

14th Annual Urban Ecology and Conservation Symposium



February 8, 2016
Proceedings

14TH ANNUAL

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Held at
**Smith Memorial Center Ballroom
Portland State University
Portland, Oregon, USA
February 8, 2016**

Organized by the
Urban Ecosystem Research Consortium (UERC)

Sponsored by

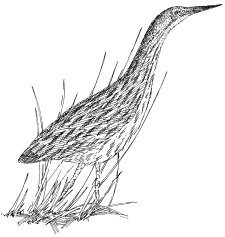


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Urban Ecosystem Research Consortium (UERC) Portland, Ore. - Vancouver, Wash. Metropolitan Region



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 design</i>	<i>land management</i>	<i>sustainable development</i>
<i>conservation biology</i>	<i>fisheries</i>	<i>land use planning</i>	<i>transportation</i>
<i>ecology</i>	<i>geology</i>	<i>social sciences</i>	<i>water quality</i>
<i>economics</i>	<i>habitat restoration</i>	<i>soil science</i>	<i>wildlife biology</i>
<i>education</i>	<i>hydrology</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 citizens 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 have served 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
Earthworks
Herrera Environmental Consultants
Kingfisher Ecological Services
Lewis & Clark College
Metro

Oregon Department of Fish and Wildlife
Oregon State University
Portland State University
Reed College
The Intertwine Alliance
Tualatin Hills Parks & Recreation District
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.

2016 URBAN ECOLOGY & CONSERVATION SYMPOSIUM ORGANIZING COMMITTEE AND PROGRAM SUPPORT

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We also wish to thank **Marjorie Brown**, City of Portland Environmental Services, **Kelly Mackura**, PSU, ESR Office Coordinator, **Christy Carovillano**, Metro Natural Areas Program and **Nancy Pollot**, U.S. Fish and Wildlife Service, for their assistance with this event.

Financial Sponsors

Audubon Society of Portland
Metro
Portland Environmental Services
Urban Greenspaces Institute



Special Recognition

The UERC would like to recognize Marjorie Brown for her years of helping with the annual symposia. For a decade, Marjorie has provided her expertise in set up and registration, and has been an all-around go-to person. Marjorie's kindness and hard work on behalf of the UERC are greatly appreciated. All the best to you, Marjorie, on your retirement!



2016 Urban Ecology & Conservation Symposium

AGENDA

8:00 REGISTRATION

9:00 WELCOME AND INTRODUCTION: Dr. Olyssa Starry, Assistant Professor, Urban Honors, Portland State University, with opening remarks from **Dr. Wim Wiewel**, President, Portland State University

9:10 OPENING KEYNOTE ADDRESS: Dr. Eric W. Sanderson
Senior Conservation Ecologist, Wildlife Conservation Society
From Mannahatta to Visionmaker: Perspective on the past, present and future of New York City's nature

GREENINFRASTRUCTURE WITHIN THE BUILT ENVIRONMENT *Moderator: Amy Chomowicz*

- | | | | |
|--------------|------------------|---|---|
| 9:50 | Evan Gutierrez | Oregon State University | Collaborative neighborhood-scale sustainability assessment and planning using the Spatial Optimization for Urban Resource Conservation and Engagement (SOURCE) Tool |
| 10:00 | Denver Igarta | City of Portland Bureau of Transportation | Collaborating for transportation and stormwater benefits: the Tryon-Stephens Headwaters Neighborhood Street Plan |
| 10:10 | Ted Hart | Portland State University | Root-enhanced infiltration within stormwater bioretention facilities in Portland, OR |
| 10:20 | Sydney Gonsalves | Portland State University | The effect of greenroof design on beetle community composition |

10:30 Q&A

10:40 BREAK *Raffle at 10:55*

CITIZEN CONNECTIONS *Moderator: David Cohen*

- | | | | |
|--------------|-------------------|--|--|
| 11:00 | Lindsey Wise | Institute for Natural Resources, Portland State University | Practical uses of the iNaturalist website and dataset |
| 11:10 | Zuriel Rasmussen | Portland State University | Clickable Coyotes: The efficacy of online education for proactive wildlife management |
| 11:20 | Michele Blackburn | The Xerces Society | Volunteer-based freshwater mussel relocation as a viable conservation strategy |
| 11:30 | Kammy Kern-Korot | West Multnomah Soil and Water Conservation District | Oak release on a privately owned farm on the urban-rural frontier |
| 11:40 | Bruce Barbarasch | Tualatin Hills Park & Rec. District | Are people using nature play? A look at THPRD nature play area users and play activities |

11:50 Q&A

12:00 LUNCH *Raffle at 12:55*

You are invited to participate in a facilitated discussion, video showing or walking tour during the lunch break. Descriptions of the lunchtime offerings can be found on page 7.

1:00 AFTERNOON KEYNOTE ADDRESS: Dr. Scott F. Burns

Professor Emeritus, Department of Geology, Portland State University

Don't forget the physical environment when doing ecological studies in the Portland region

CHALLENGING SPECIES AND INTERVENTIONS *Moderator: Sean Gordon*

1:40	Corinne Handelman	Sandy River Basin Watershed Council	Sandy Basin Weed Smackdown Partnership
1:50	Jeff Lesh	Clackamas Soil and Water Conservation District	Invasive plant eradication prioritization with WHIPPET
2:00	Joe Liebezeit	Audubon Society of Portland	Humane reduction of feral/stray cats on Hayden Island
2:10	Erin Harrington	Oregon State University	Profitability of urban habitats for Cackling geese (<i>Branta hutchinsii minima</i>) wintering in the Willamette Valley, Oregon
2:20	Q&A		

2:30 BREAK *Raffle at 2:45***HABITABLE HABITATS** *Moderator: Jennifer Thompson*

2:50	Celeste Searles Mazzacano	CASM Environmental, LLC	“Piggyback conservation”: How fish-focused stream restoration transformed a landscape for dragonflies
3:00	Brook Silver	U.S. Fish & Wildlife Service	An urban stream can support a healthy population of coastal cutthroat trout
3:10	Alice McKee	Cascade Environmental Group	Rinearson Natural Area: Urban habitat restoration
3:20	Mary Bushman	City of Portland Bureau of Environmental Services	Portland's urban oak habitats: Investigating a regional nexus for oak-associated avian species
3:30	Heather Nelson Kent	Metro Parks and Nature	Nature in Neighborhoods Title 13 - Is it working?
3:40	Q&A		

3:50 CLOSING REMARKS: Lori Hennings

4:00 – 6:00 POSTER SESSION AND SOCIAL

POSTER PRESENTATIONS

Coordinator: Ted Labbe

AUTHOR(S)	TITLE
Adam Baz*	Habitat use and area requirements of woodpeckers in urban parks
Nancy Broshot*, Wes Hanson, Carli McCormick, and Terran Sobel-Smith (Linfield College Environmental Studies)	Growth and survival of western red cedar seedlings in Forest Park
Seong Yun Cho*, Heejun Chang (Portland State University)	Assessment of urban flood vulnerability using an indicator-based approach – a case study for Portland, Oregon
Casey Cunningham (City of Portland Bureau of Environmental Services)*, and Joe Liebezeit (Audubon Society of Portland)	Portland's Ecoroof Avian Monitoring Project
Aramee Diethelm*, Susan Masta (Portland State University Dept of Biology), and Olyssa Starry (PSU University Honors)	Presence of parasitoid wasps (<i>Hymenoptera</i>) on urban green roofs suggests natural pest control
Mat Dorfman* (Portland State University Dept of Biology)	Survival and condition of community-planted street trees in Portland, Oregon
Janel Hull*, Danielle Miles, and Katie Songer (Johnson Creek Watershed Council)	Spawning surveys: Managing community/citizen science
Shawn James* (National Park Service Rivers, Trails and Conservation Assistance Program)	Portland-Vancouver EcoBlitz Series
Maya Jarrad*, Noelwah R Netusil (Reed College), and Noah Jenkins (Johnson Creek Watershed Council)	Johnson Creek Watershed restoration projects in the Conservation Registry
Martin Lafrenz*, Leslie Bliss-Ketchum, Catherine E de Rivera (Portland State University), and Lori Hennings (Metro)	Assessing habitat permeability at wildlife corridor-road intersections
Samuel Leininger*, Jenny Deszo (Clackamas River Basin Council), Jason Dumont (Mosaic Ecology LLC), Peter Guillozet (Metro), and Jeff Lesh (Clackamas Conservation District)	Clackamas River Invasive Species Partnership
Jayna Loy* and Bethany Lund (Clark Public Utilities)	Eradication Nation: Knotweed control in the Salmon Creek Watershed
Maureen Minister*, Carrie Butler, Matthew Paroulek, and Sarah Wilson (Port of Portland)	Enhancing grassland habitat on Government Island
Konrad Miziolek*, Susan Masta (Portland State University Dept of Biology), and Olyssa Starry (PSU University Honors)	Green roofs in Portland support a wide diversity of springtails

AUTHOR(S)	TITLE
Reed Norton* and John A Harrison (WSU Vancouver)	Effects of storm size and frequency on N retention, denitrification, and greenhouse gas production in bioretention mesocosms
Meenakshi Rao*, Vivek Shandas, and Linda A George (Portland State University)	Assessing the role of urban land use factors on NO ₂ exposure and mitigation: A case study of the Portland-Vancouver metropolitan region
Walter Shriner* (Mt Hood Community College) and Nick Atwell (Port of Portland)	From classroom to airfield: A successful educational-employment partnership in wildlife management
Joseph Simonis*, Mason Fidino, Elizabeth W Lehrer, Seth B Magle (Urban Wildlife Institute)	Developing a dynamic multi-species patch occupancy model to study Chicagoland mesocarnivores
Jessica Szabo*, Susan Masta (Portland State University Dept of Biology), and Olyssa Starry (PSU University Honors)	Islands in the sky: A biodiversity survey of spiders on green roofs in Portland, Oregon
Brian Vaughn*, Elaine Stewart (Metro), Emily Alcott (Interfluve), and Mike Faha (Greenworks PC)	River Island: Integrating salmon habitat and stillwater species restoration
Jackson Voelkel*, Vivek Shandas, Anandi van Diepen-Hedayat, Meenakshi Rao, Linda George (Portland State University)	Toward neighborhood-scale climate adaptation: Stakeholders, strategies and decision support
Christa von Behren* (Portland State University School of the Environment)	Seed deposition in urban riparian forests: Quantifying the potential for passive restoration
Ivy Watson*, Kimberly Koller, and Jesse Seals (City of Gresham Natural Resources Program)	10-year trends in Gresham's riparian vegetation
Sarah Whitney* (Long Tom Watershed Council)	Many beautiful paths - Improving urban water and habitats
Curt Zonick*, Marsha Holt Kingsley (Metro Parks and Nature)	Camas lily and the Native American community
Curt Zonick* (Metro Parks and Nature)	Thinking of juvenile salmon when restoring and managing a 300-acre wetland

**Primary author*

LUNCHTIME OFFERINGS

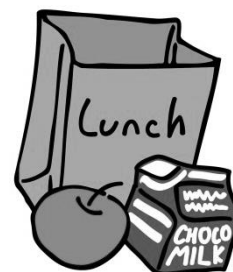
New Strategies Conversations

Come share your best ideas with your peers based on the structure of today's presentations. These informal lunchtime discussions are a platform for exploring best practices and problem solving ideas as well as creating new potential connections for you and your work.

1) **New Strategies: Green Infrastructure – Room 328**

Share your organization's latest innovations with your approach to green infrastructure issues

- Conversation Co-Leads
 - Naomi Tsurumi, City of Portland
 - Sydney Gonsalves, Portland State University



2) **New Strategies: Citizen Connections – Room 329**

Share your organization's latest innovations with your approach public outreach, citizen science, and community engagement issues

- Conversation Lead:
 - Zuriel Rasmussen, Portland State University



3) **New Strategies: Habitable Habitats – Room 333**

Share your organization's latest innovations with your approach to creating healthy habitats

- Conversation Lead:
 - Heather Nelson Kent, Metro

Other Events

4) **Presentation: Creating New Career Pathways for Youth: the Wisdom Workforce Development Program – Room 327**

Wisdom of the Elders formed Wisdom Workforce Development, LLC in 2015 as a social venture to provide a holistic approach to environmental habitat restoration utilizing Native American traditional ecological knowledge and conventional science while strengthening Native workers' career engagement, cultural identity, positive health and wellness resiliency, and addressing Native American disparities. Come hear about how this effort is making real change happen for the community.

- Presenters:
 - Ciarra Green, Wisdom of the Elders
 - Rose High Bear, Wisdom of the Elders

5) **Guided PSU Sustainable Features Tour**

This is a walking tour that will highlight cultural and ecological features at PSU. Meet your PSU guide at the stage. Tours will depart promptly at 12:15 and return by 1:00 p.m.

6) **Self-guided PSU Sustainable Features Tour**

Stop by the registration desk to pick up a map of places to explore to learn about some of the innovative, sustainable features of the PSU campus.

GUEST SPEAKERS



OPENING REMARKS

Wim Wiewel, Ph.D.

President

Portland State University

Portland, Oregon

Biography

When the Portland State community selected Wim Wiewel (pronounced Vim VEE-Vell) in 2008 to be its eighth president, the institution renewed its promise to be an active partner in shaping Portland's future - to fulfilling its motto: "Let Knowledge Serve the City." With such publications to his credit as *Global Universities and Urban Development* (2008), *The University as Urban Developer* (2005), and *Partnerships for Smart Growth* (2005), Dr. Wiewel's deep theoretical and practical knowledge of the relationship between universities and the communities they serve have made him the perfect 'fit' for Portland State University (PSU).

President Wiewel's leadership has not gone unnoticed, and since his arrival at PSU he has received the inaugural Presidential Award from the U.S. Green Building Council's Center for Green Schools as well as the Leadership Award from the Council for the Advancement and Support of Higher Education. He has served as chair of the Coalition of Urban Serving Universities and is currently the chair of the American College and University Presidents Climate Commitment, as well as a board member of many other local and national organizations.

Wim Wiewel holds degrees in sociology and urban planning from the University of Amsterdam and a Ph.D. in sociology from Northwestern University. Prior to coming to PSU, he was provost and senior vice president of Academic Affairs at the University of Baltimore, where he led efforts to broaden the university's role in the city's revitalization.



MORNING KEYNOTE ADDRESS

Eric W. Sanderson , Ph.D.
Senior Conservation Ecologist
Wildlife Conservation Society
Bronx, New York

From Mannahatta to Visionmaker: Perspective on the past, present and future of New York City's nature

On September 12, 1609, Henry Hudson sailed past a long thin wooded island called Mannahatta that would someday be known as Manhattan. Through the Mannahatta Project, Eric W. Sanderson and colleagues rediscovered the lost ecology and wildlife of Mannahatta on a block by block basis. Their research not only demonstrates how ecosystems are constructed in nature, and the extent to which the environment has been transformed in the last 400 some years, but also how ecosystem understanding can inform and inspire urban sustainability today. Since its public debut in 2009, the Mannahatta Project has extended in two directions: out, across the rest of New York City, through the Welikia Project, and into the future, through a public, free and open, webtool called Visionmaker. Visionmaker.nyc enables anyone to see the ecosystems of the city in the past, to see the ecosystems of today, and to share visions of ecosystems of the future in New York City, tied to measures of environmental performance, lifestyle choice, and climate change.

Biography

Dr. Eric W. Sanderson is a Senior Conservation Ecologist at the Wildlife Conservation Society (WCS), known for his work in landscape ecology, conservation planning and historical ecology. He is the best-selling author of “Mannahatta: A Natural History of New York City (2009),” which re-constructed the environment of Manhattan Island before European discovery, and “Terra Nova: The New World After Oil, Cars, and Suburbs (2013),” which describes how to understand recent U.S. history in terms of the promise and the perils of an economy rooted in oil, cars, and suburbs. In collaboration with others, he has studied the human footprint on Earth; range-wide conservation of tigers, jaguars, bison and other species; landscape-level conservation approaches in Asia, Africa, and the Americas; and is currently thinking about how urbanization and conservation relate at multiple scales. He is also the co-inventor of Visionmaker.nyc, an online platform to create and share visions of the ecology of New York City neighborhoods. Born in Arizona and raised in California, Sanderson holds a Ph.D. in ecosystem and landscape ecology (University of California, Davis, 1998).



AFTERNOON KEYNOTE ADDRESS

Scott F. Burns, Ph.D.

Professor Emeritus, Department of Geology
Portland State University
Portland, Oregon

Don't forget the physical environment when doing ecological studies in the Portland region

Portland, Oregon has a rich diversity in ecological habitats because of the rich diversity of geological events in the past. The differences are a result of five major episodes of geological events. The origin of the “bedrock of the area,” the Columbia River basalts, mostly occurred 14-16 million years ago from flows from eastern Oregon. Compression of the region caused by the offshore pressures of the Juan de Fuca plate formed the Tualatin Mountains, Chehalem Mountain and the Portland and Tualatin Basins. The Portland Basin then filled with over 400 meters of stream sediments from the area’s major rivers forming the Troutdale Formation, and another 300 meters of stream sediments accumulated to form the Hillsboro Formation in the Tualatin Basin. The Boring Lava Domes developed over the past two million years. The Missoula Floods created most of the region’s landforms between 15,000-18,000 years ago and formed stream floodplains, riparian communities and wetlands. East winds still blow silt into the area’s hills to create loess soils. Fragipans in soils created perched wetlands and perched aquifers, mostly in the loess and the fine-grained Missoula Flood sediments. Well- and poorly-drained sites owe their ecology primarily to the Missoula Floods. Well described ecological sites need to be sampled and described both geologically (proper mapping units) and pedologically (by horizons not increments). For example, the highest values of heavy metals and trace elements are found in the B horizons of local soils. The Portland area owes its complex ecological diversity to the region’s incredible geological history.

Biography

Scott Burns is a Professor Emeritus of Geology and Past-Chair of the Department of Geology at Portland State University, where he just finished his 25th year of teaching. He has a BS (Chemistry) and MS (Physical Science) from Stanford University and a Ph.D. (Geology) from University of Colorado, Boulder. A 6th generation Oregonian, over the past 45 years he has taught in many states and countries. Scott specializes in environmental and engineering geology, geomorphology, soils, and Quaternary geology. His many local projects include landslides and land use, earthquake hazard mapping, soils studies and the distribution of heavy metals and trace elements in soils. Scott won many teaching awards plus the Richard Jahns Award for the top engineering geologist in the U.S., the Shoemaker Award for Public Service to the U.S., and the “Outstanding Scientist for Oregon for 2014” from the Oregon Academy of Sciences. He has authored over 100 publications and was president of the Faculty Senate at three universities. His books include *Environmental, Groundwater and Engineering Geology: Applications from Oregon* and *Cataclysms on the Columbia, the Great Missoula Floods* (co-authored by PSU’s Marjorie Burns). He actively helps local TV and radio stations and newspapers bring important geological news to the public.

ABSTRACTS SUBMITTED

Michael Ahr

West Multnomah Soil & Water Conservation District; Phone: (503) 238-4775; Email: michael@wmswcd.org

Family forest management in the Tualatin Mountains: Thinning the remnant plantations

Private forests in western Oregon are dominated by Douglas-fir plantations installed after a regeneration harvest. In the Wildland-Urban interface, many of these forests have been divided from a forest of several hundred acres into smaller parcels of 20-40 acres owned by families. For the most part, the plantation style of forestry is designed to simplify management and maximize profit. In the Tualatin Mountains, staff from West Multnomah Soil & Water Conservation District (WMSWCD) are finding that these plantation style forests often don't meet the management objectives of the landowners that have purchased these parcels. Many new woodland owners are building homes on these properties and valuing aesthetics, diversity, and wildlife habitat over timber harvesting profit. Over the last six years, WMSWCD has built a forestry program to serve these landowners by writing management plans, developing thinning specifications, and training a private contract crew to perform forest management practices. In 2015, 41 acres were selectively harvested, or thinned, with the goal of building a healthier forest. We're finding great results upon visiting project sites thinned in previous years. Tree growth is expedited and diversity has increased especially on the forest floor where native ground cover has expanded rapidly. These forests are still "working lands," and WMSWCD supports a future goal of selective harvest that may provide profit to the landowner. This talk will focus on planning and implementing sound forest practices in the face of multiple landowner objectives with many lessons learned.

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

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Are people using nature play? A Look st THPRD nature play area users and play activities

Nature play areas use existing habitat and/or natural elements such as logs, rocks, and sand to create play areas for children that provide an introduction to, and familiarity with, the natural world. Tualatin Hills Park & Recreation District (THPRD) manages five of these facilities in Beaverton, Oregon. To determine how nature play areas are being used and by whom, THPRD conducted observational surveys beginning in February 2015. Preliminary data show that these areas are being utilized primarily by children under the age of eight, and that across all age groups there is an even split of participation between boys and girls. Among the types of play observed, physical play, including activities like running, climbing, and balancing, was the most popular, followed by social interaction and sensory experience. These surveys tell us who is using the Nature Play areas but it does not tell us why. As these questions become answers it will better inform THPRD, as well as other parks providers, about how and where to construct new nature play areas.

Keywords: Environmental education, Environmental social sciences, Land use planning

Adam Baz

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Habitat use and area requirements of woodpeckers in urban parks

Urbanization is a driving force in the loss of biodiversity and forest cover. In this context urban parks are essential to the maintenance of biodiversity by providing patches of remnant forest that may be particularly valuable to forest specialists such as woodpeckers. Woodpeckers perform a critical ecosystem function by creating cavities that are used by a suite of other forest organisms, yet little information exists on urban woodpecker ecology. I am investigating the habitat and landscape components associated with woodpecker abundance in 26 urban parks throughout Portland, Oregon. Five species of woodpeckers were surveyed in 2015 using point counts and audio broadcast surveys. Eleven habitat variables were measured including patch area, tree and snag density and basal area, length of downed logs, shrub density, canopy cover, and habitat connectivity. As a guild, woodpecker abundance increased with forest patch size, but not with snag availability, downed log density, or forest connectivity. I recommend that park managers protect large, contiguous forest patches. Larger forested stands appear to benefit woodpeckers and the many species associated with woodpecker occurrence.

Keywords: Conservation biology, Land use planning, Wildlife biology

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Volunteer-based freshwater mussel relocation as a viable conservation strategy

Freshwater mussels are the most at-risk faunal group in North America. Although they play critical roles in stream ecology and their life history is closely tied to native fish, their conservation needs are often not considered prior to stream restoration. Salvage of native mussels to in-stream refugia can be a viable management strategy to prevent further population declines. In 2013, the Xerces Society partnered with community groups to train volunteers in rescue and relocation of freshwater mussels from Crystal Springs Creek prior to stream restoration in Westmoreland Park (Portland, Oregon). Habitat improvements for salmon will likely have positive effects on mussels in the long term, but de-watering and in-stream construction is lethal, as mussels are unable to escape impacted areas. Mussels were collected across 2 days in summer 2013 from reaches within the restoration area, tagged, held in coolers, and relocated to an adjacent upstream reach. Survivorship was monitored for 2 years following relocation by surveying the relocation reach and recording numbers of living and dead tagged mussels. Annual mean survival rate among recovered tagged mussels after two years of monitoring was 96%. The highest mortality among relocated mussels is known to occur within the first year; thus, these results confirm that mussel translocation using trained volunteers is a viable conservation strategy for these threatened animals. The project enabled us to evaluate existing translocation techniques and document their success, engage stakeholders in a meaningful science-based conservation activity, and increase awareness of mussel management needs among regional natural resource agencies.

Keywords: Conservation biology, Environmental education, Habitat restoration

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Growth and survival of western red cedar seedlings in Forest Park

In 2005, western red cedar (*Thuja plicata*) seedlings were planted in Forest Park in Portland, Oregon to ascertain whether mammalian predation had a role in low seedling recruitment in the park. Nine study sites, three in each section (city, middle, and far) of the park were located along an urban-rural land use gradient. At each site, 27 seedlings were planted. Each tree was randomly assigned to one of three groups: deer exclusion, rodent exclusion, or control. Each was measured prior to installation of exclusion devices (March 2005). Tree height, width, basal diameter, percent of branches grazed and mortality rate has been measured annually. Last summer (2015) we remeasured all the trees. Trees grew better in the far section of the park in terms of increased height and basal area. Grazing was highest in the middle and far sections. Tree mortality was lowest in the far section and highest in the city. Our findings suggest factors related to urbanization are impacting seedling survival in Forest Park.

Keywords: Habitat restoration, Plant ecology

Mary Bushman¹, David Helzer², Adam Baz³, Joe Liebezeit⁴, Candace Larson⁴

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Portland's urban oak habitats: Investigating a regional nexus for oak-associated avian species

The Willamette River and Columbia River in Portland function as vital movement corridors for salmonids and avian species throughout their migration. To understand how these corridors function for oak associated avian species in the urban landscape the City of Portland has initiated a three year study to characterize and monitor bird communities in oak habitats located along the Willamette River in Portland. The project is monitoring bird communities in oak habitats at thirteen point count stations across five sites. Fixed radius point counts are conducted to describe the local bird community using standardized survey methodology modified from Huff et al. (2000). A total of 54 bird species were detected during the 2014 oak habitat point counts. Of the 25 most abundant species, eight (32%) were oak-associates. The one oak-obligate detected was the White-breasted Nuthatch (*Sitta carolinensis*). This species was detected 13 times throughout the season, making it the 15th most abundant species overall. The data provide useful information on avian species composition, abundance, and breeding status within the study area. The City of Portland identified a number of high priority areas where oak and prairie restoration has occurred, is underway, or is planned. With these data in hand Oak-associated bird species may be used as indicators of habitat quality and restoration efficacy.

Keywords: Plant ecology, Wildlife biology, Habitat assessment

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The Stormwater Challenge Workshops: Volunteers reducing runoff in the West Hills

The City of Portland prioritizes the infiltration of stormwater and encourages retrofits such as downspout disconnection. Some places in the city are not suitable for infiltration of concentrated volumes of runoff; however, areas with high groundwater tables and steep slopes in danger of sliding can still be retrofitted to reduce runoff. In the West Hills, the Stormwater Challenge workshop series has completed its third season and provides alternatives that reduce runoff by managing rainfall and reducing runoff before it ever turns into concentrated runoff (except in very large storms). Workshop attendees are introduced to a small handful of runoff prevention best practices – tree planting, compost amended soils, depaving, contained planters over hardscape, and porous walkways. In the first class, they learn to locate and design these practices through site visits and breakout sessions. In subsequent build events, they actually build a few of these practices at a homeowner's property, learning about construction and maintenance. Hint: There's a lot of digging! The program has tracked environmental and social metrics and feedback to decide how to most effectively influence independent positive restoration behavior. Our team's metrics and lessons learned will be shared. Our unique partnership includes West Multnomah Soil & Water Conservation District (funding), the Southwest Watershed Resource Center (homeowner and volunteer management), Green Girl Land Development Solutions LLC (technical assistance, program originator), Stamberger Outreach Consulting (behavioral science and metric tracking), and Independence Gardens (contractor).

Keywords: Environmental education, Hydrology, Water quality

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Assessment of urban flood vulnerability using an indicator-based approach – a case study for Portland, Oregon

Until now, flood risk management has been mainly focused to reduce physical vulnerability in the city. Such a narrow focus could not adequately provide equitable, effective and efficient solutions to urban flooding problems because the more frequent and more severe floods can possibly cause cumulative damage depending on city's internal and systemic capacity to deal with diverse population characteristics. The concept of social vulnerability, which represents comprehensive *a priori* conditions of urban communities and neighborhoods, thus becomes critical for sustainable urban communities. It is necessary to assess urban flood vulnerability based on a broader understanding on social capital and social relations that are closely linked to the common good and the exercise of authority. From this point of view, this research conducts surveys on university researchers and urban practitioners to investigate how differently a group of experts are aware of the concept of flood vulnerability by their academic background and experience. Under the assumption that urban population may be disproportionately affected by climate change in the city, this research attempts to explore various meanings of vulnerability and how physical and social vulnerability are interrelated each other. Moreover, this research examines the possibility of a flood vulnerability index developing process as the practice of consensus building and joint fact-finding, and its potential as social learning tools.

Keywords: Environmental social sciences, Land/watershed management, Sustainable development

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Portland's Ecoroof Avian Monitoring Project

The City of Portland's Bureau of Environmental Services and Audubon Society of Portland conducted six seasons of avian monitoring on greenroofs, conventional roofs and ground-level urban greenspaces in or near downtown Portland. The data collected demonstrate how and which species utilize greenroofs in highly urbanized areas, and how this compares to other common urban habitats. Most of the nearly 600 hours of observations were volunteered by trained citizen scientists and the data collected demonstrate that, in addition to managing stormwater, greenroofs can function as extensions of urban habitats. These results echo the results of multiple European studies. Results of avian abundance on greenroofs was comparable to ground-level greenspaces, while species diversity was nearly double what was found on conventional roofs, but less than what was found at the ground. Approximately 50% of birds detected on greenroofs were native species. Preliminary management recommendations and considerations for future studies are included.

Keywords: Animal ecology, Sustainable development, Habitat assessment

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Presence of parasitoid wasps (*Hymenoptera*) on urban green roofs suggests natural pest control

Although urban green spaces have been shown to promote biodiversity and provide ecosystem services, little is known about the biological control agents present. Parasitoid wasps (*Arthropoda; Hexapoda; Hymenoptera*) are valuable control agents against possible insect pests. Pest control is an important factor in the health of green spaces, particularly for fragmented areas such as green roofs. In order to investigate the presence and composition of parasitoid communities on urban green roofs, four sites were selected across the metropolitan Portland area. Two sites had a growing medium depth of 15 cm or less and were dominated by sedum plants. Two sites were planted with herbaceous grasses and flowering plants in over 16 cm of soil. Pitfall traps were spatially distributed and sampled every two weeks between April and June 2015. A total of 117 parasitoid hymenoptera were collected with 23 morphologically distinct species. The number and types of wasps varied greatly between the two roof types, with significantly more wasps on the herbaceous roofs. These results suggest that urban green roofs can and do support a multi-trophic community. Furthermore, these biological control agents reduce populations of harmful insects and may diminish the need for pesticides and other maintenance efforts.

Keywords: Animal ecology, Land/watershed management, Habitat assessment

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Survival and condition of community-planted street trees in Portland, Oregon

Publicly owned street trees provide a myriad of environmental benefits, but require a lifetime of stewardship in order for healthy mature trees to provide maximum returns. Existing in the right-of-way, street trees are subject to stresses that limit the level of benefits provided. Community-based planting programs are often the major source of new additions to the urban forest and more information on community-planted street tree survival can help municipalities achieve canopy goals by a better understanding of patterns in tree mortality. Over twenty five years, the nonprofit Friends of Trees (FOT) has planted about 35,000 street trees in Portland, Oregon. To estimate the survival of FOT street trees, trees planted between 1989-2014 were stratified by time since planting and randomly selected. Focusing on species that are currently or were recently approved to be planted, trees from eight species planted between 2000-2009 were stratified by 2010 census block group demographics and randomly selected. To account for the most prolifically planted species currently approved to be planted, Japanese Snowbells from 2000-2014 were stratified by time since planting and randomly selected. Overall survival was estimated at 83%, with 53% of trees in good condition, 20% fair, 10% poor, and 17% dead or missing. Two of the eight species focused on performed poorly with nearly 50% of trees in poor condition, dead, or missing. Probability of long-term survival was influenced by species and was negatively related to the time since planting and the proportion of adults without a high school degree.

Keywords: Environmental social sciences, Plant ecology

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The effect of greenroof design on beetle community composition

Greenroofs may mitigate species loss in urban areas and have been shown to support a surprising diversity of invertebrates, including rare and endangered species. It has been proposed that roofs intentionally designed as habitat—through use of native soils and plants, or elements such as logs or stones—would support greater invertebrate diversity, but there is currently minimal peer reviewed data to support this. In order to address this, we surveyed three extensive type roofs, four roofs designed as habitat, and one hybrid roof, as well as respective ground habitat sites, from April until September of 2014 in the Portland metropolitan area. Beetles (*Coleoptera*) were sampled bi-weekly as representatives of other invertebrate functional groups present. Habitat roofs demonstrated the highest beetle species richness and abundance, but a community analysis indicated that all roofs shared the most common species. Six beetle families were found on the roofs that were not found on the ground, while the ground sites had two unique families and a number of species in the most common families that were not found on the roofs. This was reinforced by community analysis in which ground and roof sites grouped distinctively. Our research confirms the results of previous studies that have found that greenroofs can provision species not otherwise detected in urban areas and supports the idea that roofs purposely designed as habitat do support higher richness and abundance of beetles than do extensive roofs, though both roof types have species in common.

Keywords: Animal ecology, Sustainable development, Habitat assessment

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Wisdom Workforce development: A Native American environmental assessment and restoration service

Wisdom of the Elders, Inc. (Wisdom) is a Native American 501(c)(3) non-profit located in Portland, Oregon. Since 1993, Wisdom has recorded, preserved and shared oral history, cultural arts, and traditional ecological knowledge of exemplary Native elders and scientists in collaboration with diverse organizations, educational institutions and government agencies. Wisdom formed Wisdom Workforce Development, LLC in 2015 as a social venture to provide a holistic approach to environmental habitat restoration utilizing Native American traditional ecological knowledge (TEK) and conventional science, strengthen Native workers' career engagement, cultural identity, positive health and wellness resiliency, and address Native American disparities. At the request of Metro, a major customer, we are providing habitat restoration services to them, plus we are offering our services to diverse environmental organizations and government agencies in the greater Portland area. The impact of our work is synergistic in practice, as the greater Portland area acquires innovative advances, our employees experience personal growth (cultural, financial, educational, and professional), Native American disparities are improved, and our firm grows to expand our influence and share our successes. Wisdom also has developed Wisdom Workforce Development Internship Program that provides specialized environmental assessment and restoration training, service learning in local natural areas, and a job pipeline to meaningful environmental career pathways for Native adults. Connecting with the world of nature while assessing and restoring public natural areas benefits Portland's Native community members.

Keywords: Environmental education, Habitat restoration, Habitat assessment

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Collaborative neighborhood-scale sustainability assessment and planning using the Spatial Optimization for Urban Resource Conservation and Engagement (SOURCE) Tool: Applying the analytic hierarchy process for spatial decision support

The Analytic Hierarchy Process (AHP) and Geographic Information Systems (GIS) were integrated to collaboratively identify and prioritize alternative development projects within a neighborhood-scale sustainability assessment and urban renewal framework through a case study in Portland, Oregon. Based on the need to increase block-level sustainability performance and identify shared public and private values, the Spatial Optimization for Urban Resource Conservation and Engagement (SOURCE) decision support system (DSS), a GIS-AHP, was utilized to spatially optimize high priority sites and partnerships for neighborhood-scale sustainable development and create opportunities to engage diverse stakeholders. Lately, approaches to urban renewal have relied on improving sustainability performance by creating development projects and partnerships. These approaches however, have lacked a tool for consulting diverse stakeholders and for optimizing the location or composition of development projects, particularly at the neighborhood scale. The SOURCE DSS aims to increase equity and inclusion in the planning process through collaboratively modeling development preferences at the neighborhood scale. The tool results in a tangible set of maps that facilitates optimal urban renewal project suite and partnership design recommendations that address multiple dimensions of block-specific sustainability performance and are inclusive of and relevant to all stakeholder groups. The presentation will also discuss the quality of available neighborhood-scale sustainability performance indicators and its effect on certainty. Spatially identifying common ground and development opportunities are the first steps toward equitable and efficient shared resource allocation decisions in social-ecological systems.

Keywords: Land use planning, Sustainable development, GIS/modeling

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Sandy Basin Weed Smackdown Partnership

The Sandy River Basin Watershed Council (SRBWC) leads a partnership to address Early Detection Rapid Response invasive species in the upper Sandy River basin. SRBWC and its partners, including Clackamas Soil and Water Conservation District (CSWCD) and The Nature Conservancy, have a long history of strategically working to control knotweeds and other priority invasive species throughout the watershed. Long-term monitoring data have been collected on locations of invasive species and treated areas and are now tracked through a customized mapping system via the Fulcrum app. SRBWC and CSWCD track sites where new EDRR species are being located, notes about landowner contacts, and can monitor contractor treatments during the field season. Data recording and management through the Fulcrum app are streamlined for all project partners, and it has become a useful tool both for use in the field and in the office. The benefit of working in partnership on invasive species management includes leveraging strengths from each organization. Current efforts to survey, map, remove, and monitor effectiveness in treating the emerging invasive Policeman's Helmet (*Impatiens glandulifera*) are streamlined by collaboration between SRBWC and CSWCD. Information will be shared about watershed-based strategies that are being used for this effort, along with data collection and management, lessons learned, and how findings are used to improve effectiveness on the ground.

Keywords: Habitat restoration, Land/watershed management

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Profitability of urban habitats for Cackling geese (*Branta hutchinsii minima*) wintering in the Willamette Valley, Oregon

The Cackling goose (*Branta hutchinsii minima*) population has increased from a low of 20,000 in 1984 to the current population of 220,000-300,000 (Stehn 2012, Sanders 2013). As the Cackling goose population began to recover in the late 1990s, the majority of the population relocated from wintering in California to wintering in the Willamette Valley, Oregon and Cackling geese in Oregon now commonly use exurban, suburban, and urban areas (Pacific Flyway Council 1999, Mini 2012). The reasons for Cackling goose use of urban areas are unclear, as they did not commonly use this habitat type on their traditional wintering areas in California or initially upon showing up in Oregon. To address this, we compared the profitability of novel, urban habitats versus traditional, agricultural habitats to determine if the foraging behavior and energetic consequences of disturbance to Cackling geese in urban habitats differed from agricultural habitats. We conducted a total of 245 hour-long disturbance surveys and 240 behavioral time-activity surveys in 109 different sites in the Willamette Valley, Oregon within urban areas in Portland, Eugene, and Salem and agricultural areas near and in the Willamette Valley National Wildlife Refuge Complex. In our presentation, we will discuss our results and potential practical applications of these results to further research of Cackling goose use of urban ecosystems, and urban ecology on a broader scale.

Keywords: Animal ecology, Wildlife biology

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Root-enhanced infiltration within stormwater bioretention facilities in Portland, Oregon

Stormwater has become one of the greatest water quality and flooding threats within urban areas. In response stormwater bioretention facilities (SBFs) have become one of the most frequently used stormwater management tools. The two primary purposes of these facilities are to reduce peak flow and retain pollutants. Researchers have shown that roots can greatly increase stormwater infiltration and retain pollutants in greenhouse, lab, field, and test SBF settings. However, no researchers have measured the extent roots can increase infiltration within currently functioning SBFs. We hypothesized that: 1) root biomass and infiltration rate would increase from winter to spring, and 2) greater root biomass would positively correlate with infiltration rate. Ten SBFs were selected as similar as possible (i.e. plant percent cover) with similar environmental characteristics (i.e. distance to groundwater) with a gradient from low to high root biomass. Roots were collected to a depth of 1 m during two periods (Jan-Feb and May-June in 2014), analyzed using WinRhizo, and weighed. Infiltration rates were recorded using water depth data loggers from December 2013 to February 2015. October through February showed lowest rate and variation of infiltration, while August showed greatest infiltration rates. We measured an average increase from Jan-Feb to May-June in root biomass (67%) and infiltration rate (40%). Correlation of average root density and infiltration rate from Jan-Feb and May-June was very little ($R^2=0.06$), Jan-Feb was low ($R^2=0.10$), while May-June was the highest ($R^2=0.46$). This work suggests roots can significantly increase the functions of SBF primary functions.

Keywords: Hydrology, Plant ecology, Sustainable development

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A new oak map to help guide conservation in the Portland region

In 2011 Metro and Kingfisher Environmental Services (KES) convened the Intertwine Alliance Oak Mapping Work Group to develop a high quality Oregon white oak (*Quercus garryana*) regional distribution map for the greater Portland area. Such a map is critical for strategic planning and increased oak habitat conservation. In 2013-2014 Metro created a preliminary oak distribution model. We used available high-resolution LiDAR and four-band imagery, vegetation modeling, as well as field observations, to create an oak distribution map. In rural settings where high-resolution imagery was unavailable, we used field observations and aerial photo interpretation to map native oak distribution. Over two field seasons community scientists collected oak field data under leadership from KES and two partner Native Americans. Professional volunteers collected non-oak field data to help ascertain which tree species were confusing the oak model. We used these data to conduct accuracy assessments and iteratively refine the oak model. The completed model captures most large oak trees and minimizes false-positive oak identifications, but does not capture over-topped or young oak trees. The data will be freely distributed in early 2016 to all interested parties via Data Basin, and are being used to foster oak stewardship on private lands. Likely next steps include expanding the oak mapping extent within the Regional Conservation Strategy boundary and assessing potential biodiversity corridors for oak-associated species. Project information is available at: <http://www.theintertwine.org/oak-mapping-work-group>.

Keywords: Conservation biology, Habitat restoration, GIS/modeling

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Spawning surveys: Managing community/citizen science

In 2011, the Johnson Creek Watershed Council piloted a salmon spawning survey program that has continued each fall through 2015. Each year, over 50 community members volunteered to undergo training in ODFW survey protocols, walk stream reaches, search for spawning coho and Chinook, and report on their findings. Data from these surveys confirmed that coho spawn each year in Johnson Creek and its tributaries, at least in small numbers, and also documented spawning locations that are now being used to inform restoration priorities in the watershed. In addition, these surveys are a valuable way for community members to engage with the watershed and witness its recovery, while making real contributions to its restoration. This program will serve as a model for future in-stream volunteer surveys, such as the spring lamprey and steelhead survey program the JCWC is currently developing in partnership with Wisdom of the Elders and Portland State University's Indigenous Studies Program.

Keywords: Animal ecology, Fisheries, Habitat restoration

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Collaborating for transportation and stormwater benefits: The Tryon-Stephens Headwaters Neighborhood Street Plan

SW Portland's mature trees, hilly topography, open streams and natural areas attract many people to this part of the city. However, these features, along with generally poorly draining soils, limit the connectivity of streets and complicate the management of stormwater. The Portland Bureau of Transportation (PBOT) and Bureau of Environmental Services (BES) worked together to complete a plan that creatively addresses street and stormwater deficiencies. Until recently, the only approved design for street improvement was a traditional street that occupied the full width of available right-of-way with pavement, curbs, sidewalks, parking, and planting strips on both sides of the street. The adoption of new Street by Street standards in 2012 allowed low-traffic streets to be built with a narrow, curbsless roadways which could be paired with a single sidewalk on one side of the street, allowing for streets with smaller footprints of new impervious surface, reduced stormwater runoff, and minimized impacts to existing trees and other natural features. The Tryon-Stephens Headwaters Neighborhood Street Plan created tools for property owners, developers, and city staff to use in identifying suitable designs for neighborhood streets that match street by street designs with the street context and appropriate stormwater management. These include a typology to define key characteristics of different streets, a flow chart to match concept-level street and stormwater designs, and drawings to illustrate various combinations of street and stormwater improvements. This Plan lays the foundation for cross-bureau collaboration and for creative thinking about street and stormwater infrastructure.

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

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Portland-Vancouver EcoBlitz Series

With over 4,000 observations and nearly 900 species identified, the Portland-Vancouver Regional EcoBlitz Series is a fun way to learn species identification and offers agencies an easy method of performing community science. An EcoBlitz, similar to a BioBlitz, is about capturing a snapshot of biodiversity within a given geography with the help of community scientists. The key components of the EcoBlitz events include the general public, species identification leaders, a cohort of youth trained in using iNaturalist, site hosts and partnering agencies, and The Intertwine Alliance and the National Park Service's Rivers, Trails, and Conservation Assistance program for marketing and coordination. With a project website at theintertwine.org/blitz, event pages and database at inaturalist.org, and a collection of event resources, the project framework is set up to leverage the value of community science. The unique aspect of an EcoBlitz is that it's up to the partnering organizations on how they want to structure the event and use the data that are collected, thus maintaining a degree of flexibility in being a part of this effort. This poster is meant to complement Lindsey Wise's proposed talk on citizen science, iNaturalist, and the value of data collected. It will highlight how to use iNaturalist and data from past EcoBlitzes, but with particular focus on sharing how others can get involved.

Keywords: Animal ecology, Environmental education, Plant ecology

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Johnson Creek Watershed restoration projects in the Conservation Registry

This poster will describe work undertaken to update the Johnson Creek watershed information in the Conservation Registry. The updated database provides more specific and quantitative information suitable for analyses of restoration project locations and a systematic approach about project characteristics. In all, 83 entries were either added or updated, bringing the total number of Johnson Creek watershed projects in the Registry to 240. Funding for this work was provided by a grant from the United States Department of Agriculture National Institute of Food and Agriculture.

Keywords: Habitat restoration, Land/watershed management, GIS/modeling

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Nature in Neighborhoods Title 13 - Is it working?

This presentation will report on the environmental indicators established in Metro's Title 13: Nature in Neighborhoods, 10 years after the adoption of the legislation by the Metro Council. During 2013-15 staff from Metro developed land use and tree canopy cover models to measure the condition and loss of floodplains, habitats of concern and riparian areas throughout the Metro region during the time period 2007-2014. Additionally, staff looked at how much development has occurred from 2000 to 2014 in the Habitat Conservation Areas (HCAs) established by the Metro Council in 2005. In adopting Nature in Neighborhoods, the Metro Council chose to rely on a combination of land use protections designed to protect the highest value habitats and voluntary measures to be implemented by public and private partners. All cities and counties within Metro's jurisdiction (except Damascus) are in compliance with Metro's Nature in Neighborhood requirements. Local governments have removed barriers to habitat-friendly development, conserved important habitat lands within their communities and support voluntary activities – often in partnership with non-profits or community groups – such as environmental education, tree planting, fish and wildlife habitat restoration and low impact development practices. Together, this mix of regulatory and non-regulatory efforts is intended to fulfill the Metro Council's vision. This presentation will focus on a review of the program performance objectives established to evaluate the program and intended to determine the region's effectiveness meeting the Metro Council's goal of keeping Nature in Neighborhoods.

Keywords: Conservation biology, Environmental policy, Land use planning

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Oak release on a privately owned farm on the urban-rural frontier

At the 58 acre Malinowski Farm in far west Multnomah County, adjacent to suburban development at the urban-rural frontier that lead to the removal of mature Oregon white oak trees, an additional 11 acres of mixed oak woodland were at risk from conifer encroachment. After initial input from foresters accustomed to working at a larger scale, the landowner believed there was not enough merchantable timber to warrant logging. The landowner, thereafter, girdled select Douglas fir trees, but worried about creating too many snags in areas used by cattle and frequented by people. Subsequent consultation determined that there might be enough timber to subsidize a habitat project to protect the precious Oregon white oaks. With support from the West Multnomah Soil and Water Conservation District and a private forester, a successful oak release project was planned and undertaken. Seven truckloads of hand-felled Douglas fir logs went to the mill and 70 oaks trees were protected. This presentation will give a history and overview of the steps taken and describe how a private landowner undertook an oak woodland habitat restoration project and made a profit.

Keywords: Economics, Habitat restoration, Land/watershed management

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Assessing habitat permeability at wildlife corridor-road intersections

Efforts to prevent and mitigate habitat fragmentation, including from roads, are essential for decreasing animal-vehicle collisions and ensuring the habitat connectivity requisite for healthy animal populations and overall biodiversity. Habitat corridors, one method for providing connectivity, have been shown to be a key factor for maintaining biodiversity in urban areas. Efforts to identify potential corridors often exclusively rely on landscape features available in spatial databases and these tend to be conducted over large regional scales. These large-scale habitat connectivity models provide correspondingly large-scale planning guidelines. We therefore developed an approach that would complement such large-scale efforts with a multi-scale approach that identifies habitat connectivity zones (e.g., corridors) and helps with restoration decisions about them and their component sections. Our goal was to create a procedure that is comparable across corridors and species and that can help guide land acquisition, habitat improvement, and barrier mitigation on an actionable scale.

Keywords: Animal ecology, Conservation biology, Habitat assessment

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Clackamas River Invasive Species Partnership

The Clackamas River Invasive Species Partnership (CRISP) was initiated to improve invasive species management within the Clackamas River basin. This partnership was a cooperative effort of the Clackamas River Basin Council, the Clackamas Soil and Water Conservation District, and Metro. The first goal of CRISP was to identify existing management efforts within the basin. An advisory group of federal, state, regional and local land managers met to discuss long-term goals, available resources, and management strategies. These meetings served as the foundation for development of a comprehensive strategy for managing invasive species in the Clackamas basin. A prioritization model was also adapted for use within the basin. This model prioritized infestations based on their potential impact and spread, and their feasibility of control. CRISP partners also ranked sub-basins based on their habitat quality, partner investments, and partner engagement resulting in the establishment of four priority areas within the basin. An action plan was created for each of the priority areas based on their land cover, prevention opportunities, survey and eradication efforts, and restoration needs. These action plans collectively formed the Clackamas River Invasive Species Management Plan which outlines an objective approach to managing invasive species in the basin. The combined efforts of the CRISP partners demonstrate the immense potential for cooperative management efforts. Agency and organizations working on invasive species issues share many common goals. Collaborative efforts such as CRISP should serve as an example of how to approach conservation efforts at the watershed and county level.

Keywords: Habitat restoration, Land use planning, GIS/modeling

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Invasive plant eradication prioritization with WHIPPET

Invasive plant eradication in urban and surrounding areas often include numerous stakeholders, agencies, and organizations with differing invasive plant eradication priorities. Additionally, large numbers of populations of high priority species make patch level prioritization difficult at a regional scale. This presentation shares information about an existing tool, WHIPPET, that offers a prioritization methodology that is transparent and fine grained. All partners have visibility into prioritization methodology and all populations across all evaluated species are ranked against each other. Populations are evaluated for invasiveness, feasibility of eradication, and level of impact. The tool is available at <http://whippet.cal-ipc.org/> and <https://github.com/leffjesh/whippet>. Examples and results will be shared from application of this tool as part of the Clackamas River Invasive Species Partnership (<http://weedwise.conservationdistrict.org/crisp>).

Keywords: Land/watershed management, Plant ecology, GIS/modeling

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Humane reduction of feral/stray cats on Hayden Island

In 2014, Portland Audubon, the Feral Cat Coalition of Oregon, and partners including Hayden Island residents, began a multi-year project to humanely reduce feral/stray cat population using strategies including Trap-neuter-return (TNR), cat adoption, community awareness and cooperation. We delineated a 486 acre portion of the island as our study area including multiple urban land-use types. We highlight initial results including 1) Cat ownership patterns/human perceptions; 2) Cat caregiver practices; and 3) Road-based cat count surveys that will serve as a baseline for population trend monitoring. Questionnaires sent to 1199 households (25% return) indicate 38% of households have pet cats, with the highest percentage of indoor/outdoor pet cats in the manufactured home community (MHC) (55% vs. <20% in other land-use types); 3) over half (52.3%) of respondents support sterilization to manage outdoor cats while 25% support removal. We interviewed 19 people that provide care for feral/stray cats on Hayden Island in the MHC. Caregivers care for an average of 7.4 cats. Typically, caregivers “inherit” cats that have been abandoned by former tenants suggesting a high proportion of stray cats. Road-based cat surveys indicate: 1) 12 times as many free-roaming cats detected in the MHC compared to other land-use types; 2) No cats were detected in the natural area; 3) sterilization rate based on ear-tip information was low (25%) contrasting with that reported by cat caregivers (75%); 4) we estimated a detection rate of 49% based on comparison of road-based counts with caregiver information. Preliminary population size estimate indicates 139-234 feral/stray cats in the study area. Next steps include refining our sterilization estimate so we can set TNR targets and formalize cat adoption as we continue monitoring population trend.

Keywords: Conservation biology, Environmental social sciences

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Eradication Nation: Knotweed control in the Salmon Creek Watershed

Clark Public Utilities created the Eradication Nation program in 2011 to help address the growing threat of invasive plant species in the Salmon Creek Watershed. Thanks to grant funding from the National Fish and Wildlife Foundation and the Centennial Clean Water Fund, Eradication Nation supports a growing network of volunteers and partnering landowners that are helping to combat the detrimental effects of invasive plant species in the local waterways. Treatment efforts focus heavily on knotweed species (Japanese, Bohemian and giant) due to their aggressive growth and widespread distribution. Eradication Nation's expanding treatment range includes rural headwaters as well as urban sub-basins. The program has reached a crucial turning point this year by successfully surveying the entire length of Salmon Creek and its system of tributary streams. Since all major knotweed sources have been identified along the creeks, future efforts will focus more on volunteer recruitment and maintenance of previously treated sites. With help from program staff and volunteers over the 2014 and 2015 treatment seasons, Eradication Nation has seen a significant reduction in the presence of knotweed in the Salmon Creek Greenway alone. The efficiency of the program and combination of stem injections and foliar treatment has been successful in decreasing the presence of invasive knotweed. Looking forward, Eradication Nation intends to continue growing its network of partners and volunteers while developing plans to expand control efforts into the East Fork Lewis River basin.

Keywords: Habitat restoration, Land/watershed management

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Rinearson Natural Area: Urban habitat restoration

Rinearson Natural Area is a 34-acre aquatic, riparian, and upland forest habitat restoration site located in Meldrum Bar Park in the City of Gladstone, Oregon. The existing site includes low-quality habitat (a warm, sediment-filled pond, a dam that blocks fish passage into the cold-water Rinearson Creek, and extensive invasive plant species such as reed canary grass and Armenian blackberry). The project has been developed in coordination with the Portland Harbor Natural Resource Trustee Council as part of the Natural Resource Damage Assessment (NRDA) process for Portland Harbor Superfund sites. The project includes modifications to the existing earthen dam to allow fish passage into the restored pond and creek, and creation of associated wetland, riparian, and upland habitat areas. Construction will begin in Spring of 2016. The design process involved multiple stakeholders and criteria, including providing habitat for multiple species, such as federal- and state-listed fish and turtle species (as well as other fish and wildlife species), coordinating with the City over the park setting and park user needs, completing a complex permitting process, and addressing concerns of adjacent homeowners (who own a portion of the site) over issues such as safety, public access, and aesthetics. Studies conducted to inform the design included sediment testing; hydrologic studies; fish, wildlife, and bird surveys; cultural resources surveys; and a survey of park users. This presentation will explain the complex design process undertaken, including incorporating multiple stakeholder goals and concerns and meeting the requirements of permitting agencies and the NRDA process.

Keywords: Fisheries, Habitat restoration, Hydrology

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Enhancing grassland habitat on Government Island

The Port of Portland initiated a 50 acre grassland enhancement project on Government Island in 2012 to mitigate for future impacts to lands at the Portland International Airport (PDX). The primary goal for the project is to create a site that provides the habitat structure and function necessary to support grassland associated wildlife, particularly grassland birds and pollinators. This site presents unique logistical challenges and opportunities due to its island location. The site was highly degraded and dominated by pasture grass and invasive broadleaf species prior to implementation. The Port began preparing the site in 2012 which included herbicide applications and mowing to achieve a site suitable for seeding. Using a combination of drilling and broadcast seeding methods in the fall of 2015 the site was seeded with 7 species of native grasses and 26 species of native forbs including 2000 hand planted native camas bulbs. Since 2010, Port staff have conducted regular bird and vegetation surveys and have partnered with the Xerces Society to conduct pre and post implementation pollinator surveys. Data collected are summarized in annual reports. The project is being approached as a field trial, utilizing principles of adaptive management, to determine the most practical and effective methods for enhancing grassland habitat on Government Island and to determine which habitat targets are achievable and sustainable. Results from this project will inform management strategies for subsequent phases of mitigation on the island.

Keywords: Habitat restoration

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Green roofs in Portland support a wide diversity of springtails

Green roofs can help address habitat loss in urban areas by supporting plant and animal communities. To determine whether green roofs in Portland support springtails (*Arthropoda*; *Hexapoda*; *Collembola*), we collected pitfall samples from April-June 2015 on two Sedum and two herbaceous green roofs in urban Portland, Oregon. Twenty morphospecies of springtails were found on the roofs, indicating that Portland green roofs support a diversity of collembola taxa. The highest number of morphospecies found in a single location was on the unwatered herbaceous roof, but together, the two Sedum roofs contained more morphospecies than the two herbaceous roofs. Springtail species composition differed on each of the four green roofs. Each green roof had a unique most dominant morphospecies, and, indeed, each roof possessed a different composition of top-three abundant collembola taxa. In sum, each of the green roofs contributed to springtail biodiversity, suggesting that cities that provide a diversity of green roof types, with no to low supplemental water, will help maintain species biodiversity.

Keywords: Animal ecology, Land/watershed management, Habitat assessment

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Using rubrics to assess environmental stewardship

Developing personal environmental stewardship is increasingly seen as an important way for nonprofits and public agencies to improve and conserve the environment. However, evaluating the impacts of programs designed to increase personal environmental stewardship has been challenged both by the wide variety of ways that stewardship can be conceptualized and by the need to look at both qualitative and quantitative data. Using rubrics offers a way for a group to develop a clear vision of program performance and incorporate diverse lines of evidence. This presentation walks through the creation and piloting of a rubric to evaluate stewardship in an environmental volunteering program. The presenter will share the process used to define what stewardship meant for the program, the development of key questions, creating the tool, and the pilot process.

Keywords: Environmental education

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Effects of storm size and frequency on N retention, denitrification, and greenhouse gas production in bioretention mesocosms

Over 1,500 bioretention facilities can be found in Portland, OR and Vancouver, WA alone. Little is understood about the ability of these facilities to permanently remove N through denitrification as opposed to temporary immobilization by soil, roots, or microbes. To build upon this knowledge, and examine the potential for both effluent and headspace greenhouse gas production should denitrification not be completed, we utilized six bioretention mesocosms located on the campus of the Washington Stormwater Center. Mesocosms were constructed with standard depth, composition, and vegetation, and sampled to measure denitrification (via N₂ production) and greenhouse gas production from systems experiencing either Portland-area combined sewer overflow (CSO) sized storms (1.2 in./24 hours) or a heavy precipitation event of the size anticipated to increase in frequency due to climate change (2.0 in./24 hours). Average denitrification rates measured over the course of a single 3-hr storm event were 252 $\mu\text{mol m}^{-2} \text{hr}^{-1}$ (S.E. 72, n=8) for a CSO storm and 205 $\mu\text{mol m}^{-2} \text{hr}^{-1}$ (S.E. 138, n=5) for an heavy precipitation event, comparing favorably to rates found in riparian wetlands (<20-260 $\mu\text{mol m}^{-2} \text{hr}^{-1}$). In contrast, N retention efficiencies proved variable (-28% to +33%), with pre-existing conditions likely playing an important factor. Bioretention effluent also proved to be an important source of greenhouse gas emissions over the duration of a 3-hr event, with effluent N₂O mass accounting for up to 89% of total emissions when compared to background headspace production (.89 μg compared to .10 μg).

Keywords: Land/watershed management, Water quality

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Monitoring the health of Portland watersheds

The Portland Area Watershed Monitoring and Assessment Program (PAWMAP) supports the watershed plan and provides much of the data used to compile the Watershed Health Report Card. The first four years of data indicate that high stream temperatures and *E. coli* are the two water quality issues most consistently seen across Portland streams. High temperatures are particularly problematic in the eastside streams. *E. coli* was much higher during storms than during seasonal sampling. Eutrophication in Portland streams is primarily limited to the Columbia Slough. Metals infrequently exceeded the hardness-adjusted water quality criteria. Total copper was the metal which exceeded criteria most frequently, yet even for this metal values above the criterion were uncommon, and all but one of these occurred during storms. All streams had very low levels of large wood, with a few exceptions in parks and restoration sites. The Willamette Streams and Tryon Creek had the highest macroinvertebrate community scores, and one station in Miller Creek met DEQ's "least impacted" benchmark. At-Risk and Special Status birds were present in Portland riparian bird communities. All ten of the most frequently encountered fish species were native, and included two salmonids. The biological results show that Portland streams still provide valuable habitat to regionally important species, but biological metrics indicate that the communities are clearly degraded by conditions in these urban streams. Analytical results identifying some of the most important limiting factors for these biological communities will be briefly described before the quack.

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

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Assessing the role of urban land use factors on NO₂ exposure and mitigation: A case study of the Portland-Vancouver metropolitan region

We develop a random forest model based on observations of NO₂ at 174 sites in summer and 82 sites in winter, to capture the variation of annual nitrogen dioxide (NO₂) concentrations across the Portland-Vancouver Metro area, using land use factors such as vehicle miles traveled (VMT), high intensity development and tree cover as predictors. Using this model, we assess the incidence and economic valuation of the respiratory health problems associated with NO₂ using the health benefits mapping tool, BenMAP, from the US EPA. Next, we undertake a sensitivity analysis, varying VMT and tree canopy by 2%, to determine how small, realistic, changes in land use affect ambient NO₂ concentrations as well as human health. We find that respiratory problems associated with NO₂ exposure have an economic cost of \$85 million 2013 USD annually. Current levels of VMT and high intensity development contribute as much as 3.5ppb and 4.00 ppb to ambient NO₂ concentrations respectively, while trees and developed open spaces are associated with as much as a 1.5ppb reduction in NO₂. A 2% decrease in VMT provides an annual benefit of \$77,000 USD through NO₂ mitigation, and a 2% increase in tree cover provides an annual health benefit of \$10,000. Given the spatial scale of mitigation provided by land cover change (100 -2000m), these mitigation strategies are ideally suited for neighborhood-scale air quality improvements.

Keywords: Air quality, Land use planning, Sustainable development

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Clickable Coyotes: The efficacy of online education for proactive wildlife management

When people are equipped with information about urban coyotes, human-coyote conflicts can be reduced. Unfortunately, there is a lack of widely-used effective educational materials about urban coyotes. Online educational materials are a promising solution because they are relatively easy to produce and distribute, but their efficacy is not well-understood. The Portland Urban Coyote Project (PUCP), a citizen science project, has an online educational tutorial that presents basic information about coyotes. A survey was conducted to explore whether this online educational tutorial had an affect on people's knowledge and attitudes about urban coyotes. People who participated in the study knew more about coyotes and had more positive attitudes about coyotes after completing the tutorial. The results of the survey suggest that online educational materials can be important tools in the proactive management of urban coyote populations. Tutorials like the PUCP tutorial provide people with access to the information they need in an understandable, inexpensive, and effective format.

Keywords: Environmental education, Environmental social sciences

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“Piggyback conservation:” How fish-focused stream restoration transformed a landscape for dragonflies

Sporadic observations during 2009–2013 indicated that Westmoreland Park supported few species of Odonata (dragonflies and damselflies), but odonate diversity and abundance appeared to increase immediately following restoration of Crystal Springs Creek. To quantify changes in odonate populations, alternating surveys of adults and nymphs were done weekly beginning in March 2015 to monitor diversity and abundance, correlate nymph and adult populations, assess movement and development of migratory dragonflies, and provide a baseline for studies in other parts of the Johnson Creek watershed. Sixteen odonate species were observed throughout the season at Westmoreland Park, most of which were not seen in previous years. Adult emergence from overwintering nymphs was first noted in late March (*Ischnura cervula*, *Pacific Forktail*), and this species dominated abundance most of the field season. Three of North America's five migratory dragonfly species were seen mating and laying eggs in the park, with the earliest northbound migrants arriving 2-3 weeks after the first newly-emerged resident damselflies appeared. Damselfly nymphs were found in aquatic samples throughout the season, but dragonfly nymphs did not appear until mid-summer and were comprised mainly of skimmer (*Libellulidae*) nymphs. The most productive habitat was the vegetated wetland on the northwest side of the park, which was heavily used by pond damsels (*Coenagrionidae*), spreadwings (*Lestidae*), and skimmers (*Libellulidae*), including one of the most northerly sightings of Flame Skimmer (*Libellula saturata*) in Oregon. Surveys will continue, but initial results show a clear benefit to an urban biotic community that was not directly targeted in the restoration project.

Keywords: Conservation biology, Habitat restoration, Habitat assessment

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From classroom to airfield: A successful educational-employment partnership in wildlife management

Mt. Hood Community College (Natural Resources Technology Program) and the Port of Portland - PDX (Wildlife Hazard Management Program) have a long standing relationship in which students serve as Wildlife Interns for one to three quarters and are given valuable opportunities to apply skills and knowledge acquired in their professional technical Associates degree program. During the last 20 years this joint program has grown from an intern-only opportunity to a full-time career pathway. The current PDX Wildlife Management team consists of five graduates of the MHCC-NRT program and one MHCC intern. Bordered on three sides by open water, located on a major migratory flyway and at the confluence of two major river systems, PDX is located in a region rich in avian wildlife. As a result, the airport serves as an excellent laboratory for developing and testing innovative approaches to wildlife management. Students and graduates at MHCC benefit from this “laboratory” through hands on training and application of adaptive management principles, data collection, and active management activity as they work to maintain a safe airspace for over 200,000 flight operations a year. We present details of this successful public-private partnership as well as the wildlife management challenges in the 34th busiest airport in the nation.

Keywords: Environmental education, Wildlife biology

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An urban stream can support a healthy population of coastal cutthroat trout

Urbanization presents numerous challenges to aquatic species. For fish, typical threats include altered flow dynamics, poor water quality, and degraded food webs. These threats can be detrimental to fish and whether urban environments can support healthy populations is unclear. Tryon Creek is one of the largest urban watersheds in Oregon. Located in Portland, its headwaters flow through urbanized neighborhoods where developed land accounts for 55.6 % of the total land use. We used demographic, life history, disease, and genetic indices to assess the overall health of the coastal cutthroat trout population in Tryon Creek. Results of these population health indicators were compared to coastal cutthroat trout populations not influenced by urbanization and considered healthy. Preliminary results indicate an estimated abundance of 1.9 ± 0.2 individuals per m^2 with a mean condition factor of 1.26 (range 0.80-2.42). The population tested negative for 10 different pathogens and results were equivocal for *Renibacterium salmoninarum*. The population did not exhibit excessive deviation from Hardy–Weinberg equilibrium. Expected heterozygosity and allelic richness were 0.76 and 6.6, respectively. The FST value between putative generations approximated 0.00. The characteristics of coastal cutthroat trout in Tryon Creek were similar to those found in populations not influenced by urbanization and suggest an urban stream can support a healthy fish population. However, Tryon Creek may be an unusual urban watershed, with some protection from surrounding public land and supported by multiple conservation programs.

Keywords: Animal ecology, Fisheries

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Developing a dynamic multi-species patch occupancy model to study Chicagoland mesocarnivores

Estimating the richness and dynamics of ecological communities in fragmented landscapes is a key step in conserving biodiversity and managing human-wildlife interactions. However, the composition of wildlife at a site is a dynamic process that is influenced by species-specific and community-level factors, making the process of estimating species presence (and thus richness) in habitats difficult. This issue is further confounded because we detect species presence imperfectly. To address these issues we developed a robust statistical modeling framework that can account for imperfect detection to make inferences about community dynamics in a fragmented landscape. Our framework is hierarchical and draws from single-species, multi-season patch occupancy and multivariate autoregressive models. Specific models can be parameterized using existing data to include species interactions, movement or dispersal, covariate effects, the role of humans, and can be used to make projections of possible future dynamics. Here we detail the development of the modeling framework and then apply it to a study of the mesocarnivore guild of Chicagoland. Since 2010, we have been passively sampling the wildlife in Chicagoland greenspaces using camera traps at ca. 100 sites. Housing density strongly influenced colonization rates of mesocarnivores, but was not related to species persistence within a habitat patch. Furthermore, species richness declined with increasing housing density. Finally, community composition in habitat patches was highly dynamic, varying through both space and time. Our results illustrate how camera trap studies can be used to quantify spatiotemporal dynamics in urban mesocarnivores.

Keywords: Animal ecology, Wildlife biology, GIS/modeling

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How I learned to stop worrying and love bare ground

When conducting ecological restoration, practitioners must occupy the ground with native plant material to exclude problematic weeds. This axiom is one of the first principles we teach new colleagues in our field. Perhaps it arose from silvicultural practice of densely planted trees to shade out shrubs that might reduce tree growth via competition. Whatever its origins, “occupy the ground” is standard practice. If we unpack the axiom, there are at least three questions to consider. In our rush to occupy the ground with native cover, are we establishing simple plant communities with lower than necessary ecological value? Do the native plants exclude weedy exotics? Is it a good thing to occupy all of the ground with plant material? Over-reliance on this restoration axiom can lead to plant communities that are dominated by a few native grasses, lack structural diversity and provide habitat to a limited suite of wildlife, while “weeds” continue to move in and thrive. Examples from prairie restoration projects in Western Oregon illustrate these points. Restoration practice would be served well by paying less attention to “occupy the ground” and more attention to habitat objectives such as structural diversity, species richness and needs of native plants and wildlife that are appropriate conservation targets for a site. Practitioners need more information on the relative threats posed by exotic species to habitat establishment and what abundance thresholds should trigger treatment of them.

Keywords: Habitat restoration, Plant ecology, Wildlife biology

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Islands in the Sky: A biodiversity survey of spiders on green roofs in Portland, Oregon

Urban development reduces green space and causes fragmentation of natural habitats, reducing the connectivity of populations of organisms. Green roofs (rooftops with vegetation and shallow soil) may help to augment green space in cities and provide connectivity for plant and animal populations. Spiders are good bioindicators of the health of an ecosystem; if spiders are abundant in green roof communities, they have a food source (typically arthropods) available to them, signaling a thriving ecosystem. We surveyed the spider community on eight green roofs in Portland, Oregon, sampling every two weeks from April through September. We examined whether plant composition on the green roofs influenced spider biodiversity and abundance by comparing herbaceous and Sedum planted roofs. We found that herbaceous roofs had only slightly higher abundance and diversity of spiders, but that both types of roofs harbored different compositions of spider species. Interestingly, the green roof watering regime did not affect spider biodiversity, as the unwatered herbaceous roof had equivalent spider diversity as the watered roof. We suggest that cities incorporate a diversity of green roofs, including those with herbaceous and Sedum plantings, and low to no additional water, to best maintain arthropod biodiversity.

Keywords: Animal ecology, Land/watershed management, Habitat assessment

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River Island: Integrating salmon habitat and stillwater species restoration

River Island Natural Area is located near Barton, Oregon near river mile 14 on the Clackamas River, a tributary to the Willamette River. The Clackamas supplies drinking water to over 400,000 people and supports significant runs of federally listed fish species, including Chinook, coho, steelhead, and Pacific lamprey. In 1996, a major flood event broke through the levee at River Island, cutting off a meander bend and occupying an active gravel mine. The cutoff reduced stream length by 3,600 feet, eroded 138,000 cubic yards of gravel, and triggered a variety of sediment-transport impacts throughout the reach. Metro acquired a majority of the site in 1999 and now owns 234 acres at River Island. Restoration at the site was considered by Metro and project partners in 1997 and again in 2002. However, the then-recent significant disturbance to an already dynamic site, and restoration funding sources tied to specific performance criteria made restoration at that time unfeasible. Today, River Island has transformed into a complex blend of disconnected floodplain, open water, riverine system, wetlands, oak savanna, riparian forests and upland forests. This blend of habitats supports diverse wildlife populations including ODFW (Sensitive-Critical) listed Western painted turtles and ESA-listed Chinook salmon, steelhead trout, and coho. While enhancement and restoration of habitats for each of these species are part of Metro's goals for the site, optimal habitats for salmonids and turtles are often mutually exclusive. Consequently, the purpose of this project's planning and design were required to find a balance between enhancing existing high quality habitats for stillwater species, while restoring habitats for riverine species, primarily anadromous salmonids.

Keywords: Fisheries, Habitat restoration, Hydrology

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Toward neighborhood-scale climate adaptation: Stakeholders, strategies and decision support

Landuse and environmental planning organizations throughout the United States have spent the past two decades mounting efforts to mitigate and adapt to the imminent consequences of a warming planet. While climate change poses an immediate threat to human health and wellbeing, cities may foster the opportunities necessary for improving our adaptive capacity to a changing climate. However, planners face substantial challenges in developing strategies for localized resilience across the city without clear models for understanding how climate vulnerability befalls the urban landscape. This study describes a collaborative planning process we developed to construct models that enable stakeholders to identify local stressors and create a collective understanding of how vulnerability occurs in urban spaces. The process combines stakeholder engagement, collaborative planning and the use of web-based geospatial tools to visualize and share locally specific data and vulnerabilities. We used this process to model two urban environmental stressors: mobile-source air pollution and urban heat. We integrated said models with sociodemographics to identify neighborhoods most vulnerable to these environmental stressors. While our results suggest variation in climate vulnerability across the metropolitan area, we recognize that not all stressors are equally important. As a result, we showcase an interactive online mapping platform, allowing diverse stakeholders to define and evaluate factors of vulnerability relevant to their communities of interest. We conducted this modeling effort as a means for co-producing social-ecological knowledge useful for efforts to build a more climate-resilient future in Portland, particularly for communities most vulnerable to the imminent threats of climate change.

Keywords: Air quality, Environmental social sciences, GIS/modeling

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Seed deposition in urban riparian forests: Quantifying the potential for passive restoration

In urban riparian restoration projects trees and shrubs are typically planted, while understory herbaceous plants are left to colonize on their own. However, there is little evidence that desired species recover on their own, and dispersal limitation may constrain the potential for this approach. While streams are known to connect otherwise isolated plant populations, the altered hydrology and channel morphology of urban streams may make them less effective dispersal vectors. The purpose of this study is to quantify the abilities of different vegetation types to disperse seed to forested riparian areas across a gradient of watershed urbanization. It is hypothesized that as urbanization increases, large seeds, those from herbaceous plants, and those with no special structure to aid in dispersal will become more limited. Ten riparian forests along second- and third-order streams have been selected in the Portland metro area along a gradient of watershed urbanization. Seed traps were installed in the sites and will be used to sample seeds through summer 2016. Two types of seed traps allow for analysis of seed deposition both by wind and by the stream. Preliminary results suggest that in winter months the total number of seeds deposited by streams decreases as watershed urbanization increases. Results of this study may indicate where passive restoration can be a viable option and where enhanced efforts will be needed.

Keywords: Habitat restoration, Plant ecology

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10-Year trends in Gresham's riparian vegetation

The Gresham Natural Resources Program's 10-year cycle of annual biodiversity surveys is designed to inventory resources and document trends on the City's 1,000 + acres of natural areas. The second survey of riparian vegetation, first conducted in 2005, was completed this fall and the data were compared to data from 10 years ago. The survey allowed us to map the distribution of vegetation types, ecological impacts, and ecological assets in our natural areas and to see trends in canopy cover increase, invasive species distribution, vegetation type changes, and ecological health improvement.

Keywords: Habitat restoration, Plant ecology, Habitat assessment

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Many beautiful paths - Improving urban water and habitats

The Urban Waters & Wildlife Program has been successfully engaging businesses for five years to install voluntary stormwater retrofits and other water quality and habitat improvement measures on private commercial and industrial sites. This methodology includes multiple paths: a) Pesticide Stewardship Program to monitor water quality for pesticides in an urban and agricultural area, implement BMPs, and monitor for change, b) A stormwater retrofit program to engage local businesses in landscape transformation to beautiful Trout Friendly Landscapes, incorporating LID techniques such as raingardens and green roofs decades ahead of any code or requirement, c) A Latino outreach program to bring environmental health messages directly to yard care businesses in Spanish, d) A new outreach program to increase the certification of large urban parcels as Salmon Friendly in the S. Willamette Valley, e) A new outreach program to create and support Employee Stewardship Groups to take care of creeks, raingardens and pollinator gardens. This is all done with a unique cross-section of partners including Long Tom Watershed Council, SureCrop Farm Service, Cities of Eugene and Springfield, local utilities, private business owners, DEQ and ODA, farmers, Latino NGOs and educational institutions, Salmon Safe, and a diversity of funding sources including Meyer Memorial Trust, private businesses, OWEB, DEQ, City of Eugene and Springfield, local utilities, and EPA. The program continues to seek ways to expand and be more inclusive, collaborative and efficient with fellow watershed councils, NGOs, and others.

Keywords: Environmental education, Sustainable development, Water quality

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Practical uses of the iNaturalist website and dataset

The iNaturalist website is proving to be an engaging and useful tool for naturalists and resource managers to document biodiversity in the greater Metro area. The Intertwine chose it as the platform for their Eco-Blitz series; invasive species data are collected through the Oregon iMapInvasives and Clackamas County Weed Reports projects; and rare species sightings contribute to the Oregon Biodiversity Information Center's Biotics database. Nationwide, iNaturalist is being used in projects such as National Geographic's Great Nature Project, Rare Plants of Texas, and the Vermont Atlas of Life. Although the initial reaction of many to data sourced by citizen science is skepticism, iNaturalist's community of amateur and professional naturalists has proven to be effective in documenting and confirming species observations. Incidental observations from iNaturalist users have already contributed valuable sightings such as reports of an A-listed noxious weed at a school in Oregon City and a state-endangered plant on Cooper Mountain. Under the Creative Commons license that applies to the majority of iNaturalist observations, sightings can be downloaded and used by scientists in their own work. This talk will focus on current and potential scientific uses of iNaturalist data in the Metro area and the tools available to quickly start a project to search for and solicit observations for your species of interest. As a fun platform to engage new naturalists and a source of species observations when most programs have limited time or funds for surveys, iNaturalist can be of use to many of us.

Keywords: Conservation biology, Environmental education, Land/watershed management

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Camas lily and the Native American community

Over the last 3-4 years, Metro and the Native American Community have come together at sites like Metro's Quamash Prairie to share a friendship and learn from each other. One of the goals at the Prairie is to allow the Native Community to renew traditional and plant harvests at the site. Until recently, this has taken the form of gathering native seeds and bulbs for restorative replanting, and cattail and other plant material for weaving and other traditional uses. In November, Metro and the Community took a step toward harvesting camas lily bulbs for roasting and eating by strategically collecting bulbs from the Prairie and sending them to a local food laboratory to test for the presence of herbicide residuals that might affect food safety. Results will be presented in the poster.

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

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Thinking of juvenile salmon when restoring and managing a 300-acre wetland

Metro has advanced restoration through three major phases at its Multnomah Channel Marsh, a 300-acre wetland protected by the 1995 Open Spaces Bond Measure in the late 1990's. Early restoration phases, focusing on re-establishing seasonal flooding and functional stream connections within the site, successfully converted large portions of the wetland from monocultures of reed canarygrass, thistle and blackberry to native habitats dominated by native trees, shrubs and emergent herbs, created greatly improved wildlife habitat that was evident in major expansions in native pond-breeding amphibian populations, and functionally connected two large wetland basins within the site. The third restoration phase, described here, sought to enhance connectivity between the wetlands at the site and the adjacent Multnomah Channel to improve accessibility of the wetlands to juvenile salmon. The restoration involved the replacement of a set of culverts between the wetland basins with a bridge, and the construction of two riparian dike breaches to create new connections to the Multnomah Channel. Project effectiveness was evaluated via a new partnership between Metro, NOAA and ODFW to use PIT-tagging and other methods to track juvenile salmon populations at the site. That partnership is entering its 3rd year. Details of the restoration at the site and results from the first two years of juvenile salmon monitoring will be presented.

Keywords: Fisheries, Habitat restoration, Hydrology

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