Urban Ecology & Conservation




13TH Annual Symposium

February 9, 2015

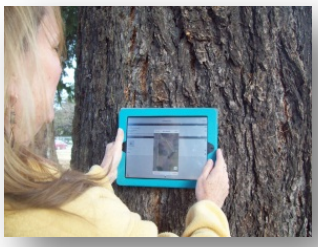



Photo credits for 2015 UERC Symposium cover page

Mapping trees for OakQuest. (USFWS)

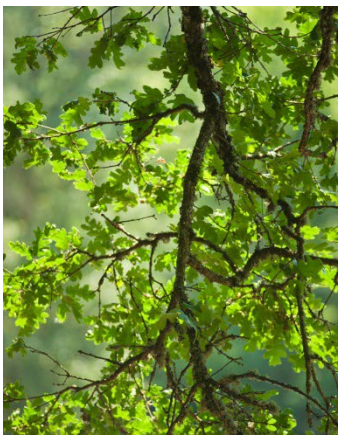
Beaver (Wikipedia)

Mussels (USFWS)

Nootka rose (USFWS)

Student at Will Creek Greenway (Bruce Barbarasch)

Fox (USFWS)



Background image: Detail of white oak tree (Fred Joe Photo)

Mushrooms (Bruce Barbarasch)

Mapping white oak trees (Fred Joe Photo)

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Nancy Pollot, USFWS

13TH ANNUAL

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Organized by the
Urban Ecosystem Research Consortium (UERC)

Held at
Smith Memorial Center Ballroom
Portland State University
Portland, Oregon, USA
February 9, 2015

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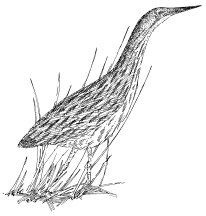

Urban Ecosystem Research Consortium (UERC)
Portland, OR - Vancouver, WA Metropolitan Region

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

air quality	*environmental design*	*land management*	*sustainable development*
conservation biology	*fisheries*	*land use planning*	*transportation*
ecology	*geology*	*social sciences*	*water quality*
economics	*habitat restoration*	*soil science*	*wildlife biology*
education	*hydrology*	*stormwater management*	

Mission Statement
To advance the state of the science of urban ecosystems and improve our understanding of them, with a focus on the Portland/Vancouver metropolitan region, by fostering communication and collaboration among researchers, managers and 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.

2015 URBAN ECOLOGY & CONSERVATION SYMPOSIUM PLANNING COMMITTEE

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We also wish to thank Marjorie Brown, City of Portland Environmental Services, Maura Gingerich, PSU, ESR Office Coordinator, Ally Gregg-Zellars, 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

2015 URBAN ECOLOGY & CONSERVATION SYMPOSIUM
AGENDA

8:00 **REGISTRATION**

9:00 **WELCOME AND INTRODUCTION: Dr. Alan Yeakley**, Director, School of the Environment, with remarks from **Dr. Jon Fink**, Vice President for Research and Strategic Partnerships, Portland State University

9:10 **OPENING KEYNOTE ADDRESS: Dr. Marina Alberti**

Department of Urban Design and Planning, University of Washington

Eco-Evolutionary Dynamics on an Urban Planet

OUR REGION: INFORMATION, TOOLS AND RESOURCES *Moderator: Olyssa Starry*

9:50	Scott Burns	Portland State University - Geology	The effects of local dynamic geology on all phases of ecology in the Portland area
10:00	Jason King	Herrera	Ecological inspirations: The hidden hydrology of Portland
10:10	Brandy Saffell	Oregon State University Extension Service	Oregon Forest Pest Detector: Combating the threat of invasive tree killers
10:20	Lindsey Wise	Institute for Natural Resources, Portland State University	Using iMapInvasives to track invasive species in the Metro area
10:30	Q&A		

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

FISH, WILDLIFE AND HABITAT *Moderator: Joe Liebezeit*

11:00	Karen Dyson	University of Washington	Bird-window collisions across North America: Results and next steps from Seattle in the context of a national study
11:10	Robin Jenkinson	Johnson Creek Watershed Council	Collaborating to open migration access for salmon in Johnson Creek
11:20	Paulette Bierzychudek	Lewis & Clark College	Changes in the plant community of River View Natural Area following removal of invasive plants
11:30	Sean Bistoff	City of Portland Environmental Services	Mason Flats wetland enhancement project: Flexible design for beaver modification
11:40	Susan Barnes	Oregon Department of Fish and Wildlife	Best Management Practices for conserving Oregon's native turtles
11:50	Q&A		

12:00 **LUNCH** *Raffle at 12:55*

You are invited to participate in lunchtime discussions about various topics. See lunchtime discussions program information page in the proceedings.

1:00 AFTERNOON KEYNOTE ADDRESS: Scott Hoffman Black

Executive Director, Xerces Society for Invertebrate Conservation

Bringing Back the Pollinators: A Rousing, Science–Based, Evangelistic Call for People to Take Better Care of Pollinators

THE POWER OF ENGAGED CITIZENS *Moderator: David Cohen*

1:40	Savahna Jackson	Native American Youth and Family Center	OakQuest: Collaborative mapping and stewardship of Oregon white oak
1:50	Adam Zucker	ESA Vigil-Agrimis	SE Sandy Green Street: A citizen's effort to transform an underutilized section of roadway
2:00	Jane Hartline	Sauvie Island Habitat Partnership	Saving a vanishing species – How local citizens worked together to help red-legged frogs
2:10	Bruce Barbarasch	Tualatin Hills Park & Recreation District	Natural resources planning for habitat management and community engagement
2:20	Q&A		

2:30 BREAK *Raffle at 2:45*

URBAN FORESTS *Moderator: Cory Samia*

2:50	Jennifer Karps	City of Portland Environmental Services	Environmental justice in the urban forest: does Portland plant trees equitably?
3:00	Marion Dresner	Portland State University	Patterns of disturbance in Forest Park leads to different forest succession characteristics
3:10	Jill Van Winkle	Portland State University	How informal trails affect understory plant communities in Forest Park
3:20	Toby Query	City of Portland Environmental Services	Restoring the understory: Researching, testing, developing and outplanting plant material for the new frontier
3:30	Steven Sobieszczyk	U.S. Geological Survey	Organic matters: Investigating the sources, transport, and fate of organic matter in Fanno Creek, Oregon
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
Ana Barajas* and John Patterson, South Salem High School Animal Behavior class	Is squirrel stimulation evoked more by visual motion (of throwing food) or by the sight of food?
Corrina Chase*, Tryon Creek Watershed Council; Mary Logalbo, West Multnomah Soil and Water Conservation District	Urban Restoration Mentor Program
Nicole Czarnomski*, ESA Vigil-Agrimis; Nicole Maness, Willamette Partnership; Tracie-Lynn Nadeau, U.S. Environmental Protection Agency, Region 10; Dana Hicks, Oregon Department of State Lands; Robert Coulombe, CSS-Dynamac Inc.; Peter Skidmore, Skidmore Restoration Consulting	Functions-based stream assessment and classification in Oregon
Michelle Delepine*, West Multnomah Soil & Water Conservation District; see abstract for list of co-authors	Pacific Northwest Garlic Mustard Working Group - Highlights from recent collaborations
C. Tracey Dulin, Clean Water Services	Derry Dell stream restoration project
William Gerth* and Alan Herlihy, Oregon State University, Department of Fisheries & Wildlife	Narrow-range endemic aquatic invertebrates in urban areas: A conservation challenge
Jake Gorski* and Rod Struck, GSI Water Solutions; Mary Stephens, City of Portland Bureau of Environmental Services; Carol McCarthy, Wild Rose Consulting	Consolidating mismatched data sets: Creating the foundation for decision making
Peter Guillozet* and Kate Holleran, Metro	Expanding Early Seral Habitat: Why? Where? How?
Rose High Bear, Wisdom of the Elders, Inc.	Discovering Yidong Xinag: Wisdom's summer field science camps
Noah Jenkins*, Robin Jenkinson and Danielle Miles, Johnson Creek Watershed Council; Brittany Sahatjian, PSU; Jill Bonnano, Tualatin SWCD; Julie DiLeone, East Multnomah SWCD; Torrey Lindbo, City of Gresham; Roy Iwai, Multnomah County; Frank Wildensee, City of Portland	Johnson Creek Riparian Reforestation Strategy implementation
Jennifer Karps*, City of Portland Environmental Services; Erica Timm, Susie Peterson and Jesse Batty, Friends of Trees	To live and die in PDX: Tracking young urban tree mortality in Portland, Oregon
Joe Liebezeit* and Candace Larson, Audubon Society of Portland	Great blue heron rookery status in the Portland Metro Region: 2009-2014

AUTHOR(S)	TITLE
Stephanie Magee* and Spencer Martin, South Salem High School	Does the transparency of a bird feeder affect how much food is taken by wildlife?
Kaley McLachlan*, Columbia Springs; Karen Litfin, Ph.D., University of Washington	Why should I care? Increasing environmental engagement through science and morality
Jennifer Morace, U.S. Geological Survey	Assessing the effects of land-use and streamflow stressors on urban ecosystems in the Willamette Valley and Puget Sound Lowlands
Jennifer Morse*, Portland State University; Deonie Allen, Herriot-Watt University; Robert Terrell, Cranfield University; Scott Arthur, Herriot-Watt University; Jenny Mant, Cranfield University; Alan Yeakley, Portland State University; Colin Thorne, University of Nottingham	The influence of stormwater pipes and green infrastructure on sediment biogeochemistry in a rural-to-urban river network
Meenakshi Rao* and Linda A. George, Portland State University	Using the oxides of nitrogen to determine patterns of primary and secondary air pollution exposure in Portland, OR
Zuriel Rasmussen, Geography Department, Portland State University	The Portland Urban Coyote Project: Using citizen science to understand human-coyote interactions
Erin Scheibe, Lewis & Clark College	Temperature impacts of top-flow dams on urban tributary streams of the Tualatin River
Aaron Shaw*, Bethany Lund and Ellen Palmquist, Clark Public Utilities	Eradication Nation: Knotweed control in the Salmon Creek Watershed
Ashley Smithers*, Portland State University; Laura Guderyahn, City of Gresham, Oregon; Joe Maser, Portland State University	Management Plan and Population Analysis of Western Painted Turtles (*Chrysemys picta bellii*) at Fairview Creek Headwaters
Dolores Weisbaum*, Jodie Delavan and Paul Henson, U.S. Fish and Wildlife Service	Strategic habitat conservation management in Oregon's Willamette Valley
Lea Wilson*, City of Portland Environmental Services; Tree Program Outreach Team: Amber Ayers, Adam Brunelle, Mathew Dorfman, Jennifer Karps, Patrick Keenan, Matt Krueger, Darin Lund, City of Portland Environmental Services	Who wants a free tree? Exploring motivations, opportunities, and barriers to tree planting with single family residences in Portland, OR

**Primary author*

MORNING KEYNOTE ADDRESS

Dr. Marina Alberti
Department of Urban Design and Planning
University of Washington
Seattle, WA

Eco-Evolutionary Dynamics on an Urban Planet

A great challenge for Urban Ecology in the coming decades is to understand the role cities play in eco-evolutionary dynamics. Can the emergence and rapid development of cities across the globe change the course of Earth's evolution? Can urbanization patterns determine the probability of crossing thresholds that will trigger regime shifts on a planetary scale? If, as we are learning from observations, rapid evolutionary change affects ecosystem functioning and stability, current rapid environmental change driven by urbanization may have significant implications for ecosystems and human wellbeing. Urbanization is not simply altering biodiversity by reducing the number and variety of native species. Humans are determining which species can live in cities and urbanizing regions causing organisms to undergo rapid evolutionary change. Novel interactions in urban ecosystems might trigger unprecedented dynamics and unpredictable change with significant implications for ecosystem function and dynamics. At the same time, novelty in urban ecosystems is a key component of reorganization and renewal. Dr. Alberti advances the hypothesis that cities are hybrid ecosystems and that it is their hybrid nature that makes them unstable and unpredictable but also capable to innovate. Understanding the mechanisms by which cities mediate evolutionary feedback will provide new insights for maintaining ecosystem function in an urbanizing planet.

Biography

Marina Alberti is Professor of Urban and Environmental Planning in the Department of Urban Design and Planning at the University of Washington, where she directs the Interdisciplinary Ph.D. Program in Urban Design and Planning and the Urban Ecology Research Laboratory. Alberti's scholarship aims to understand the complex interactions between human and natural processes in urban and urbanizing ecosystems and the mechanisms that control their resilience and innovation. She also leads research on simulation modeling and strategic foresight to assess the potential impacts of climate change. Alberti is the author of Advances in Urban Ecology (Springer 2008), which synthesizes the state of knowledge on the complex interactions between of urbanization patterns and ecological functions and articulates the challenges for scholars of urban ecosystems. In her forthcoming book (2015) Cities as Hybrid Ecosystems, Alberti advances the hypothesis that cities are hybrid ecosystems that play a significant role in the Earth's eco-evolutionary dynamic.

AFTERNOON KEYNOTE ADDRESS

Scott Hoffman Black
Executive Director
Xerces Society for Invertebrate Conservation
Portland, OR

Bringing Back the Pollinators: A Rousing, Science–Based, Evangelistic Call for People to Take Better Care of Pollinators

Despite the recognized importance of pollinators and the services they provide, there is a growing body of evidence that suggests they may be at risk. Causes of pollinator declines include loss of habitat, widespread use of pesticides, climate change, and disease and parasites.

There are major pollinator conservation efforts at the local and national level. In June, President Obama released a memo to the heads of federal agencies titled "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators." The first product from the presidential memo is a report from the White House Council on Environmental Quality that provides guidance on how federal agencies can incorporate pollinator friendly practices in landscaping improvements. At the local level, cities like Eugene, Spokane, and Seattle have banned the use of highly toxic neonicotinoids on city lands.

From yards and parks to ecoroofs and bioswales, pollinator habitat can be integrated into urban and suburban conservation. Scott Hoffman Black will discuss the importance of insect pollinators, describe what groups of insects provide pollination services, and outline successful strategies to provide habitat for pollinators. He will also discuss how each and every one of us can play an important role in pollinator conservation.

Biography

Scott Hoffman Black is the Executive Director of the Xerces Society for Invertebrate Conservation. Scott has authored over 200 scientific and popular publications, co-authored three books and contributed chapters to many others and his work has been featured in newspapers, magazines, books and on radio and television. He is co-chair of the Monarch Joint Venture, and was appointed as an ex officio member of the High Level Federal Monarch Working Group. He also serves as the chair of the Migratory Dragonfly Partnership, and is vice-chair of the International Union for Conservation of Nature (IUCN) Invertebrate Conservation Subcommittee and chair of the IUCN Butterfly Specialist Group. He has received several awards including the 2011 Colorado State University College of Agricultural Sciences Honor Alumnus Award, and the National Forest Service Wings Across Americas 2012 Butterfly Conservation Award.

ABSTRACTS SUBMITTED

Ana Barajas[1] and John Patterson[2]

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[2]South Salem High School Animal Behavior class

Is Squirrel Stimulation Evoked More by Visual Motion (of throwing food) or by the Sight of Food?

Instinct and memory are both mental aspects that result in physiological responses; though the difference between the two is derived from nature versus nurture. To explore this phenomenon, an experiment was conducted to determine whether Eastern Gray Squirrels, who are slightly domestic in the sense of having been fed by humans so consistently as not to retreat when approached, are more attracted to the sight of food or simply by the sight of a human making "tossing" motions.

Keywords: Animal ecology

Bruce Barbarasch

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Natural Resources Planning for Habitat Management and Community Engagement

In 2014, the Tualatin Hills Park & Recreation District created a Natural Resources Functional Plan. The purpose of the plan is to provide a vision and set of tools to help staff prioritize and measure the success of their work in stewardship and community engagement in the district’s 1,400 acres of natural areas. A series of decision making guides, flow charts, and milestones provide guidance. This plan is unusual in that it combines social factors such as community interest and trail development with natural resource management. Staff will present highlights of the plan and offer a model replicable at other land management agencies.

Keywords: Environmental education, Habitat restoration, Land/watershed management

Susan Barnes[1], Carrie Butler[2], Jane Hartline[3], Laura Guderyahn[4], Elizabeth Ruther[5], Elaine Stewart[6]

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[3]Sauvie Island Habitat Partnership
[4]Oregon Department of Fish and Wildlife
[5]City of Gresham
[6]Metro

Best Management Practices for Conserving Oregon's Native Turtles

Populations of western pond turtles and western painted turtles have dwindled throughout their ranges, especially in the Willamette Valley. Many turtle populations have been wiped out by development in and around their aquatic habitats and nesting sites, but turtles can also be impacted by seemingly harmless activities like development of trails, clearing of invasive plants, and stream enhancement projects. The Oregon Native Turtle Working Group has just completed an extensive document with recommended best management practices to avoid and minimize harmful impacts to turtles and their habitats, plus how to create and maintain suitable habitat for turtles. This talk will cover some highlights of the BMPs and give you information on where to download your own copy of this important document.

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

Paulette Bierzychudek

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Changes in the Plant Community of River View Natural Area following Removal of Invasive Plants

Despite ongoing efforts to remove invasive plant species from degraded natural areas, little is known about how plant communities will respond to invasive removal. River View Natural Area (RVNA) comprises 146 acres of urban forest, purchased by Portland Parks & Recreation in 2011. At the time of its purchase, RVNA was heavily-invaded by ivy, clematis, holly and laurel. Cover of these species was reduced in fall 2011 by felling, air gapping, and ground application of glyphosate. This provided an opportunity to investigate how the forest plant community would respond to invasive removal. In the summers of 2012, 2013, and 2014, we compared the abundance and diversity of native and non-native plant species in this treated ("removal") forest with that in adjacent untreated ("control") areas. Invasive species abundance continues to decrease in the removal areas while remaining stable in control areas. There is strong evidence that some elements of the plant community of RVNA are recovering. Native herb abundance and richness are higher in the removal areas than in control areas, and have been increasing in removal areas over time since 2012. However, not surprisingly, the frequency of seedlings of non-native plant species is higher in removal areas, where bare ground is more common, than in control areas. Curiously, native shrub species are significantly less diverse and less abundant in removal areas than in control areas. This result could be due either to pre-existing differences between treated and control areas, or to unintended herbicide effects. At the end of summer 2014, some of the former control areas were also treated, creating the potential in future years to distinguish between these two possibilities. We plan to continue monitoring these areas for further changes.

Keywords: Habitat restoration, Plant ecology

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[2]City of Portland Bureau of Environmental Services

Mason Flats Wetland Enhancement Project: Flexible Design for Beaver Modification

The project site is a 27-acre marsh and scrub-shrub wetland which discharges to the Columbia Slough in an industrial area in Northeast Portland. The project goals are to improve Columbia Slough water quality through stormwater treatment and temperature reduction, improve habitat for native species, increase floodplain function and floodwater storage, increase native vegetation and protect and enhance wetland habitat. The site consisted of a drained and abandoned agricultural field of reed canary grass adjacent to a partially functioning wetland mitigation site. The project directs water back onto the drained field, but protects the mitigation site from degradation. Two sets of weirs and a network of engineered swales and vegetated channels were constructed to divert spring flow and treated stormwater onto the field. During design, several existing beaver dams were observed in the project area. Rather than designing a system that would be at odds with beaver activity, a flexible design was developed to allow modification and enhancement by beaver. Our data show that beaver activity has increased since project completion, and has improved the overall project effectiveness. For example, beaver dams have remedied two construction errors that were potentially going to require further work, and a complex of new dams has increased the overall wetted area and detention time on the site. Since the site is inherently difficult to access with equipment, it has been successfully designed to be flexible and to allow continued beaver modification without intensive maintenance.

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

Melissa Brown

City of Portland Bureau of Environmental Services; Phone: (503) 867-6260; Email: melissa.brown@portlandoregon.gov

Fish Passage Restoration and Results in Crystal Springs Creek

Portland's Bureau of Environmental Services staff have been chipping away at their goal to remove fish passage barriers from salmon-bearing streams. Between 2010 and 2013, seven culverts on the mainstem of Crystal Springs Creek in the Johnson Creek watershed were removed or replaced. Water quality improvements, stormwater attenuation, and stream restoration elements were designed into the culvert project suite so that native fish and wildlife could migrate throughout the watershed and improve their populations. For the first time in decades, adult salmon returned to Crystal Springs. Their use of newly rebuilt habitat in one of the project areas last fall is documented in a short video.

Keywords: Fisheries, Habitat restoration, Land/watershed management

Scott Burns

Portland State University - Geology; Phone: (503) 725-3389; Email: burnss@pdx.edu

The Effects of Local Dynamic Geology on all Phases of Ecology in the Portland Area

Portland, Oregon has a rich diversity in ecological habitats because of the rich diversity of geological events in the past. The great resulting geological differences in bedrock, soils, sediments and streams are a result of five major episodes of geological events. The origin of the "bedrock of the area", the Columbia River basalts, mostly occurred between 14-16 million years ago from flows from eastern Oregon. Compression of the region caused by the offshore pressures from the Juan de Fuca plate have led to the development of a series of anticlines and synclines in the area. The bedrock was warped into the Tualatin Mountains, and the Portland Basin developed between them and the Cascades. The large basin then filled with over 400 meters thick of stream sediments from the area's major rivers forming the Troutdale Formation. In the past two million years younger volcanoes developed in the region, the Boring Lavas, that produced over 30 small vents in the region. The Missoula Floods created most of the landforms of the region through erosion and deposition from the 40 different floods from 15,000 – 18,000 years ago. Eastern winds have continued to blow silt into the hills of the area creating loess soils. Coarse grained soils and fine grained soils owe their differences to the Missoula Floods. Wetlands are mostly in depressions created by the Missoula Floods. Stream floodplains and riparian communities have been created by the Missoula Floods from the past. Fragipans in soils have created perched wetlands and perched aquifers in the region. Well-drained and poorly drained sites owe their ecology to mainly Missoula Floods from the past. The great ecological diversity in Portland owes it complexity to the underlying geology and the incredible geological history of the Portland area.

Keywords: Geology, Plant ecology, Soil science

Holly V. Campbell

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Integrating Land-Sea Policy Options through an Ecosystem-Services Framework

Natural systems are resilient until the magnitude of anthropogenic disturbance becomes greater than the system's self-regulating capacity. In general, when systems encounter significant, persistent human disturbance they reorganize into a different structure that may, or may not, produce the ecosystem services of the former undisturbed system. Disturbed systems often exhibit less complexity, such as a simpler food web and reduced habitat structure and biodiversity. These impacts are illustrated across familiar settings including deforestation, rapidly urbanizing areas with increased impervious surfaces, overfished areas of the coastal ocean, and fresh water or coastal areas of eutrophication, hypoxia, or anoxia. This investigation is part of a larger project that includes studying the state of knowledge of conditions of inland watersheds along the Pacific (British Columbia, Washington, Oregon, California)—many of which are urban/suburban or agricultural—and the runoff (stormwater, but also sewage from overflows) that contribute to coastal water quality degradation. The questions regarding the influences of inland water pollution on the coastal zone are so critical that the United Nations convened an international group of experts (United Nations Environmental Program (UNEP) Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (known as the GPA). The goal of the GPA is to develop an iterative, adaptable set of principles, practices and policies that may be adopted by individual nations to clean up coastal water quality. The governance factors (federal, state, and local laws, standards, and enforcement) affecting runoff are, of course, important to reducing coastal pollution, as is understanding the science of contaminants—their sources, pathways and effects (including synergistically). However, land use patterns and the ingrained practices of individuals and industries are also paramount—law and science alone are not enough. Contemporary integrated coastal zone management (ICZM) recognizes that comprehensive planning that holistically takes water quality and conservation into account across the land-sea interface is far more effective in achieving multiple goals than traditional terrestrial or marine planning in isolation. There is abundant literature (theoretical and research-based) on polluted runoff from land-based activities, and its effects. Despite the wealth of ideas for solutions presented in the literature, a gap exists in potential policy solutions between the state of the literature and the state of practice (as well as communication or collaboration) among land-use planners, landowners, water quality managers and coastal management agencies. This project will provide a synthesis of practices and policies to improve water quality spanning the coastal zone.

Keywords: Environmental policy, Land/watershed management, Sustainable development

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Urban Restoration Mentor Program

The Tryon Creek Watershed Council and West Multnomah Soil and Water Conservation District partner to train volunteers in basic site assessment and restoration planning, resulting in ready-to-go site plans and building volunteers' job skills. Tryon Creek is a small urban watershed with many landowners with similar riparian restoration potential. Only one staff person working with 80 or more landowners involved in grants per year is daunting and a primary limiting factor TCWC. This program increases the attention to individual sites by assigning skilled volunteers as point people. They take their site through the planning process during the series of classes and work with habitat restoration professionals to ensure quality of the final product. After finishing the program, volunteers often continue to help with the site, leading work parties or monitoring plantings. This program can be expanded to other watersheds and improved to leverage equity through its ability to boost hireability.

Keywords: Environmental education, Habitat restoration

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Functions-Based Stream Assessment and Classification in Oregon

To meet the goals of the U.S. federal Clean Water Act and Oregon's Removal-Fill Law, unavoidable impacts to jurisdictional waters, including streams and rivers, must be compensated for through compensatory mitigation. Both federal and state mitigation rules require functional replacement of impacts, and there is broad agreement that form-based restoration alone provides questionable gains toward ecological goals. While many rapid stream assessment methods exist that could be used to evaluate replacement of impacts, few attempt to evaluate function (processes that create and support a stream ecosystem). We will present new function-based assessment and classification tools developed by project partners to provide an integrative, systematic approach for stream assessment and mitigation in Oregon. The function-based stream assessment methodology (Method) is built to describe hydrologic, geomorphic, biologic, and water quality functions by evaluating a number of measurable attributes. The Method calculates an ecologic function score that describes the relative presence or absence of each function, and a separate ecological value score that describes opportunity and significance of each function at a site in terms of management and watershed priorities. Field testing in dry and wet seasons across a broad diversity of hydrologic landscape settings and stream types showed that the Method is strongest for wadeable, alluvial, 2nd to 3rd order streams with distinct floodplains. Additional efforts are underway to strengthen the Method for seasonal streams and large rivers. Sensitivity analyses provide support for inclusion of a number of measures to represent the diversity in stream functions. A statewide stream classification system was developed to describe both watershed and stream reach scale hydrologic and geologic characteristics. The classification system is hierarchical, expandable, and dualistic – meeting several a priori criteria established to assure statewide applicability. From this statewide classification system, we identified seventeen stream classes to inform application of the Method. We will describe how the Method and stream classification system will be used together to assess site/reach scale impacts of proposed and permitted actions to stream function. They provide the scientific underpinnings for a Stream Mitigation Framework in Oregon that includes policy and guidance for site selection, assessment of impacts and restoration actions, development of function-based objectives and performance standards, and defining a watershed approach for compensatory mitigation decision-making.

Keywords: Environmental policy, Habitat restoration, Land/watershed management

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Pacific Northwest Garlic Mustard Working Group - Highlights from Recent Collaborations

Invasive plant managers and field staff working on control of garlic mustard (*Alliaria petiolata*) in Oregon, Washington and Alaska recently convened to share observations, identify challenges, discuss treatment strategies and refine methodologies. Through collective sharing of observed treatment successes and deficiencies, potential improvements to control methodologies were revealed. A composite, regional view of the current work being undertaken to combat garlic mustard was also compiled. Developing a platform for future collaboration promotes timely sharing of key information and supports a region-wide effort to contain and decrease garlic mustard presence in the Pacific Northwest. Overall, the consensus was that control programs appear to be curtailing spread of A. petiolata from established management zones. Relatively few new invasions have been discovered outside active management areas. While some do not report decline in population density, more have seen declines in density following 2-3 years of treatment. Content presented reflects discussion from a day-long working group gathering, and email and phone correspondence.

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

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Patterns of Disturbance in Forest Park Leads to Different Forest Succession Characteristics

Our PSU research team has studied 6 permanent forest plots, all mixed conifer-deciduous and each 1-hectare in size, for the past 4 years. We seek to understand differences in plant species composition and abundances between the urban (Balch watershed) and rural (Miller watershed) ends of Forest Park. Two plots in the urban end were paired with two plots in the rural end having similar age classes of trees. The urban end of Forest Park has been subjected to periodic disturbances; logging and woodcutting (1850-1940), wildfire fire (1889), a legacy of soil erosion, and continues to be subjected to low-impact disturbance from a variety of sources, including invasive species (ivy increased 14% over 3 years), and trampling. Our data shows severe soil disturbance in two urban forest plots when compared with both an old growth urban plot and matched rural end plots. Significant differences in tree species composition, sapling numbers, and coarse woody debris occur between the two ends of the park. These differences translate into different successional trajectories for the mature urban plots as compared with a nearby old growth urban plot, and as compared with mature rural plots. When projected 100 years into the future, we predict a pattern of dominance of early successional species in the urban mature plots. These results are concurrent with similar findings for other urban forests, where early successional species dominate over long periods of time instead of the 'traditional" sequence of secondary successional species replacing early successional species. Whether this means forest succession will be delayed or if we can expect novel future forest conditions is unknown. An experiment in forest composition restoration will also be reported.

Keywords: Conservation biology, Plant ecology, Soil science

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Derry Dell Stream Restoration Project

Clean Water Services and the City of Tigard partnered on a long-awaited project to upgrade critical infrastructure, restore Derry Dell Creek, and complete a trail that connects neighborhoods parks and green spaces. This joint project restored the confluence of Derry Dell and Fanno Creeks, upgraded the sanitary sewer and water lines, installed a fish-friendly culvert, and extended the Pathfinder/Genesis Trail. A degraded section of Derry Dell Creek was realigned in the floodplain to increase flood storage and planted with forested and emergent wetland species to establish a healthy urban stream corridor. Native cutthroat trout, brook lamprey, coho and winter steelhead will have an easier time making their way upstream after three barriers were removed, finally giving them access to previously enhanced habitat. A new boardwalk extends the Pathfinder trail to Woodard City Park along with stream corridor enhancements that connect the park to Metro owned natural areas.

Keywords: Habitat restoration, Land/watershed management, Sustainable development

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Bird-window Collisions across North America: Results and Next Steps from Seattle in the Context of a National Study

One challenge facing birds living in urban areas is mortality from bird-window collisions. However, we know relatively little about the factors influencing these collisions. Recently, a team of researchers at the University of Washington participated in a national study of bird-window strike mortality. Along with 41 other collaborators from across the United States and Canada, we gathered data to test the hypothesis that the magnitude of bird-window collisions in urban areas reflects landscape structure and functional connectivity (Hager and Cosentino, project PIs). During the study period, we observed very low levels of bird-window strike mortality, in stark contrast to the relatively high mortality observed in the Midwest and Southeast. In this presentation, we will discuss our results, and place them in context using both national data from this study and the results of other regional studies. We will also explore the possible reasons for and implications of our results and share some lessons learned for other potential collaborators.

Keywords: Animal ecology, Conservation biology, Sustainable development

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Narrow-range Endemic Aquatic Invertebrates in Urban Areas: A Conservation Challenge

Narrow-range endemic species are those which only occur in small areas. These species are generally at greater risk of extinction than more widespread species, and their risks are likely even higher in modified urban stream habitats. Due to lack of species-level data in many biomonitoring surveys, it is hard to know how common narrow-range endemic aquatic invertebrate species are in urban or urbanizing watersheds. Here we discuss information about a probable narrow-range endemic freshwater amphipod, *Ramellogammarus similimanus*, in the Portland, Oregon metro area. *Ramellogammarus similimanus* was described from specimens collected in 1958 from a single spring in Portland. Since then, there has been no further published information on this species. In 2008, we confirmed that this species had not gone extinct by finding specimens in a spring near the original collection location. Subsequently, through targeted collections and re-examination of archived biomonitoring samples, we have found additional *R. similimanus* populations in several Portland metro springs and streams. For conservation planning, further work is required to determine the distribution limits of this species and its sensitivity to habitat modification in the urban environment.

Keywords: Conservation biology

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Consolidating Mismatched Data Sets: Creating the Foundation for Decision Making

The Columbia Slough in Portland, Oregon has been subject to environmental monitoring for decades. In that time data has been collected by various regulatory agencies and private parties during multiple studies and stored in separate tables, spreadsheets and databases. Because sampling data was not stored in a normalized manner, or in a single location, analyzing the distribution of pollutants and pollutant trends using all available data was not possible. In order to create a foundation for risk-based decision making, and assessing pollutant trends over time, a single relational database was designed and built for the City of Portland Bureau of Environmental Services by GSI Water Solutions, Inc. The poster illustrates the benefit of storing data in a relational model, how environmental data should be structured so that queries can easily be written using SQL, and covers typical issues encountered when building an environmental database such as calculation of analyte totals and methods for data normalization.

Keywords: Land/watershed management, Sustainable development, Water quality

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Oregon Forest Pest Detector: Combating the Threat of Invasive Tree Killers

Oregon's forests are under threat from invasive wood borers such as emerald ash borer (EAB) and Asian longhorned beetle (ALB), which are not yet established in the Northwest, but together are responsible for killing millions of trees and causing billions of dollars in losses in the U.S. These insects are most likely to be detected first in urban or interface areas because the pathways for their movement (untreated shipping material and firewood) are linked to human behavior. At particular risk are Oregon's urban forests, where maple and ash (two primary host trees) are significant components of the tree canopy; and riparian corridors, where the native Oregon ash is a primary species. The Oregon Forest Pest Detector program is being launched in 2015 in response to this threat by training arborists, natural resource professionals and volunteers who work regularly with trees to be on the lookout for signs and symptoms of ALB and EAB. Oregon Forest Pest Detectors will take a training consisting of some short online modules, a field workshop and a reference guide. They will use their skills in the course of their everyday work and assist state and federal agencies in evaluating suspected infestations. Having these skilled and trained individuals in the field will greatly increase the chances of successful early detection and rapid response to EAB or ALB. This program is modeled after successful First Detector programs in other states, where experience shows that most initial detections of EAB and ALB were made by professionals or members of the public, not via trapping and monitoring. This program is a joint effort between Oregon State University Extension Service, Oregon Department of Forestry, Oregon Department of Agriculture, and USDA-APHIS.

Keywords: Land/watershed management

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Expanding Early Seral Habitat: Why? Where? How?

With over 16,000 acres of Natural Areas under management, Metro's restoration and stewardship of forested habitats affects a broad array of species. Increased understanding of the importance of early-seral habitat (ESH) for diverse animal and plant species and a growing recognition of the significant declines in ESH in comparison to historical conditions points to the need for greater attention to how contemporary management practices affect ESH distribution, extent and quality. This poster highlights historical trends in forest management and ESH-dependent species populations and describes the role of ESH in supporting migratory songbirds and other species. We also suggest ways Metro and other land managers might work to expand ESH extent and quality. Potential approaches include reducing conifer cover in overstocked stands to promote understory shrub development; increasing standing and downed dead wood through snagging, felling and other wood placement; altering reforestation strategies by shifting away from tree/conifer-dominated plantings and towards shrub-dominated plantings; and establishing shrub-only buffers (especially thicket forming species) along forest edges, roads, trails, and power line corridors. We also highlight practices to reduce bird-disturbing maintenance activities.

Keywords: Conservation biology, Habitat restoration, Wildlife biology

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Saving a Vanishing Species – How Local Citizens Worked Together to Help Red-Legged Frogs

In January of 2013, local citizens discovered the largest known mass migration of Northern Red-legged Frogs in the Portland area. From Forest Park, the frogs were observed having to cross U.S. Highway 30, two residential roads and two sets of railroad tracks to get to the Harborton Wetlands, north of Linnton and adjacent to the Willamette River, to reach their breeding habitat. In past years, this resulted in massive carnage. Early this year, an intrepid group of volunteers, under the supervision of biologists from the Oregon Department of Fish and Wildlife and the City of Portland, set up a "shuttle service" to help more than 650 frogs successfully make the journey to the wetlands and back. Later in in the season, over 350 egg masses were observed. This presentation will cover logistics of the project including how the shuttle operation was set up, the data collected and other observations about the frogs behavior during the breeding season that will assist others involved in conserving amphibian habitats.

Keywords: Animal ecology, Conservation biology, Wildlife biology

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Discovering Yidong Xinag: Wisdom's Summer Field Science Camps

Wisdom of the Elders, Inc. provided Summer Field Science Camps in 2013 and 2014 to engage Native American youth in STEM educational and career fields. Our culturally-tailored multimedia curriculum integrates Western environmental and climate science lesson plans with Traditional Ecological Knowledge and cultural arts (music, dance, storytelling, and traditional arts). Our learning model was developed over the past decade and is compatible with Native learning styles to strengthen Native student success and resiliency factors including cultural identity. We are providing training, mentorships and work experience to inspire Native students and adult workers to become environmental conservationists and follow the footsteps of tomorrow's retiring boomers (i.e. field biologists, ecologists, wildlife biologists, park managers, etc.).

Keywords: Environmental education, Environmental social sciences, Sustainable development

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Johnson Creek Riparian Reforestation Strategy Implementation

In 2012, the Johnson Creek Watershed Council (JCWC) collaborated with the Inter-jurisdictional Committee for Johnson Creek (IJC) to develop a Riparian Reforestation Strategy, intended to prioritize the necessary streamside revegetation work needed to address exceedence of the Total Maximum Daily Load (TMDL) for temperature in Johnson Creek (as set forth in Oregon Department of Environmental Quality's Lower Willamette Sub-basin TMDL). Implementation of the Strategy is now underway, with 17 landowners enrolled in JCWC's CreekCare program since the Strategy was drafted. Meanwhile, JCWC and the IJC have worked together to gather and analyze six years of summer temperature data (2009-2014) in Johnson Creek and its tributaries, providing baseline information on stream temperatures in the watershed to enable future assessment of the effectiveness of our reforestation efforts.

Keywords: Habitat restoration, Land/watershed management

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Collaborating to Open Migration Access for Salmon in Johnson Creek

Johnson Creek is one of few Portland streams with active runs of threatened coho, steelhead, and Chinook. The creek is a 26-mile-long corridor for birds and wildlife that is fed by 52 square miles of tributaries and hill-slopes. In Johnson Creek, extensive temperature monitoring shows that tributaries often offer cooler water temperatures for rearing salmonids in the summertime, and in the winter, these tributaries offer refuge for young, rearing salmonids from high flows. Moreover, better water quality and more forested, undisturbed habitat are found in many tributaries. To restore native trout and salmon runs, we must fix culverts and other stream crossings that often block salmon migration access to valuable tributary stream habitat. For the past two years, the Johnson Creek Watershed Council (JCWC) has mapped, assessed, and prioritized culverts for fish passage restoration. JCWC partnered with Saturday Academy, Portland Community College, and Portland State University students to map, collect, and analyze data. With funding from East Multnomah SWCD, the cities of Portland and Gresham, and the PGE Salmon Fund, and technical assistance from ODFW, the Johnson Creek IJC*, and Kingfisher Ecological Services, JCWC surveyed 273 potential fish passage barriers throughout the watershed. Of these 273 stream crossings, 165 were publicly-owned and 108 were located on private properties. Using the well-vetted WDFW Fish Passage protocol, we found 202 or 74% of them to be fish passage barriers (73 privately- and 129 publicly-owned). To prioritize passage barriers for removal at the watershed-scale, JCWC applied the innovative APASS (Anadromous Fish Passage Optimization Tool) model to synthesize aquatic habitat and passage information. Now, with our partners, we're moving towards restoration of several top-ranked barriers on important, perennial tributaries with habitat suitable for salmon and trout.
* The IJC consists of technical representatives from the cities of Portland, Gresham, and Damascus, Clackamas and Multnomah Counties, Metro, East Multnomah SWCD, the USGS, and ODEQ.

Keywords: Fisheries, Habitat restoration, Land/watershed management

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Environmental Justice in the Urban Forest: Does Portland Plant Trees Equitably?

In recent years the city of Portland has increased efforts to achieve equitable service provisioning, access, and opportunity for all residents (e.g., the equity framework of the Portland Plan and the creation of the Office of Equity and Human Rights). The legacy of land use and development in the city, and related unevenness in urban forest canopy cover and greenness, contribute to differences in the ecosystem services provided by Portland's natural resources. These differences contribute to and have concomitant implications for, human health, livability, and environmental justice. The Environmental Services Tree Program (Tree Program) works to maximize the ability of the urban forest to foster healthy watersheds, clean rivers, and the livable, sustainable communities these support. A recent paper by two USFS research economists (Donovan and Mills, Journal of Arboriculture, 2014) cautions that the Tree Program may exacerbate environmental justice issues by planting relatively fewer trees in underserved communities. This presentation addresses Donovan and Mills' concerns with six years of outreach canvassing and tree planting data.

Keywords: Environmental education, Land/watershed management, Sustainable development

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To Live and Die in PDX: Tracking Young Urban Tree Mortality in Portland, Oregon

Urban tree growth and longevity are poorly understood. Few studies have attempted to determine how urban trees grow and when they die (e.g., Foster and Blaine, 1978; Roman and Scatena 2011). As cities embark on tree-planting efforts to provide environmental and social benefits for residents, questions of return on investment drive the need to better understand the life cycle of urban trees. In 2008, Portland Environmental Services began planting trees in the built environment as part of larger investments in green infrastructure. Six planting seasons and 37,000 trees later, questions of how many trees will survive to maturity, when they will reach maximum canopy potential, and how long they will live remain outstanding. Monitoring data collected after the first and second growing seasons suggest a mortality rate of 3%/year during the establishment phase. Now, data from five years following planting give us a preliminary sense of how young trees fare post-establishment in Portland.

Keywords: Land/watershed management

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Ecological Inspirations: The Hidden Hydrology of Portland

This presentation will focus on current work related to Hidden Hydrology of Portland, a project of mapping, on-site exploration, and proposed interventions focused on establishing and enhancing connections to urban nature and ecology. Using 1850s-era Cadastral survey mapping of Portland, and a range of other source material, the project explores historical hydrological and ecological systems in the context of ‘disappeared streams’. These streams, creeks and other water bodies were originally present throughout the urban realm but have since been piped, filled, and removed through urbanization over the past century and a half. A process of mapping these pre-development hydrological systems, using historical maps and archival photography, allows transposition of hydrology onto the current urban spatial context. Explorations of these sites provide additional context, with visual documentation providing a collections of latent hydrological cues, topographic traces, and ecological remnants that remain. These processes provide the inspiration for interventions through site scale interventions, ecological planning, site-scale art, environmental storytelling, tours, and self-guided interactive explorations. The goal of the project is to use the juxtaposition between the historical hydrological systems and the modern urban realm to highlight, inform, and connect residents with urban nature – past, present, and future.

Keywords: Environmental education, Hydrology, Land use planning

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OakQuest: Collaborative Mapping and Stewardship of Oregon White Oak

Biodiverse and imperiled, native white oak ecosystems represent a top conservation priority in Oregon. Responding to a lack of basic inventory data, the Intertwine Alliance Oak Mapping Work Group (OMWG) formed in 2011 to coordinate a regional partnership of over 20 public agencies, park districts, and non-profit organizations. Initial efforts have focused on developing a regional, cross-jurisdictional oak distribution map combining remote sensing and citizen science approaches. During summer 2014, we conducted a citizen science effort to map and document Oregon white oak across the region. 'OakQuest' engaged over 80 citizen scientists who logged over 1,030 hours to collect field observations of Oregon white oak across 641 square miles, spanning urban and fringing rural areas of the Portland metropolitan region. Citizen scientists learned about oak-prairie conservation and historic tribal uses during June 2014 trainings. Two college-age Native American youth were employed to coordinate the field effort and provide career training opportunities for a traditionally under-served population. During summer fieldwork volunteers recorded oak tree or stand locations, took photos, and made notes using a custom smartphone application. To complement these data OMWG professionals conducted field surveys in October 2014 to gather non-oak tree observations to help refine the remote sensing model. During the combined effort we collected a total of 13,583 Oregon white oak observations, 3,977 of other tree species, and 4,162 photos. Based on aerial photo review of field observations, we pinpointed several thousand additional Oregon white oak trees. The data are being used to refine the remote sensing model predicting regional oak distribution. During winter 2014-15, we will refine the remote sensing model, conduct an accuracy assessment, and determine whether and where additional model development and citizen science observations are needed. The resulting oak map and data will be freely available to all interested parties.

Keywords: Conservation biology, Environmental education, Plant ecology

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Great Blue Heron Rookery Status in the Portland Metro Region: 2009-14

Great Blue Herons are an iconic bird species and the official bird of Portland. This species can be sensitive to disturbance at nesting rookeries and to contaminants in the environment. Over the past six years the Audubon Society of Portland organized a citizen science effort to monitor heron rookeries in order to track trends in rookery use and provide an opportunity for volunteer participation. From 2009-14, we monitored up to 39 heron rookeries in the Portland Metro area. During each monitoring visit observers counted the total number of nests, occupied nests, and adult birds present in each rookery. Approximately 40 volunteers contributed to this project, logging 573 hours. The average number of total nests per rookery/rookery complex was 30.1 ± 25.0 SD while the average number of active nests per rookery/rookery complex was 18.9 ± 17.5 SD. An average of 60% of the available nests were active (had eggs/chicks) each year. We documented a low rookery abandonment rate (~13%) and the average number of active nests and adults did not change significantly over the timeline of this project. Our findings suggest that the Great Blue Heron population in the Portland Metro area is currently stable, which is supported by local Christmas Bird Count data. We warn that the trend analysis is based only on a subset of five of the rookeries and so may not accurately reflect the trend for the entire local population. Because our findings suggest a stable heron population we do not plan to continue heron monitoring in the near future. We have good baseline data and could re-initiate monitoring if there is concern about negative impacts to the local heron population.

Keywords: Wildlife biology

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Does the Transparency of a Bird Feeder Affect How Much Food is Taken by Wildlife?

The motivation for our research was to determine how a bird's sight affects its foraging habits. We believe our findings could improve the production of bird feeders as well as improve future studies that involve bird eating habits. We went about gathering our data by hanging up two separate bird feeders; one clear and one opaque. We then used a camera to capture footage of which feeders were visited. By reviewing the footage, we found that the clear feeder was visited an average of 2.5 times more than the opaque feeder. We believe this outcome suggests that wild birds are most likely to be seen foraging in areas where there is food in plain sight as opposed to areas where food is hidden.

Keywords: Wildlife biology

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Why Should I Care? Increasing Environmental Engagement Through Science and Morality

Environmental issues are more talked about than ever in the public sphere, but often lack the levels of public engagement necessary to meaningfully combat environmental degradation. Much of the public conversation about environmentalism is motivated by scientific findings that portend negative consequences of failing to act now on environmental issues. Yet despite scientific consensus on the need for environmental stewardship, many still are unmotivated to act. Studies have shown that better public understanding of science can increase active engagement with environmental issues, but other methods must also be utilized. With the assistance of Karen Litfin, Ph.D. of the University of Washington, I used survey and interview data collected at Columbia Springs' public stewardship events as a case study to compare to my analysis of academic literature about environmental communication. Protecting and restoring the environment in our communities is necessary to protect our health and quality of life, but requires the public's active support and participation. The data from the case study and literature review supports the notion that we can increase our communities' engagement with environmental issues by effectively communicating scientific reasons for action and also by framing arguments for stewardship within social values from a diverse set of worldviews.

Keywords: Environmental education, Environmental social sciences

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Assessing the Effects of Land-use and Streamflow Stressors on Urban Ecosystems in the Willamette Valley and Puget Sound Lowlands

In spring 2015, the U.S. Geological Survey National Water-Quality Assessment Program (NAWQA) will assess stream quality in the Pacific Northwest, from the Willamette Valley north to the Puget Sound lowlands. The Pacific Northwest Stream Quality Assessment (PNSQA) region is undergoing rapid urban growth in greater Seattle/Tacoma, Portland, and other smaller metropolitan areas such as Everett, Bellingham, Olympia, Vancouver, and Salem. Agriculture and coniferous forest also are major land uses, with the most intensive agricultural practices in the Willamette Valley and parts of northern Puget Lowlands in the Nooksack and Skagit Valleys and Deltas. Many streams' headwaters lie in forested uplands, flowing into urban and agricultural settings in the valleys. Streams in the PNSQA region are critical ecological resources for salmon reproduction, including several threatened and endangered species. Of particular concern are the habitat, food supply, and stressor impacts for juvenile salmonids in the Puget Lowlands, Willamette Valley, and other areas with intensive land development, and for other species such as bull trout, Pacific lamprey, and green sturgeon. PNSQA's goal is to assess the quality of streams in the PNSQA region, with highest priority on the effects of urban stormwater runoff and secondary priority on agricultural runoff. The primary objective of the PNSQA is to determine the relative influence of nutrients, contaminants, sediment, and streamflow during spring runoff conditions on aquatic biota as the summer begins. Roughly 70 sites will be sampled across the region for 10 weeks from April-mid June for contaminants, nutrients, and sediment. This water-quality "index" period will culminate with an ecological survey of habitat, algae, benthic invertebrates, and fish at all sites. Sediment will be collected for analysis of sediment chemistry and toxicity testing. The sites are still being finalized, but they will be distributed so as to capture changes in water quality in response to changes in the principle stressors. Findings will provide communities and policymakers with information on which human and environmental factors are the most critical in controlling stream quality and, thus, provide insights about possible approaches to protect or improve stream quality. The impetus for presenting the plans for this study at UERC is to inform interested parties about the project and offer an opportunity for interested parties to inform us about potential chances for collaboration or joint research.

Keywords: Fisheries, Land/watershed management, Water quality

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The Influence of Stormwater Pipes and Green Infrastructure on Sediment Biogeochemistry in a Rural-to-Urban River Network

Stormwater pipes are frequently point sources of contaminants in urban catchments. Recent advances in stormwater management that fall under the umbrella of "green infrastructure" attempt to promote infiltration and pollutant removal by routing stormwater through vegetated structures or through restored riparian zones. In Johnson Creek and its tributaries in Portland, OR, that encompasses rural and urban subcatchments, river restoration and green infrastructure have been widely implemented to reduce flooding and improve water quality. In this river network, we sought to 1) identify hot spots of metal contaminants from stormwater inputs; 2) characterize relationships between metal concentrations and sediment microbial activity; 3) and characterize spatial patterns in sediment biogeochemistry as a function of catchment land use, management approach, and spatial configuration. We identified 40 stormwater pipes that discharged into 18 stream reaches of Johnson Creek and its tributaries. We collected surface sediment samples next to, upstream, and downstream of each pipe. Sediments were sieved through a 2 mm sieve, subsampled for analysis of denitrification potential and substrate-induced respiration, and air-dried for particle size distribution, phosphorus and metals (Al, Cu, Pb, Zn) by ICP-MS. Results are analyzed using regression analysis, PCA, and geospatial techniques. We present our results for sediment microbial activity (respiration) and denitrification potential as a function of metal concentrations. This allows us to identify hotspots of contamination in the river network and show the effect of green infrastructure and river restoration on sediment biogeochemistry in this urban river.

Keywords: Hydrology, Land/watershed management, Water quality

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Integrated Planning – A Systems Perspective

Clean Water Services has been implementing a variety of innovative strategies to meet NPDES and TMDL permit requirements for more than 10 years. The most notable is the strategy to meet its thermal load TMDL allocation by planting riparian shade and augmenting flows. These two strategies combined offset the Districts thermal load allocation entirely in 2013. However, as more stringent environmental regulatory requirements are put in place and on-going urbanization continues to put additional pressure on the Districts' ability to provide its core services cost-effectively over the long-term, CWS finds itself in the position of needing to think more broadly about how to achieve its long-term goals and objectives in a cost-effective integrated way. Many of the outcomes of habitat enhancement including riparian shading activities have been described as "ancillary benefits". These benefits such as the: collection, storage, and discharge of water as runoff as well as water-quality treatment and habitat for flora and fauna are key watershed functions that are often altered, degraded, or entirely eliminated by human activities on the landscape. CWS has implemented several habitat enhancement projects in urban and rural areas that are providing many of these essential watershed functions and are contributing to the District's ability to cost-effectively meet its long-term goals and objectives for regulatory compliance and watershed health. Why not take credit for them?

Keywords: Environmental policy, Habitat restoration, Water quality

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Restoring the Understory: Researching, Testing, Developing and Outlplanting Plant Material for the New Frontier

Restoration projects that involve controlling understory weeds or thinning trees call for ecologists to develop understory restoration plans. The Bureau of Environmental Services' Watershed Revegetation Program (Reveg), Metro's Native Plant Center and partners have been working to collect, test, and outplant various understory native species. Seed, plug, and root fragment trials have been set up by Metro to gauge success of various species, propagule performance, and propagation protocols. Seed mixes, seeding rates, and mollusk predation plots have been set up by Reveg. Twenty-two species have been collected and tested by Reveg, of which 8 have potential for large scale seed growout and outplanting. Metro has collected and tested 30 species of which 15 are currently in development for larger scale production. We will detail our findings after 3 years of testing and developing understory plant material. Challenges include growing and collecting sufficient quantities of seed, seeding sites before viability is diminished, finding private nurseries to amplify seed, developing techniques to disperse odd-shaped or sticky seed, matching appropriate plant materials to the site's needs, and creating a sustainable plant material source for future projects in the region.

Keywords: Habitat restoration, Plant ecology

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Using the Oxides of Nitrogen to Determine Patterns of Primary and Secondary Air Pollution Exposure in Portland, Oregon

Human activity in urban areas such as driving, construction, waste incineration, etc., leads to emissions of primary pollutants into the atmosphere. These primary pollutants can react with other chemicals in the air over a period of seconds to days to create secondary air pollutants. Both primary and secondary air pollutants can be harmful to human health. Although the spatial distribution of primary pollutants can be readily determined through proxies such as roads and population density, the pattern of secondary air pollution is harder to determine. We use measurements of NO_2 and NO at 144 sites in the Portland Metro area in the summer of 2013 to determine the patterns of primary and secondary air pollutant dispersion in the city. NO is a primary air pollutant and a strong marker for anthropogenic combustion-related air pollution. The ratio of NO_2/NO is an indicator of the oxidative potential of the local atmosphere, and hence a strong indicator for secondary air pollutant formation. Using the measured values of NO and NO_2/NO, we develop land-use regression models for primary and secondary air pollution in Portland. We then combine this information with population distribution at the census block group level to determine exposure patterns. We use hotspot analysis to identify "hot" and "cold" spots of exposure in the city.

Keywords: Air quality

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The Portland Urban Coyote Project: Using Citizen Science to Understand Human-Coyote Interactions

The Portland Urban Coyote Project (PUCP) is a citizen science project developed by researchers at Portland State University in partnership with the Audubon Society of Portland. Since 2010, the PUCP has been collecting citizen-reported coyote sighting locations across the Portland metropolitan area. The PUCP website (urbancoyoteproject.weebly.com) has long been a platform for basic information about urban coyotes, a sighting report form, and a map of sighting locations. Presently, researchers are conducting a more in-depth exploration of the nature of human-coyote interactions with a survey about perceptions, attitudes, and knowledge of urban coyotes. Moving forward, the PUCP will examine the relationship between online citizen science projects and education. Additionally, PUCP researchers will explore the accuracy of citizen science data. The history of the project, the sightings map, preliminary findings of the human-coyote interaction surveys, and future directions will be discussed.

Keywords: Animal ecology, Environmental education, Environmental social sciences

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Ecologically Sustainable Landscapes Initiative

The Ecologically Sustainable Landscapes Initiative focuses on the ecology of landscapes - the relationship between living organisms and their environment, and the functions and process they provide. PP&R is continuing to use and develop best management practices to increase ecological function in developed parks through the introduction of habitat patches. Examples of habitat patches include pollinator gardens, adding understory plantings, and tall grass meadows. PP&R developed an opportunity matrix to select passive open spaces that are underutilized or difficult to maintain as having the highest capacity for rehabilitation.

Keywords: Habitat restoration, Land/watershed management, Sustainable development

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Temperature Impacts of Top-flow Dams on Urban Tributary Streams of the Tualatin River

Small top-flow dams often provide a source of thermal loading in streams because water is spread over a larger surface area and the flow increases solar exposure. The warmer upper layer of water is spilled over these dams, increasing downstream temperatures. This project measured the temperature impact of small top-flow dams on urban tributaries of the Tualatin River, primarily upstream and downstream of the Summerlake Park impoundment. Temperature readings were also collected at two separate beaver dams along Summer Creek to determine their potential cooling effect. HOBO data loggers that record temperature every 15 minutes were deployed between May and October at nine sites along Summer Creek. Conductivity and dissolved oxygen readings were also collected every two weeks at the site directly upstream and downstream of Summerlake Park. Stream temperature impacts microfauna and fish habitats in aquatic ecosystems, yet mitigation for these temperature loads has not been a priority in permits and management plans in the Tualatin River Basin. The hope is that this study will elevate the visibility of the problem.

Keywords: Hydrology, Land/watershed management, Water quality

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Eradication Nation: Knotweed Control in the Salmon Creek Watershed

Clark Public Utilities created the Eradication Nation in 2011 in response to the growing threat of invasive knotweed species in the Salmon Creek Watershed. The main goal of the program is to increase public awareness of invasive plant species through community education and participation in control efforts. Japanese knotweed (*Fallopia japonica*) and related species, including bohemian and giant knotweed, have been the main focus of the program due to their widespread distribution throughout the watershed and detrimental ecological characteristics. Knotweed out-competes desirable native species and negatively impacts healthy riparian function, creating poor habitat for fish and wildlife. Eradication Nation received initial funding in 2011 from the National Fish and Wildlife Foundation (NFWF) to control knotweed in the lower third of the Salmon Creek Watershed. An additional grant from the Centennial Clean Water Fund increased the program's range to include the headwaters of Salmon Creek. The efforts of program staff and volunteers over the 2013 and 2014 treatment seasons resulted in a 50% net area reduction of invasive knotweed in the Rock Creek sub-basin alone, suggesting that a combination of stem injections and foliar treatment has been successful. The area covered and stems treated by Eradication Nation would not be possible without the commitment of volunteers and landowners. Since 2011, 174 volunteers have logged over 1,500 hours, and 123 landowners have given permission to treat knotweed on their property. Maintaining these relationships will be crucial as Eradication Nation continues to expand control efforts in the Salmon Creek Watershed. In 2014, NFWF provided funding to target highly urbanized sub-basins in Salmon Creek, as well as funding for re-vegetation in areas where knotweed is believed to be eliminated. Future plans for Eradication Nation include treating new and existing knotweed infestations, expanding a growing network of volunteers and landowners, and increasing public education through classroom presentations, workshops and attending community events.

Keywords: Environmental education, Habitat restoration, Plant ecology

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Management Plan and Population Analysis of Western Painted Turtles (*Chrysemys picta bellii*) at Fairview Creek Headwaters

Fairview Creek Headwaters in Gresham Oregon holds the eastern most urban population of Western Painted Turtles (*Chrysemys picta bellii*) in the Willamette valley. Understanding threats and current status of the urban population of turtles is of great interest to the City of Gresham. Data was collected from 2007-2014 on the population including: weight, gender, size, recapture, age, and nesting location. A habitat assessment was done looking for available nesting and basking habitat available at the site. Data collected and analysed in this project will be incorporated into a management plan for the turtle population and the site.

Keywords: Animal ecology, Conservation biology, Wildlife biology

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Organic Matters: Investigating the Sources, Transport, and Fate of Organic Matter in Fanno Creek, Oregon

Organic matter is abundant in Fanno Creek, Oregon, and is linked to a variety of water-quality concerns, including periods of low dissolved oxygen downstream in the Tualatin River. This study was designed to investigate the sources, transport, and fate of organic matter found in the Fanno Creek watershed and its effect on water-quality in the area. The study focused on three elements, including: 1) quantifying the annual terrestrial contribution of organic matter; 2) characterizing the role of fine sediment erosion and deposition in relation to organic matter transport; and 3) monitoring instream organic matter and carbon transport. Through these three components, researchers were able to assess the amount, type, and distribution of organic matter above, on, and in Fanno Creek. By quantifying the organic matter along the creek this research provides a reach-scale assessment that land managers can use for planning future restoration efforts. Results from this study indicate that most organic matter comes from terrestrial sources, such as leaf litter falling along the creek. An estimated 991 (±22%) metric tons (tonnes, t) of leafy, or foliar, biomass is produced annually above the floodplain, with about 136 t (±24%) of that foliage falling directly into Fanno Creek. The amount of leaf litter varies along the creek depending on the density of tree cover, with forest-dominant reaches that contain more mature deciduous trees with broader tree canopies supplying more organic matter than either wetland or urban-dominant reaches. Based on an analysis of the carbon content of samples collected from the streambanks, along with measured rates of erosion and deposition, the streambanks supply between 50 and 120 t of organic matter, per year (at least during the 3-year study period). Generally, the organic matter that is stored in topsoils along the floodplain is 2 to 5 times richer in carbon than that sampled directly from the subsoil of the streambanks. Comparatively, the streambanks supply less organic matter to Fanno Creek than that from the foliage above. Each year, roughly 320 t of organic carbon floats or flows through Fanno Creek, with around 70 percent of it being dissolved in the water. The concentration of the dissolved organic carbon varies throughout the year, but generally amounts to at least 3 to 4 milligrams (mg) per liter during most of the year. Laboratory analyses confirm that the carbon in the stream originates predominantly from terrestrial organic matter, such as from leaf litter or other surface-soil runoff, rather than from wastewater or other instream (algal) organic matter sources.

Keywords: Habitat restoration, Hydrology, Water quality

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How Informal Trails Affect Understory Plant Communities in Forest Park

The risk of spread and establishment of invasive species to interior habitat within urban parks is of great concern to park managers and ecologists. Informal trails as a vector for this transmission are not well understood. To characterize effects of informal trails on understory plant communities, I conducted a study of the informal trail network in Forest Park, Portland, Oregon. The system of 382 informal trails was mapped and evaluated qualitatively, and from this population a systematic sample was selected for analysis. To identify hotspots of informal trail activity, showing the relationship of informal trails to formal trails, other park features, and trail use level, I evaluated all mapped trails using line density spatial analysis tools. To characterize understory communities, thirty transects were placed along informal trails, with paired transects along nearby formal trails for comparison. I measured percent cover by species for non-graminoid understory plants, and percent total plant cover at different structural layers, for quadrats at regular intervals from the trail edge. I calculated richness and Shannon-Weaver diversity for non-graminoid understory plants. For community analysis, species were grouped by dispersal strategy, native status, and growth form. Observations from system mapping suggest that “hidden” behaviors drive many informal trails: bathroom stops, party spots, waste dumping, and camps make up 28% of all informal trails. Trails to private property are few but represent over 29% of total trail length. Informal trail density is highest along Balch Creek. Hotspots of informal trail presence are associated with trailheads, trail intersections, and water access. Quadrats located within one meter of informal trails showed higher richness and diversity due to increased number of introduced and ruderal species. Formal trails exhibit these same patterns to a stronger degree and over a greater distance (two meters) from the trail edge. Distance from trail edge explained variation in plant communities when grouped by dispersal type, but not by growth form. This study shows that although informal trails are widely distributed throughout the park, they are concentrated in high-use areas. The presence of informal trails leads to significant changes in Forest Park plant communities that favor invasive and ruderal species, but these effects appear limited to two meters from the trail edge.

Keywords: Land/watershed management, Plant ecology

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Strategic Habitat Conservation Management in Oregon's Willamette Valley

The U.S. Fish and Wildlife Service (Service) is using strategic habitat conservation management to conserve important landscapes in Oregon’s Willamette Valley. Our approach emphasizes the use of surrogate species to monitor, evaluate, and motivate landscape conservation. We divided the Valley into five key habitat types and identified ten surrogate species for these respective habitats. The selection of habitats and surrogate species was conducted by a core team of representatives from the Service, Oregon Department of Fish and Wildlife, and some of the key conservation partners in the Valley. The team took a practical, inclusive, and consensus approach to surrogate species selection by conducting a “meta-review” of existing plans, inventories, and strategies. This enabled us to build on the existing, high quality work and will increase the likelihood that surrogate species monitoring and conservation efforts will be implemented on the ground.

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

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Who Wants a Free Tree? Exploring Motivations, Opportunities, and Barriers to Tree Planting with Single Family Residences in Portland, OR

In Portland, the Bureau of Environmental Services Tree Program works with community partners to increase canopy cover in support of clean rivers, healthy watersheds, and livable, sustainable communities. The Tree Program supports several different planting models and outreach strategies, and especially focuses tree planting in diverse, low canopy, and underserved neighborhoods. One popular model for projects is an "opt in," where property owners are offered a free, professionally planted street tree if they agree to the responsibility of establishment and long-term care. During the 2013-2014 planting season the Tree Program used this model to plant more than 1,500 street trees with 834 single-family residential (SFR) properties in neighborhoods across Portland. Following planting season, we distributed a participant survey to better understand what motivates residents to plant with the Tree Program and whether we have been successful in engaging underserved Portlanders. Using feedback from 323 SFR participants, we found that the Tree Program plants with a diverse range of Portlanders, ethnically representative of their neighborhoods, economically primarily low and middle-income, and having lived at their residence a median range of 2 to 15 years. Participants are significantly more highly educated than their neighbors, however, highlighting a barrier to service delivery. We learned the Program offers a service many residents have never considered and reduces barriers such as the personal investment of time and resources into tree planting and concerns about tree selection and utilities. While most participants understand Environmental Services' stormwater management goals, they are motivated predominantly at the personal and neighborhood-scale, highlighting the many benefits of trees and synergistic opportunities in tree planting relationships.

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

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Using iMapInvasives to Track Invasive Species in the Metro Area

iMapInvasives is an online, GIS-based invasive species mapping tool available to all Oregonians. The site allows land managers, regional planners, and others who are working to prevent, control or manage invasive species to accurately record and track where invasive plants, animals, and insects occur. In the Metro area iMapInvasives is being used as a data hub for resource managers tracking fast-spreading invasive species such as pokeweed and garlic mustard. Observation points, survey outcomes, and treated areas can all be entered on the site or shared via bulk upload. An e-mail alert system will notify other users to new observations of their species of interest. With so many groups working on invasive species in the Metro area, sharing data through the iMapInvasives online venue and creating a standardized dataset for the region can lead to regional planning and prioritization of management efforts by identifying survey gaps or areas where a population is expanding. iMapInvasives requires a free login and allows for tiered access, giving managers the option to mask some information from the general public. However, anyone is free to create an account and explore the point observation data, or to report invasives in their area. iMapInvasives promotes data standardization, collaboration, and access to non-native species data by creating an open online system in which anyone can participate.

Keywords: Conservation biology, Land/watershed management

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Surface Water Solutions that Meet Evolving Regulations

Surface water is regulated by a multitude of local, State, and Federal regulations each with its own set of priorities and rules. Oregon is facing increasing surface water regulations related to the recent FEMA NMFS BiOP which will require stricter regulations for floodplain development including stormwater management, buffers, and setbacks. These new regulations represent an opportunity for jurisdictions to develop and implement mitigation strategies that meet multiple compliance-based objectives by re-focusing their efforts on restoring ecosystem function and processes rather than costly piecemeal mitigation. Navigating this maze of layered and overlapping compliance measures is increasingly challenging for surface water management agencies and regulators alike. Mitigation markets propose simplified accounting strategies but struggle to represent ecosystem services accurately without double counting. Meeting regulations and mitigation requirements on a piecemeal basis is increasingly complex and costly and has a high risk of failure. This is because ecosystem services operate as interdependent processes that cannot be parsed out and accounted for in isolation. Understanding ecosystems as a network of interdependent systems that support diverse services such as water quality, habitat, and flood control enables us to focus on restoring the overall network. This approach is more cost effective, self-sustaining, and resilient while meeting multiple compliance goals.

Keywords: Environmental policy, Habitat restoration, Land/watershed management

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SE Sandy Green Street: A Citizen's Effort to Transform an Underutilized Section of Roadway

The SE Sandy Green Street project transformed awkward, underutilized pieces of the right-of-way into a vegetated three block roadway corridor of storm water basins, pedestrian and bicycle safety improvements, and artistic features. This project replaced over 7,000 square feet of impervious surfaces with pervious landscaped areas that collects and infiltrates stormwater runoff from over 1.5 acres of impervious roadway surfaces. The project also includes 26 new street trees, including grand fir and ponderosa pines located within the roadway median.
This presentation will describe how a citizen (with a background in engineering and environmental design):

- Identified an opportunity to enhance an underutilized portion of the right-of-way,
- Obtained stakeholder support for the project,
- Secured funding,
- Worked with the stakeholders to develop innovated design features, and
- Assisted with the final project implementation.

This presentation will also share commentary regarding this unique 8-year long process as well as insights that may help other individuals embark on similar, citizen/community lead projects.

Keywords: Hydrology, Transportation, Water quality

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