under climate change alongside project maturation over time. Our results highlight areas of these urban streams that would be most important to protect or restore for these fish species and identify the largest impacts on these urban stream populations in the present and future. In addition to evaluating future in-stream restoration priorities, the city is incorporating the results into its Stormwater System Plan that evaluates stormwater infrastructure needs to align built and natural green infrastructure investments to also benefit salmonids and watersheds.

Keywords: Climate Change, Habitat restoration, Fisheries

Shared space: Can landscaping influence homeowner attitudes about conservation and stewardship?

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The greater Portland metro area supports many large restoration sites, but with a growing population large areas for conservation and restoration are becoming scarcer. The geographical gaps between large restoration projects often consist of non-native landscaping and turf lawns, but could instead support native plant communities and greater biodiversity. Traditional thinking about residential or commercial landscaping presents a challenge and opportunity. We hope to leverage the property owner-landscape contractor relationship to expand habitat restoration and enhancement efforts into suburban and urban areas. To facilitate this process, we have sought client input on attitudes about and understanding of native plants, habitat, pollinators, and wildlife in backyards and campuses both before and after project installation. Because landscape design involves a back-and-forth with clients, it presents a unique chance to address an individual's perspective, questions and level of information. Additionally, we believe that having a personal stake in a small-scale restoration project will bolster positive attitudes towards conservation and restoration. We designed a survey to administer to clients pre- and post- project to assess how they prioritized native plants and wildlife habitat on their private property. We also asked them to rate their interest in and knowledge of broader conservation topics. In pilot surveys done before project installation, most clients (66%) expressed an interest in supporting pollinators and wildlife. This poster will include an overview of results from pilot surveys and a description of the methods we are using to collect data, as well as those that will be used for analysis.

Keywords: Habitat restoration, Sustainable development, Environmental social sciences

Designing hydro-logical community resilience

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Traditionally, infrastructure, ecology, and architecture in a city have existed in separate systems, jurisdictions, disciplines and scales. Our architectural design perspective will offer an innovative opportunity to expose the interconnectedness of these parts within the Lents and Powellhurst-Gilbert neighborhoods to examine where current efforts are falling short in providing a holistic solution for floodwater risk, health, displacement, and economic prosperity within a historically disadvantaged community. The project, currently in the conceptual design stage, begins with an urban design framework addressing watershed-scale concerns with interventions for storing, evaporating, and infiltrating water to restore natural hydrological systems and reduce flood impact while promoting community wellbeing. With this awareness, the architectural intervention consists of an industrial building where captured floodwater becomes a resource for production processes which will use, store, and clean water. Following the Danish Industrial Symbiosis model, the building will include additional public and private uses to encourage the sharing of "waste" resources in the form of water, heat and materials to improve ecological health, business creation, and community place-making. Our partners in this project represent a range of disciplines in the private and public sector including hydrology, engineering, economics and art to recognize the importance of collaboration in producing urban hydrological designs that can encompass economic, political, ecological, and social challenges. The objective of this project has attracted the attention of various organizations and I believe that it will inspire questions and thoughts among the audience interested in diverse approaches for addressing ecological and human health in Portland.

Keywords: Hydrology, Water quality, Sustainable development

Urban impacts on the biological health of Portland streams

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The ecological health of Portland stream communities varies widely. Fish and bugs score poorly against regional benchmarks, yet there are clear signs of ecological values that persist in the face of urbanization. The ten most commonly encountered fish are native, two of the five most common are salmonids, and bug communities in some streams within Forest Park meet or approach values expected of regional reference streams. A set of upland and instream indicators of urbanization were used to investigate the key drivers of stream health in Portland. Macroinvertebrate health was most strongly related to canopy cover, particularly within the riparian zone, and stormwater indicators (impervious and zinc) accounted for additional variability in models with riparian canopy. Culverts were the strongest predictor of fish communities: there were no fish present in 45% of the reaches above impassable culverts. In contrast, fish were always found in reaches above fully- or partially-passable culverts. Evaluating additional factors beyond culverts was hampered by 1) the strong effect of culverts, 2) confounding effects of land use (the best habitat in Portland is often located above impassable culverts), and 3) a strong watershed effect – the Columbia Slough, Johnson Creek and West Hills streams have very different fish communities, and likely always did. Next steps to advance the findings beyond these analytical roadblocks include accounting for spatial autocorrelation, improving impervious indicators, applying causal inference, and using inverse distance weighting to better account for proximity of land use impacts. Initial results suggest accounting for spatial autocorrelation is particularly important.

Keywords: Land/watershed management, Water quality, Habitat assessment

Hydraulic vulnerability of native trees is increased by urban heat

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While a warming climate has implications on human populations and infrastructure systems, we also need a better understanding of ecosystem responses, particularly within urban landscapes. Since cities amplify temperatures through a phenomenon known as the ‘urban heat island effect,’ we can examine variation in temperature-related stress to assess the response of urban ecological systems. Here we combined a highly-resolved urban heat map and tree canopy data with plant ecophysiological techniques to ask 3 research questions: 1) how does variation in urban temperatures impact hydraulic function of native Northwest trees?; 2) what is the water status of trees exposed to different levels of urban heat?; and 3) which native tree species are most at risk during a warming climate? We address these questions by examining three PNW native tree species: Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), and bigleaf maple (*Acer macrophyllum*) across an urban heat gradient in the City of Portland. Our findings suggest trees in warm sites have lower water status, elevated rates of hydraulic impairment, and other indicators of temperature and moisture stress. Consistent patterns of difference across species with contrasting water use strategies (e.g., conifers vs. angiosperms) suggests urban heat affects a wide variety of plant functional types. Highest rates of loss in hydraulic conductivity in bigleaf maple--which composes approximately 20% of the urban canopy--suggests this species may be particularly vulnerable to future drought/heat stress in Portland, and in western Oregon as a whole as temperatures continue to rise.

Keywords: Climate Change, Plant ecology

Mixing of the Willamette and Columbia Rivers across Sauvie Island, Oregon based on stable isotopes ($\delta^{18}\text{O}$ and δD) of surface water

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The stable isotopic composition of surface water ($\delta^{18}\text{O}$ and δD) is used extensively to constrain water evolution throughout the hydrologic cycle. The isotopic composition of meteoric water varies globally based on latitude, elevation, distance from its source, and environmental conditions during and after precipitation. Existing data show that the isotopic signatures of the Willamette and Columbia Rivers are distinct from one another with $\delta^{18}\text{O}$ values of approximately -10.5‰ and -16.2‰ respectively. Sauvie Island lies at the confluence of these two rivers. It is an 84.8 km² floodplain containing wetlands, channels, and lakes. I collected water samples throughout the region, including sites upstream of the confluence, downstream, and across Sauvie Island itself. The isotopic composition of collected samples was analyzed to develop a mass-balance model that shows how the rivers mix throughout the study area. Analysis of Sturgeon Lake water samples from Sauvie Island constrain the effect of evaporation on the isotopic composition of river wetlands. This study improves our understanding of the interaction between the Columbia and Willamette Rivers, providing a foundation for future studies of river dynamics along a critical transportation corridor in the Pacific Northwest.

Keywords: Hydrology, Geology

A study of avian population response after habitat restoration using remote sensing and community science bird observation data

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During the last two centuries, the contiguous United States has lost over half of its wetland habitats. Preserving the remaining wetland habitats and reversing this trend is of critical importance. Fernhill Wetlands in Forest Grove, Oregon is a natural wastewater treatment site that was transformed from unused wastewater ponds to a complex natural wetland habitat in 2014-15. To assess the effect of habitat restoration on biodiversity changes, previous studies involved comparisons of bird populations before and after habitat restoration. In this study, Landsat-8 and Sentinel-2 satellite imagery and PRISM climate data were analyzed using Google Earth Engine to calculate vegetation, water and climate indices for Fernhill Wetlands for the first time for the pre- and post-restoration periods. Then, the summary data was fed into Microsoft Excel and R and quantitative correlations were established between these indices and community science bird observation data from the Cornell University eBird database collected using a protocol developed by Portland Audubon. The study showed the effects of the habitat restoration, both positive and negative, on several species. Shorebirds, marsh birds and others that lived at the water's edge showed much subtler and sometimes unexpected reactions to the habitat change. Additionally, supervised machine learning classification was used to obtain clarity on land, vegetation and water changes in the region of interest. This study could be of great interest to the Fernhill Wetlands managers to help guide further habitat modifications.

Keywords: GIS / modeling, Habitat restoration, Animal ecology

Exploratory noxious weed survey of the Middle and Upper Columbia Slough Watersheds

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A major responsibility of Multnomah County Drainage District #1 (MCDD) is to manage drainage and maintain water conveyance within 45 miles of ditches, sloughs, and streams in the Portland Area. In 2014 MCDD staff observed an increasing abundance of noxious weeds, which resulted in additional resources allocated to the removal of plant material. The increasing abundance of noxious weeds conflicts with MCDD's responsibility of maintaining conveyance. With assistance from Mosaic Ecology LLC, annual exploratory surveys were initiated in 2016 within the Middle and Upper Columbia Slough sub-watersheds to assess the current distribution of noxious weeds and provide recommendations for management. In 2018, 14 of the 41 target weeds were found to be present within the survey area. Of the five primary targets, *Myriophyllum spicatum* was the most abundant species within both sub-watersheds. *Myriophyllum aquaticum* was not present in the Upper Slough, but is highly abundant within the Middle Slough, west of I-205. Manual control of *M. aquaticum* in 2016 and 2017 successfully removed isolated populations from the mainstem, east of I-205. Short-term control recommendations include containment of existing aquatic noxious weeds while applying Early Detection and Rapid Response (EDRR) strategies to new populations. The primary long-term control recommendation is to increase canopy cover and enhance riparian buffers along the mainstem and side channels of the Columbia Slough to reduce sunlight to macrophytes. Emphasis would be placed on establishing woody species on the southern banks of waterways. Developing long-term partnerships with local government, business, and non-profit stakeholders will be critical to the success of long-term goals.

Keywords: Habitat restoration, Land/watershed management, Plant ecology

Survey of the native bees of Portland State University

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We surveyed the bee species present on Portland State University's campus, with a focus on the Community Orchard, over the course of two years. We found a wide diversity of bees present, representing five different families. Our survey allowed us to make the first checklist of bee species present in this highly urbanized landscape in the core of Portland. We also tracked the seasonality and floral preferences of the different species, to better document the life histories of taxa for which little prior data existed. Our data allow us to make recommendations to property owners and managers on how to provide habitat and resources for native bees in the Portland region and to help in efforts to conserve these often-overlooked pollinators.

Keywords: Conservation biology, Habitat assessment, Animal ecology

Documenting change in an urban forest restoration project

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The West Willamette Restoration Partnership is working to enhance connected natural areas, on both public and private property, in SW Portland to increase functionality as a wildlife corridor with connections to Forest Park to the north and Tryon Creek State Natural Area to the south. To manage the invasive vegetation currently found within strategically selected restoration sites in the Westside Wildlife Corridor, a variety of treatments were conducted and monitored between 2016-2018. Ground ivy (*Hedera* sp.), canopy weeds (including *Clematis vitalba*, *Hedera* sp.), and weedy tree treatments were conducted. Treatments included manual pulling, herbicide treatments, and plantings of native trees and shrubs. Changes in plant species composition and coverage was assessed using the Unified Monitoring Protocol and photo-point monitoring. The current results show promising signs that both long-term community stewardship efforts and short-term high intensity treatments are having the intended effect of decreasing ivy cover and having positive effects on native species diversity. Photo-points of sites of ground ivy and canopy ivy treatments showed noticeable effects: less and dying ivy and new non-invasive plants establishing. More work, and continued maintenance, will be necessary to fully restore these sites to a native plant-dominated condition. The project also utilizes a variety of tools to engage with the public about enhancement efforts.

Keywords: Habitat assessment, Habitat restoration

Plant community composition patterns in urban parks of Portland, Oregon

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Urban parks are biodiversity hotspots and are integral components of green infrastructure as development increases in urban areas. The purpose of this study is to better understand the relationships between plant community composition, structural patterns, and environmental and species traits in different types of urban parks in Portland, Oregon. A stratified random sampling design was used to select 15 parks in Portland of three different types based on use: 1) recreational-active use parks, 2) natural-passive use parks, and 3) multi-use parks. Within each of the selected parks, plant species/cover and environmental data were collected in five 400-m² square plots. In terms of taxonomic composition, the data include a total of 178 plant species belonging to 141 genera and 65 families. The average species richness and biodiversity indices (Shannon-Weiner and Simpson) were highest in natural-passive use parks, followed by multi-use parks, and then recreational-active use parks. This study describes a range of patterns for native, non-native, invasive species in different parks as well as plant form (i.e., trees, sapling/shrubs, herbs, vines), various environmental variables, and plant traits (i.e., monocots, dicots, perennial, etc.). The plant community composition information, cluster analysis groups, non-metric multidimensional scaling ordinations with joint plots, and hilltop plots can be used to highlight particular parks and/or plants, as well as provide information for potential management actions. Overall, this plant community composition research may assist park managers in their aims to promote native species cover, reduce invasive species cover, or achieve additional management goals for Portland's urban parks.

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

Providing for birds in our neighborhoods: Relationships between bird communities, front yard habitat, and neighborhood-scale landcover

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Urbanization is associated with high levels of anthropogenic disturbance, fragmentation and altered native bird communities. The aim of this study was to investigate anthropogenic drivers of urban bird communities in three Portland, Oregon neighborhoods. Focus was given to the conservation value of urban green space and front yard habitat in residential areas. During the 2018 spring breeding season, community-based scientists monitored 56 point count stations across the Hillsdale, Lents and Pearl neighborhoods. Species richness decreased and invasive species became dominant in areas with greater impervious surface cover. The prominence of invasive cavity nesting birds [European Starlings (*Sturnus vulgaris*) and House Sparrows (*Passer domesticus*)] was investigated and shown to predict low abundance of native cavity-nesting birds. This study also found that front yard habitat has conservation potential, as increased front yard foliage height diversity was associated with increases in native species abundance and diversity.

Keywords: Conservation biology, Habitat assessment, Sustainable development

Assessing the relationship between floral blossom density, type and floral visitation activity of bees in southeast Portland involving community scientists

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Pollinator populations have been declining over the past few decades; scientists are unsure of the cause of decline but have attributed it primarily to habitat fragmentation, pesticide use, and climate warming (Potts et al., 2010 - Trends in Ecology & Evolution 25: 345-353) which are all exacerbated in cities. The loss of global pollinators would be devastating to the economic market; 35% of global crop-based food production requires pollination services (Brown et al., 2009 - Apidologie 40: 410-416). Due to the threat of losing our pollinators, there are many conservation actions such as “pollinator friendly” areas being constructed in cities around the globe. Because of this there is a need for a greater understanding of the relationship between bees, and floral resources at a local landscape level. I assessed the relationship between blossom density, inflorescence type, cover, frequency, density and numbers of bees observed at three different “pollinator friendly” areas in southeast Portland. This project utilized community science members to gather observational monitoring data at Johnson Creek Commons Rain Garden, SE Yukon Bioswales and Beyer Court Rain Garden in Lents, Oregon. I hypothesize several significant findings from my research, such as the relationship between small scale vegetation metrics and floral visitor activity, and a relationship between diversity and richness of sites and morpho-species groupings. The results of this study will be utilized in developing a deeper understanding of the relationship between pollinators and floral resources at a local landscape level, and in addition will provide recommendations for floral resources used in “pollinator friendly” projects in conservation areas in southeast Portland.

Keywords: Habitat assessment, Environmental social sciences, Conservation biology

iMapInvasives 3.0: New features and improvements

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Since its launch in 2010, iMapInvasives has provided users with a powerful online data management tool for invasive species work. In Oregon, iMapInvasives has brought together over 350,000 observations of nearly 400 species, as well as recording several thousand survey results and treatment actions. Coming in spring/summer 2019, the new iMapInvasives 3.0 will tap into the power of cloud-based and mobile mapping technologies and provide a suite of new features for users. iMapInvasives 3.0 will enable you to: 1) Map and share invasive species locations, surveys, and treatments from many data sources; 2) work collaboratively using specialized tools to make informed management decisions; 3) stay informed with customized e-mail alerts and GIS-based reports; 4) prioritize management actions with standardized information; and 5) utilize jurisdictional controls to administer user permissions, species- and record-level sensitivities, and custom map reference layers (via iMap data managers). iMapInvasives 3.0 will build on and expand iMap’s features to include: 1) customizable data collection; 2) use of Esri’s suite of mobile tools to create custom workflows for data upload; and 3) provide increased map coverage in North America, with plans to expand to Central and South America and the Caribbean region. Users will be able to view and query all data across the iMapInvasives network and better visualize change over time with map-based queries and reports. Use of web map services will help facilitate transfer of real-time data to and from other invasive species mapping platforms and iMapInvasives. iMap version 3.0 will also include improved mobile interface for use on your smartphone or tablet.

Keywords: GIS / modeling, Land/watershed management, Conservation biology

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