



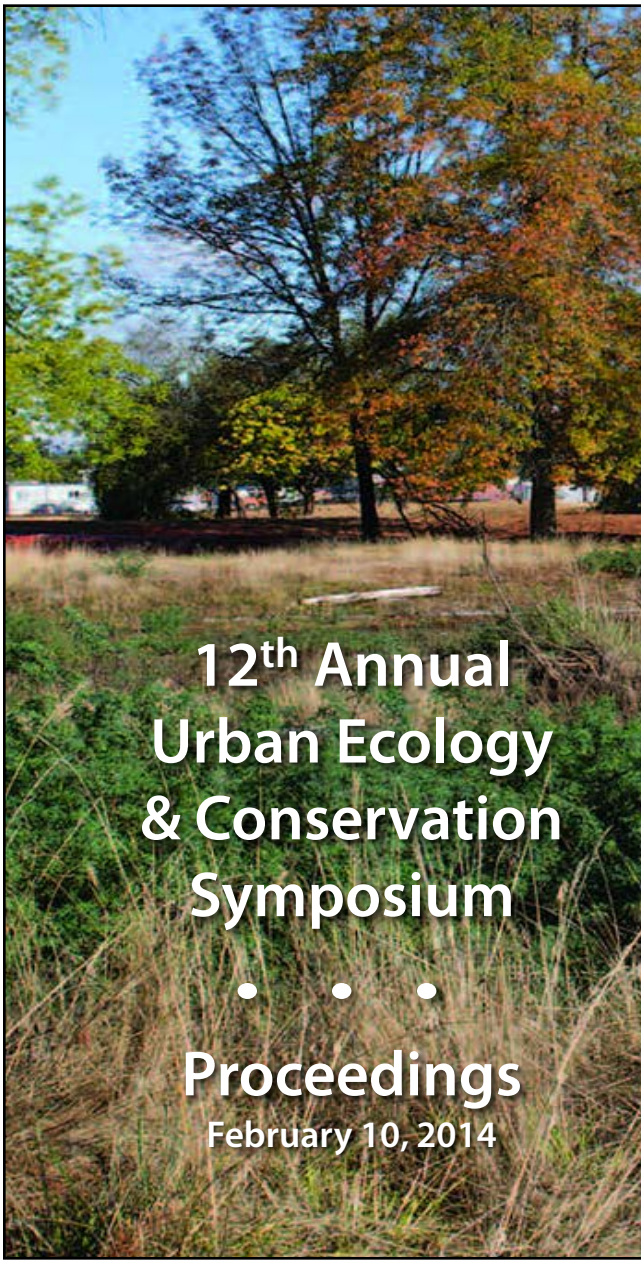


12th Annual Urban Ecology & Conservation Symposium

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Proceedings

February 10, 2014


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12TH 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 10, 2014

TABLE OF CONTENTS

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

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

air quality	*environmental 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.

2014 URBAN ECOLOGY & CONSERVATION SYMPOSIUM
PLANNING COMMITTEE

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We also wish to thank **Marjorie Brown**, City of Portland, Environmental Services, **Carrie Belding**, 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

2014 Urban Ecology & Conservation Symposium
AGENDA

8:00 **REGISTRATION**

9:00 **WELCOME AND INTRODUCTION:** Alan Yeakley

9:10 **OPENING KEYNOTE ADDRESS: Dr. David R. Montgomery**
Professor of Geomorphology, Department of Earth & Space Sciences, University of Washington
Responding to Climate Change: Stop Treating Urban Soils Like Dirt!

CONSERVATION AND MANAGEMENT TOOLS AND STRATEGIES *Moderator: David Cohen*

9:50	Bruce Roll	Clean Water Services	It takes a community: One million. One year. One water
10:00	Joseph Karasek	Portland State University	Performance of proprietary stormwater infiltration devices in poorly draining soils in Pleasant Valley, Gresham, OR
10:10	Jeff Lesh	Clackamas County Soil and Water Conservation District	Improving efficiency of invasive plant management in urban and rural settings using optimized field data workflows
10:20	Michael Rosen	Portland Bureau of Environmental Services	Portland's new Watershed Health Index
10:30	Tommy Albo	Metro, Sustainability Center	New Regional Conservation Strategy Viewer: Introduction and case studies
10:40	Q&A		

10:50 **BREAK** *Raffle at 11:05*

VEGETATION IN VARIOUS SETTINGS *Moderator: Sean Gordon*

11:10	Christa Von Behren	Portland State University	Riparian vegetation assemblages and associated landscape factors across an urbanizing metropolitan area
11:20	Graham Klag	The Forest Park Conservancy	Mature forest characteristics influencing non-native invasive plant species abundance
11:30	Kate Holleran	Metro	Cut more trees: Metro uses restoration thinning to improve habitat diversity, structure, and function
11:40	Tom Liptan	LIVE Center	The Red Cinder Ecoroof: Non-irrigated vegetated roof system for dry summer climates
11:50	Q&A		

12:00 **LUNCH** *Raffle at 12:55*
You are invited to participate in lunchtime discussions about various topics. Details will be provided at the symposium.

1:00 **AFTERNOON KEYNOTE ADDRESS: Dr. Timothy Beatley**
Teresa Heinz Professor of Sustainable Communities, University of Virginia
Connecting With Nature and Adapting to Climate Change: The Promise of Biophilic Cities

PUBLIC PERCEPTIONS AND INVOLVEMENT *Moderator: Julie Fry*

1:40	Bob Sallinger	Audubon Society of Portland	Carnage and mayhem on the urban landscape Part 2: Analysis of urban wildlife phone data from Audubon's Wildlife Care Center
1:50	Neil Schulman	Lund-Chaix Consulting	Building effective cross-purpose volunteer programs in urban natural resources: Analysis and redesign of Metro's Volunteer Services Program in natural areas, parks, conservation education & historic cemeteries
2:00	Sheilagh Diez	Columbia Slough Watershed Council	SERVE - Students Engaged in Restoring Vital Ecosystems
2:10	Noelwah Netusil	Reed College	Valuing water quality in urban watersheds: A comparative analysis of Johnson Creek, Oregon and Burnt Bridge Creek, Washington
2:20	Q&A		

2:30 **BREAK** *Raffle at 2:45*

WILDLIFE IN THE REGION *Moderator: Lori Hennings*

2:50	Leslie Bliss-Ketchum	Portland State University	The influence of artificial light on wildlife use of undercrossing structures
3:00	Ashley Smithers	Portland State University	Habitat and landscape factors influencing the presence of five pond breeding amphibian species in highly urbanized ponds in Gresham, OR
3:10	Katie Holzer	University of California, Davis	Moving beyond the "non-native=bad" paradigm: Examining the relationship between a native frog and introduced reed canary grass
3:20	Aileen Miller	Portland Bureau of Environmental Services	A Riparian Bird Integrity Index for the Portland Region
3:30	Q&A		

3:40 **CLOSING REMARKS:** Lori Hennings

3:50 – 6:00 POSTER SESSION AND SOCIAL

POSTER PRESENTATIONS

Coordinator: Ted Labbe

AUTHOR(S)	TITLE
Joshua Baur, Joanne Tynon, Paul Ries and Randy Rosenberger	Public attitudes about urban forest ecosystem services in Oregon cities
Nancy Broshot, Wes Hanson, Morgan Yarber and Meghan Lockwood	Lichens in Forest Park and nitrogenous air pollution
Nancy Broshot, Meghan Lockwood, Wes Hanson and Morgan Yarber	Twenty years of change in the tree community in Forest Park
Mindy Brooks and Roberta Jortner	City of Portland Natural Resources Inventory
Karl Dawson	Learning landscape school arboretum
Robert Emanuel, Brian Shepard, Laura Porter, Rich Hunter and Jared Kinnear	A decade of shading the Tualatin Watershed: How a utility takes an ecosystem services approach to riparian and stream enhancement
Jennifer Grant and Zuriel Rasmussen	The geography of urban coyotes in Portland, Oregon
Kammy Kern-Korot and Thom Epps	Identifying habitat conservation and restoration priorities on Sauvie Island with the use of remote sensing
Jim Labbe and Courtney Shannon	Managing laminated root rot at Nadaka Nature Park
Ted Labbe, Esther Lev, Megan Garvey, Kaegan Engelmeyer and John Bauer	Nyberg Marsh: Urban watershed retrofit, habitat restoration, and partnership opportunities
Jennifer Lam and Samuel Chan	Dose of reality: What can we learn from pet owners to guide more effective environmental stewardship of pharmaceutical and personal care products (PPCPs)?
Bethany Lund, Emily Bialowas and Aaron Shaw	Expanded monitoring and treatment of knotweed in the Salmon Creek Watershed by Eradication Nation
Jan Mehaffy, Robin Jenkinson and Ted Labbe	A volunteer-led, screening-level assessment of potential fish passage barriers in the Johnson Creek Watershed, Portland, Oregon

AUTHOR(S)	TITLE
Katie O'Connor, Tosha Comendant, James Strittholt and Brendan Ward	Data Basin: Using an open source web-based platform for project management, data sharing, communication, and geospatial analysis
Meenakshi Rao, Linda George, Todd Rosenstiel, Vivek Shandas, Jean Daniels and Alexis Dinno	Healthy trees, healthy people: Assessing the relationship among urban trees, nitrogen dioxide, and human health
Brittany Sahatjian	Modeling effective shade to prioritize riparian restoration efforts in the Johnson Creek Watershed
Roberta Schwarz	Preservation and restoration of rare white oak savanna
Alexander Staunch	Eradication of Ludwigia peploides from the Blue Heron Wetlands of NE Portland: Project update
Alan Tuan, Ben Ayres, Julie Fry, Alisha Lund-Chaix, Debra Fife and Stacey Triplett	Environmental impact of fine particulate matter from Brooklyn Railyard
Brian Wegener and Maria Cahill	Parking forests: Parking lots as if Mother Nature designed them

MORNING KEYNOTE ADDRESS

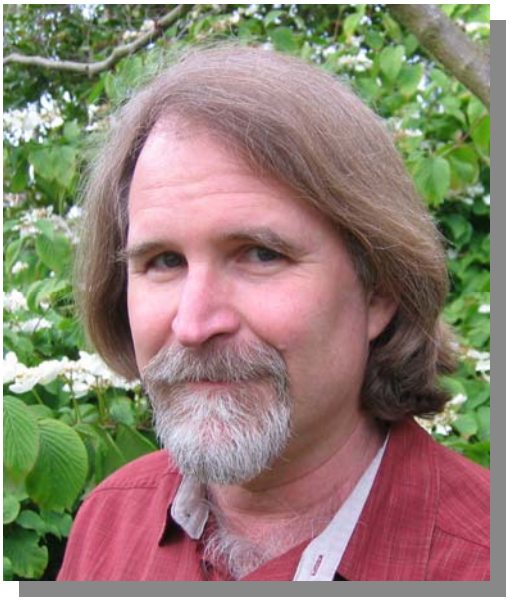
Dr. David R. Montgomery
Professor of Geomorphology
Department of Earth & Space Sciences
University of Washington

David Montgomery, "Responding to Climate Change: Stop Treating Urban Soils Like Dirt!"

Soil - humble, lowly, everyday dirt - is an essential, irreplaceable, and strategic resource. As Dr. Montgomery reported at a recent Biocarbon Summit in Seattle, soil degradation is at the heart of an under-appreciated global crisis. Fertile topsoil sustains our food systems and forests and, it turns out, stores a whole lot of carbon in the process. Soil degradation is an important driver of climate change because soil is a huge carbon reservoir, storing about three times more carbon than in all of the world's vegetation and two times more than the atmosphere. Over time, changes in the amount of carbon stored in soils reflect the balance between how much dead plant material is put in versus how much carbon is released through decomposition. Disturbing topsoil speeds oxidation and the release of stored carbon into the atmosphere. In fact, about a third of the carbon added to the atmosphere between the industrial revolution and the late 20th century came from degradation of soil organic matter as agriculture expanded across North America and Eastern Europe. Fortunately, we can reverse the historical pattern. And the payoff is potentially huge, not only for climate mitigation but also for agricultural productivity, water quality, biodiversity, and public health. On one side of the equation, we can reduce the amount of carbon released from soils by reducing soil exposure to erosion and oxidation. Soil, including urban soil, should be seen as a secret weapon for addressing climate change. As it turns out, the solution is simple: stop treating soil like dirt.

Biography

David R. Montgomery is the author of The Rocks Don't Lie: A Geologist Investigates Noah's Flood (2012), Dirt: The Erosion of Civilizations (2007), and King of Fish: The Thousand-Year Run of Salmon (2003). A MacArthur Fellow and a three-time winner of the Washington State Book Award, Montgomery is a professor of geomorphology in the Department of Earth & Space Sciences at the University of Washington. His research interests involve the effects of geological processes on ecological systems and human societies, and interactions among climate, tectonics, and erosion in shaping topography on Earth and Mars.



AFTERNOON KEYNOTE ADDRESS

Timothy Beatley
Teresa Heinz Professor of Sustainable Communities
University of Virginia

Connecting With Nature and Adapting to Climate Change: The Promise of Biophilic Cities

Nature provides many emotional, spiritual and health benefits to residents of cities. Biophilia argues that we have co-evolved with nature, and that we have a deep need to affiliate with the natural world. The human species has "grown up with nature", as E.O. Wilson says, and little wonder that we are happier, more productive, more creative, and even more generous in the presence of nature. Nature in cities offers the promise of lives that are wondrous connected lives, lives attentive to the natural magic around us. The daily and hourly contact with nature that we need to be healthy becomes more difficult to provide in cities. But, there is a remarkable amount of urban nature and biodiversity, and many opportunities to design and plan in ways that integrate and restore nature, and that foster connections to the natural world and to each other. Biophilic Cities are resilient cities, Beatley argues, and many of the strategies and actions to enhance nature in cities will also aid in responding to and adapting to climate change and the economic shocks cities will face in the future.

In this presentation Beatley will discuss the new planning and design agenda of Biophilic Urbanism and the need to shift towards a vision of Biophilic Cities. He will also examine ways in which cities can be thought to be biophilic and will also describe tools, techniques and strategies available to advance this vision of nature in cities. He will draw from the findings of his current research, especially the ongoing Biophilic Cities Project to describe thinking and examples that emerging leaders and partner cities are already doing in this arena. From urban forests and river restoration in Oslo, to parklets in San Francisco, to Vitoria-Gasteiz's green ring, to vertical greening innovations in Singapore, Beatley will survey the emerging practice of biophilic urbanism, as well as discuss future needs and likely future directions.

Biography

Timothy Beatley is the Teresa Heinz Professor of Sustainable Communities, in the Department of Urban and Environmental Planning, School of Architecture at the University of Virginia, where he has taught for the last twenty-five years. Beatley is the author or co-author of more than fifteen books on these subjects, including Green Urbanism: Learning from European Cities (recently translated into Chinese), Native to Nowhere: Sustaining Home and Community in a Global Age, and Biophilic Cities: Integrating Nature Into Urban Design and Planning. Beatley directs the Biophilic Cities Project at UVA (http://biophiliccities.org/) and is also co-director, with Reuben Rainey, of UVA's Center for Design and Health, within the School of Architecture.

ABSTRACTS SUBMITTED

Tommy Albo

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New Regional Conservation Strategy Viewer: introduction and case studies

The RCS Viewer is an online mapping tool that allows users to view Portland-Vancouver Regional Conservation Strategy habitats in the context of their own projects and GIS layers (www.regionalconservationstrategy.org). The Viewer was released in Beta form at the Intertwine Alliance's fall summit in October 2013. We released it in Beta format to give folks an opportunity to try it out and provide us with some feedback. With the remaining budget we were able to accommodate many suggestions. We will highlight these improvements and showcase some examples to demonstrate how easy it is to take advantage of the RCS Viewer. By uploading or selecting one of the many predetermined "canned" geographies, users can quickly get a summary of the area's landcover, protected lands, and view the RCS modeled high value habitat rescaled to that defined geography. Users are now able to upload an overlay of their project(s)' data and see it in context of the RCS. In this presentation we will provide examples of how folks can mark up and share this information with their colleagues, their partners and their potential funders. We want your work and your creative applications to not only utilize this tool, but have easy access to the Biodiversity Guide and the Regional Conservation Strategy.

Keywords: Conservation biology, land/watershed management

Rachel Aronson

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Sustainability Metrics, Assessment, and Planning for Landscapes: Toward a New Method of Landscape Sustainability Assessment for Brookhaven National Laboratory

Universities, corporations, and government facilities all have primary objectives to better our society and our economy, yet a prevalent gap in current practices is that environmental values are seldom represented in their standard sustainability plans. Brookhaven National Laboratory (BNL) is a 5,265-acre laboratory managed by the Department of Energy (DOE) that is situated in a globally rare ecosystem, the Long Island Pine Barrens. The 2010 BNL Site Sustainability Plan (SSP) reflects explicit direction from the DOE; however, it contains no sustainability goals or metrics to account for environmental values in the BNL landscape. Using the BNL landscape as a study area, my research centers on the idea that sustainability goals representative of environmental values could be created to fit maximally into the current BNL Site Sustainability Plan. First, I define four broad categories of land uses within the BNL landscape. Next, I offer a review of the qualities of natural resources in the BNL landscape, and an analysis of opportunities and constraints in current management strategies. Then, based upon qualities and needs of the BNL landscape, I carry out a comparative critique of three contemporary representative landscape sustainability assessment methods: LAND Code, Sustainable Sites Initiative and, Performance Measures for Ecosystem Management. Finally, I combine conclusions drawn from the critique with the analysis of the BNL landscape to create a proposal for a landscape sustainability assessment approach consisting of two overarching goals: 1) Practice ecosystem management in the BNL landscape and, 2) Manage construction activities in the BNL landscape for ecological sustainability. While these two goals offer an approach for incorporating the assessment of environmental goals in the BNL SSP, their achievement is constrained by funding and current institutional practices.

Keywords: Land use planning, Sustainable development

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Public Attitudes about Urban Forest Ecosystem Services in Oregon Cities

Urban natural resource managers and planners need comprehensive and integrated data and strategies to help them effectively manage urban natural resources. Effective urban and urban-proximate natural resource management strategies must incorporate an understanding of public perceptions and attitudes about ecosystem services. Currently, however, there remains a relative lack of research and information on public attitudes about urban ecosystem services. This study used a mailback survey randomly distributed to residents in Portland, Bend, Eugene, and Springfield, to ask residents how important urban forest ecosystem services were, how well the services were provided, and looked at differences between females and males, homeowners and renters, and among the cities. Results revealed that for the entire sample, clean water was most valued among all the services we described. Space for outdoor recreation and opportunities for contact with nature were second and third most valued. There were significant differences between males and females for numerous services, few significant differences between renters and homeowners, and significant differences among cities for ecosystem service importance. Respondents indicated that outdoor recreation was the most strongly provided, followed by opportunities for contact with nature, and clean water. For attitudes about provision, few significant differences were found between males and females, homeowners and renters, and among cities. Without incorporating human dimensions of urban ecosystem services in policy discussions, managers and decision makers risk unbalanced policy. Policy and management actions that ignore public attitudes also can lead to agencies becoming irrelevant to the general public. In order for urban natural resource managers to continue providing excellent service, human dimensions of urban ecosystem services management should be fully integrated into policy and management decisions.

Keywords: Environmental policy, Sustainable development

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The influence of artificial light on wildlife use of undercrossing structures

Artificial light severely disrupts migratory behavior in birds, sea turtles and bats among other species. Its effects on the movement and activity patterns of terrestrial animals, however, are largely unknown. Such information is needed to inform mitigation of habitat fragmentation in the face of expanding urbanization. Wildlife crossing structures can help mitigate habitat fragmentation by roads although some crossing structures are proposed as dual-use (for use by foot or bike traffic as well as for wildlife) and typically include artificial light. The undercrossing in this experiment is a bridge structure used solely for water and wildlife passage that has three ~30 m long sections. On a weekly basis each section was subjected to either high ~10 foot candles (fc), low ~5 fc, or zero light followed by a "break" period where all light treatments were off. Sand tracking data was collected to determine use by the terrestrial vertebrate community. Data was collected during the summer seasons of 2011 and 2012 and documented 23 species of mammal, bird, reptile and amphibian. ANOSIM analysis gave a significant result ($p=0.001$) for the difference in the vertebrate community detected between light treatments. Species were then grouped by activity period into nocturnal, non-nocturnal and crepuscular. ANOVA analysis showed a significant difference for nocturnal ($p=0.002$) and crepuscular ($p=0.002$) taxa between treatments and no difference for non-nocturnal taxa ($p=0.14$). It is clear that for the terrestrial vertebrate community habitat connectivity is disrupted by the presence of artificial light with the strongest response by nocturnal and crepuscular species.

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

Mindy Brooks[1], Roberta Jortner[2]

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City of Portland Natural Resources Inventory

In 2012 the City of Portland adopted a city wide Natural Resources Inventory (NRI) for the purposes of informing City and community plans, projects and programs. This presentation will showcase the information and products now available. The City's NRI builds on the regional inventory of riparian corridors and wildlife habitat that was developed and adopted by Metro in 2005 as part of Title 13 Nature in Neighborhoods program. The City uses the same science-based approach and methodology as Metro. The City has incorporated current high-resolution natural resource data (e.g., LiDAR topography), information from recent scientific literature, and observations from targeted field visits. The City also updated the regional "Habitats of Concern" and adapted or clarified some of the regional GIS model criteria to be more applicable to the urban landscape. The City's NRI products include GIS data and maps of existing natural resource features, riparian corridor functions and wildlife habitat attributes. Features include rivers, streams, wetlands, flood area, vegetation (forest, woodland, shrubland, and herbaceous), and slopes. Functions include microclimate, control of sediments/pollutants, stream flow moderation, flood storage, nutrient cycling, organic inputs, large wood, channel dynamics and wildlife habitat. The City's "Special Habitat Areas" maps and descriptions highlight rare or declining habitat types and habitat features supporting at-risk plant and animal species. The City is currently using the NRI to inform an update of Portland's 30-year old Comprehensive Plan and area-specific plans such as Airport Futures, West Hayden Island, and Central City 2035. The NRI information can also be used by other City bureaus, agencies, non-profit organizations, property owners, or developers to identify natural resources on a site or in a neighborhood, and set mitigation, restoration or land acquisition priorities.

Keywords: Land use planning, Land/watershed management

Nancy Broshot[1], Meghan Lockwood[2], Wes Hanson[3], Morgan Yarber[4]

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Twenty Years of Change in the Forest Park Tree Community

In 1993, 24 permanent sites were randomly located in Forest Park with one additional site in the Ancient Forest Preserve. Three, 250 meter square quadrats were randomly located at each site. All trees within each quadrat were identified to species and the dbh (diameter at breast height) of each tree was measured. Data were initially collected in 1993, and measurements were repeated in 2003 and 2013. We present preliminary results from last summer's work, and more thorough results will be presented on our poster. We found significantly fewer live trees and live saplings (trees smaller than 10 cm dbh) in each decade, although the rate of loss appears to be slowing. When examined by section of the park (city, middle, far, old growth), the far section had significantly more live trees and saplings than did the city section, but there were significantly fewer live trees in all sections of Forest Park in 2013 as compared to 1993. Our findings suggest important implications for management of the park.

Keywords: Plant ecology, Conservation biology

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Quantifying Cultural and Social Ecosystem Services in the Urban Context

Contributions of urban ecosystems to human well-being have been emphasized in recent policy, but with less attention to important cultural and social services and nonmaterial values. Despite the fact that Ecosystem Services (ES) are beginning to surface in land steward policies and decision making, consideration and application of cultural ES in the urban context have received little attention in the social sciences. In order to appropriately prioritize land use decisions and adequately plan for the steps needed to ensure cultural sustainability and ecological biodiversity, the links between urban greenspaces, economic prosperity, and cultural value must become evident. Earth Economics (EE) will present current research on the development of a framework for identifying and quantifying social and cultural ES, in an urban context. In 2013, Earth Economics conducted an economic and social analysis of natural infrastructure within the Green-Duwamish Watershed, which flows directly into Puget Sound. The project was designed to facilitate watershed-wide investment in ES and sustainable planning and management of natural resources. Additional goals were to test a new framework for identifying and valuing the cultural and social benefits as part of an overall ES valuation of the watershed. This framework is informed by work EE undertook in 2011, when it partnered with Metro Parks Tacoma to provide an analysis of the ES, health and social values of the 70 parks in Tacoma, WA. Emphasising the importance of restoration in the parks, the study focused on the increased value of removing invasive species and the rehabilitation of the park's natural vegetation. This research includs estimations of health benefits from physical activity and air purification, two ancillary services provided by Tacoma’s urban parks.

Keywords: Environmental policy, Sustainable development

Karl Dawson

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Learning Landscape School Arboretum

Over the past 13 years, Portland Parks & Recreation Urban Forestry has partnered with 30 schools to plant 750 street trees on school grounds with over 2,000 students to create Learning Landscape School Arboretums. What is a Learning Landscape? A Learning Landscape is a collection of trees planted at a school by students and Portland Parks & Recreation (PP&R) Urban Forestry volunteers. Learning Landscapes offer an outdoor educational experience to students, as well as environmental and aesthetic benefits to the school. Learning Landscapes are designed to teach students about biology and urban forestry issues, but can also be use to teach geography, writing, history, and leadership skills. Funding for Learning Landscapes comes from mitigation issued by the Bureau of Development Services when a developer chooses to remove trees and does not want to replant. Community involvement and building capacity is crucial to the success of Learning Landscapes. PP&R works with Parks Neighborhood Tree Steward volunteers, parents, students, and community members to design, plant, establish and maintain Learning Landscapes. PP&R helps facilitate this community by working with the school districts, neighborhoods, students and teachers to create landscape designs that meets everyone’s needs. Tree plantings via the Learning Landscapes program is performed by middle or high school students who mentor elementary students. This leadership aspect of Learning Landscapes gives students the opportunity to connect with their peers, build confidence and develop public speaking skills. Educational Activities using Learning Landscapes includes the following:Tree biology and Pruning, Tree Identification Walks, Native Habitats, Geography and History, Writing Projects and Research Papers, Designing Tree Maps and Signs, and learning about the Indigenous Uses of Trees

Keywords: Environmental social sciences, Environmental education

John Deshler

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Western Painted Turtle Rescue and Relocation at the Sandy River Delta: Lessons Learned

In 2013, the Portland Water Bureau (PWB), the US Army Corp of Engineers, the US Forest Service, and BPA cooperated on a project to remove a 1930's dam owned by Oregon Department of Fish and Wildlife and restore the historic channel at the Sandy River Delta for the benefit of threatened and endangered fish. Among the contributions by the many agencies involved in this project, PWB's Environmental Compliance group agreed to capture and relocate native turtles out of harm's way prior to dredging and dam deconstruction. The slack-water area covered by the one-mile length of the historic channel made this turtle salvage effort one of the largest ever attempted in the state. Regional turtle experts were involved to help carry out a successful strategy for relocation. Nevertheless, unanticipated site conditions and turtle behaviors brought an adaptive management strategy into play. Turtles demonstrated extraordinary site fidelity and rapid mobility despite the suitability of the relocation site and terrestrial obstacles and distances that seemed likely to impede their movements. During this presentation, PWB's wildlife biologist, John Deshler, will describe the lessons learned during a successful habitat restoration and wildlife relocation project.

Keywords: Habitat restoration, wildlife biology

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SERVE - Students Engaged in Restoring Vital Ecosystems

The Students Engaged in Restoring Vital Ecosystems (SERVE) Project of the Slough School Education Program provides classroom presentations, field studies, and service-learning opportunities for 4-8 grade students attending schools within the Columbia Slough Watershed. Students participating in this project are engaged in all aspects of restoration, including project design, implementation, and monitoring. Students receive a series of classroom presentations aimed at increasing their knowledge of local native plants, site planning, photo monitoring, and correct steps for planting. After these initial presentations, teachers work with students to produce a planting plan for their site. This map is reviewed by the Stewardship Director and finalized. Students then conduct photo monitoring, native plant identification, and native habitat restoration at field sites. In the spring, students receive further classroom support to understand proper monitoring and data collection techniques before returning to their site to monitor the degree of survivorship in their planting. End products of the SERVE Project include:

- Site Maps: SERVE participants will create, evaluate, and submit plans for habitat restoration.
- Restored habitat: SERVE participants will use these maps to plant native shrubs and trees, contributing to improved habitat for local species.
- Data: SERVE participants will collect data on plant survivorship from restoration projects. They will also conduct photo point monitoring.

This data will guide future plantings on watershed sites. Students learn important and memorable lessons in ecology, conservation, and project management. By adopting degraded sites and transforming them into high quality native habitat, students gain a sense of satisfaction and ownership of their local watershed that will last a lifetime.

Keywords: Environmental education, habitat restoration, land/watershed management

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Managing Our Urban Forest: What do Leaders and Professionals Think and Need?

Why do some cities manage their urban forests while others seem to ignore them? What elements of urban forestry management are most important to cities, and do urban forestry perspectives differ between elected community leaders and natural resource professionals who work for them? These are just a few of the questions being answered by a new research study organized by Oregon State University in cooperation with METRO, the state forestry agencies from Washington and Oregon, and the Intertwine Alliance. These partners have come together to create a regional strategy to advance urban forestry in the Portland-Vancouver Metro area. Now in its second year, this project includes 1) an ecosystem analysis and needs assessment survey, 2) stakeholder workshops and forums, and 3) local projects focused on the health of the urban forest as a whole. In addition, this strategy will provide a replicable template for other metropolitan areas looking to advance regional urban forestry efforts as part of the national Vibrant Cities and Urban Forests initiative sponsored by the US Forest Service and the Sustainable Urban Forests Coalition. This presentation will focus on the preliminary results of the needs assessment survey which was sent to 350 community leaders and urban forestry professionals in the Portland-Vancouver metro region. Survey results will serve to inform the development of the Regional Urban Forestry Strategy by identifying the barriers and needs to urban forestry management in the region and advance current and future urban forestry efforts. Because the urban forest knows no political boundaries, this research will encourage collaboration across jurisdictions, helping to increase the livability and environmental sustainability of the Portland-Vancouver metropolitan area while allowing local jurisdictions to achieve successful urban forestry programs that increase the health of our urban forests while reaping the benefits trees provide.

Keywords: Land/watershed management, Environmental policy, Environmental social sciences, Land use planning

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A Decade of Shading the Tualatin Watershed: How a Utility takes an Ecosystem Services Approach to Riparian and Stream Enhancement

Clean Water Services is a water resources utility in the Tualatin River Watershed located immediately west of Portland, Oregon. In addition to serving nearly 540,000 people with more traditional sanitary sewer and stormwater management, the utility's unique combined water quality permit allows it to engage in extensive work on stream enhancement projects across the entire watershed at a variety of scales on public and private lands. These projects bolster a number of important ecosystem services while meeting permit requirements to support salmon and trout habitat. The utility's Temperature Management Plan allows it to directly trade riparian re-vegetation for shade credit against thermal loading of the Tualatin River from wastewater effluent. Using this ecosystem services driver and business case, Clean Water Services has created or enhanced nearly 1,400 acres of riparian habitat on more than 40 miles of streams in the last ten years. The canopy created by these plantings prevents 714 million kilocalories of solar energy from entering the Tualatin and its tributaries per day. The effort has also resulted in improved wildlife habitat, natural area recreation, nutrient cycling and sediment capture on floodplains throughout the basin. In this poster, the authors outline the regulatory and physical basis of the Temperature Management Plan, the process for planning, implementing and maintaining revegetation projects, and discuss the utility's successful engagement of a wider community of partners in urban, rural and public sectors in riparian revegetation. We use case studies to highlight these partnerships and illustrate outcomes across different landscapes in the watershed. The poster concludes with a forecast for future riparian revegetation needs.

Keywords: Habitat restoration, water quality, hydrology, fisheries

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The Geography of Urban Coyotes in Portland, Oregon

An adaptive, opportunistic, and intelligent animal, coyotes (*Canis latrans*) live silently and successfully in cities across the United States, including Portland. The Portland Urban Coyote Project is a citizen science project developed by the Portland State University Geography Department in collaboration with the Audubon Society of Portland. The objective of this project is to engage the general public in wildlife study by asking them to record coyote sightings across the city. We map these results to better understand coyote habitat use in the Portland metropolitan area. The project began in 2011 with Portland State University's Geography Department and the enthusiastic participation of second-graders from Alameda elementary, neighborhood associations, and other local community groups. Interest in coyotes and outreach efforts have generated over one hundred and fifty sighting reports from local community members. A map of reported sightings was created for the public to access, providing an opportunity for community members to understand how coyotes live in their neighborhoods. Using this existing infrastructure, we are in the process of expanding the visibility of this project through social media, community centers, and outreach to K-12 schools. We intend to develop an interactive online map and educational website that will act as a permanent place for useful coyote information in Portland. In the future, we plan to compare the gathered citizen science data with data from more traditional biological wildlife survey methods, such as camera traps and radio collars. This comparison will inform us about the utility of citizen science data for applications including wildlife management and education.

Keywords: Animal ecology, Environmental education

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Lichens in Forest Park and Nitrogenous Air Pollution

Lichens have been shown to be useful bioindicators for determining levels of nitrogen deposition related to air pollution. Preliminary lichen surveys in Forest Park in 2011 and 2012 revealed the presence of lichen species associated with high levels of nitrogenous pollution. This summer we conducted lichen surveys at 25 permanent research sites that had been set up in Forest Park and the Ancient Forest Preserve in 1993. The majority of the lichens we collected at every site were classified as indicative of worst, poor or fair air quality, with few lichens found that would indicate good or best air quality. Lobaria is a lichen common in Oregon and is important in the normal nitrogen cycle in forests. However, Lobaria is very sensitive to nitrogenous air pollution and is associated with the best air quality category. We collected Lobaria at one site in the middle of the park. We found no significant differences in lichens in the different air quality variables in the various sections of the park, indicating that all of Forest Park is subjected to poor air quality. We are still identifying lichens, so these results are preliminary, however we do not believe the basic results will change.

Keywords: Plant ecology, Air quality

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A Riparian Bird Integrity Index for the Portland Region

City of Portland's Bureau of Environmental Services (BES) implements a broad range of projects and programs to improve water quality and watershed health. The City's watershed goals include protecting, maintaining, and improving habitat and biological communities. BES recently developed a city-wide assessment of watershed health: the Portland Area Watershed Monitoring and Assessment Program (PAWMAP). A variety of habitat, water quality and biological community indicators are included in this assessment program; bird communities serve as one of the biological indicators. Birds respond to watershed conditions at different spatial scales than macroinvertebrate and fish communities contributing to a more complete picture of watershed health. We developed a Riparian Bird Integrity Index (RBII) based on a similar index developed by the Environmental Protection Agency for Willamette Valley streams. This index uses 13 metrics relating to avian foraging, dietary, nesting, and migratory guilds. The index provides a score that can be compared between sites and tracked over time. In the first three years overall bird abundance and species richness did not necessarily result in a high RBII score, however the number of protected or special status species was positively correlated with RBII scores. RBII scores were also strongly correlated with tree canopy cover within a 100m riparian buffer zone. Westside Willamette watershed streams, particularly in Forest Park, scored the highest while lower Johnson Creek and Columbia Slough generated the lowest RBII scores.

Keywords: Wildlife biology, Animal ecology, Land/watershed management

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Cut more trees: Metro uses restoration thinning to improve habitat diversity, structure, and function

Metro Regional Government manages thousands of acres of former commercial tree farms between the ages of 18 and 25 years old. These forests were established after clear-cut harvesting or intensive agriculture use and lack the typical structure and composition of naturally regenerated stands. Metro is applying the latest research on young forest management to create structural, compositional, and functional diversity through pre-commercial and commercial thinning projects. Thinning prescriptions to date have incorporated examples of variable density thinning, creation of gaps, snags, and down wood, slash management, and management of upland shrub habitat. Key lessons learned include that thinning prescription complexity impacted implementation success, clear objectives and frequent communication improved implementation success, weed response increased with increasing density reduction, herbivory in planted gaps was high, bird response to reduced stocking levels was rapid, and wind-throw and wind-damage occurred but at low levels and contributes to diversity.

Keyword: Habitat restoration

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Moving beyond the "non-native=bad" paradigm: Examining the relationship between a native frog and introduced reed canary grass

Non-native plants are identified as a major threat to biodiversity. However, management of non-native plants is often expensive, can directly harm other organisms, and sometimes does not effectively reduce the cover of plants in the long run, especially in substantially altered urban systems. Additionally, it has been shown that native species are not always harmed by non-native plants, and can even benefit in some cases. For these reasons, it is important to understand the specific relationship between species of concern and non-native plants. Here we examine the relationship between native frogs and some common native and non-native aquatic plants. We conducted an outdoor mesocosm experiment using 1,000-L cattle tanks as experimental ponds. We assessed the preference of adult Pacific chorus frogs (*Pseudacris regilla*) and survival of their tadpoles with two native and two non-native plant species. We found that male frogs preferred to call and female frogs preferred to lay eggs in non-native reed canary grass (*Phalaris arundinacea*) over other plants offered. Tadpoles also had higher survival in reed canary grass than in the other plants. The behavior of the frogs and tadpoles indicated that that these patterns are likely due to the complex spatial structure of reed canary grass by providing substrate for calling males to rest on, possessing leaves and shoots of ideal size for oviposition, and providing refuges from predators. This study demonstrates that non-native plants are not always detrimental for native frogs in this area, and in fact, they may be beneficial in some cases. Improved understanding of the specific relationships between non-native plants and management target species may help guide management to achieve specific goals for habitat projects.

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

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A Volunteer-led, Screening-Level Assessment of Potential Fish Passage Barriers in the Johnson Creek Watershed, Portland, Oregon

The Johnson Creek Watershed is home to a wide variety of fish and animal species including ESA-listed threatened Lower Columbia Coho, Chinook, and steelhead trout. Recent fish surveys found that nearly all tributaries to Johnson Creek are inhabited by salmonids and other native fish species. However, no fish were detected in nearly a dozen stream reaches with good-quality habitat, indicating that downstream barriers (in particular, culverts) are likely limiting fish access. The assessment and then removal of barriers to fish passage has long been a priority of the Johnson Creek Watershed Council, however there are significant data gaps in culvert evaluation. As a first step towards prioritizing barriers for removal, the Watershed Council developed a protocol for volunteers to conduct a screening-level assessment of fish passage at potential barrier culverts, based on the Washington Department of Fish and Wildlife fish passage assessment protocol. During spring and summer of 2013, Portland State University (PSU) Sustainable Watersheds course students and summer interns used this protocol to conduct a screening-level assessment of fish passage at over 150 potential barriers throughout the Johnson Creek Watershed. Culverts that were not obvious barriers (outlet drop heights over 0.15m) or obviously passable (bridges) were flagged for follow-up assessments by a professional contractor. This presentation demonstrates how citizen science can help advance restoration of habitat connectivity in Pacific Northwest streams.

Keywords: Habitat restoration, Environmental education

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Performance of Proprietary Stormwater Infiltration Devices in Poorly Draining Soils in Pleasant Valley, Gresham, OR

Stormwater management requirements are designed to reduce the impacts of the volume and water quality issues associated with increased impervious surface area in developing urban watersheds. In the rural Pleasant Valley area of Gresham, on-site stormwater management is required to minimize impacts to the natural hydrology from urbanization. While on-site stormwater management is required, the soils in this area have limited infiltration rates. In the first phase of development within Pleasant Valley, proprietary underground infiltration vaults were installed in an effort to manage stormwater, while still allowing for traditional landscape. These devices were assessed to determine how they would perform in an area with low infiltration rates and to identify potential issues using similar systems in the future. Infiltration rates and drawdown times were measured for three systems to determine response of each device to actual and modeled stormwater inflow in order to determine if performance met design rates. Concerns identified included infiltration rates below design assumptions, unexpected non-stormwater inputs, design flaws with the overflow system, and difficulty for long-term maintenance and assessment by the homeowner and city. Results will inform future guidelines and regulations concerning the use of similar systems in areas with limited infiltration.

Keywords: Land/watershed management, Hydrology

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Identifying Habitat Conservation & Restoration Priorities on Sauvie Island with the use of Remote Sensing

To efficiently identify important remnant habitats and prioritize areas for restoration potential at a landscape level on Sauvie Island, remote sensing analysis was employed. The analysis was also intended to better assess opportunities to improve connectivity of key habitats, including: 1) oak woodland, savanna, and grassland, 2) riparian, and 3) wet meadow, and emergent wetlands. Beyond mapping existing known oaks and hypothesized oaks (the latter of which is challenging, yet a regional priority due to the rare and declining nature of this habitat type in the Willamette Valley), we sought to understand the potential increase in range of oak habitat types given present day conditions of drainage and diking -- by overlaying known oaks with soils, historic vegetation and elevation data. Partly prompted by the development of a new protocol by the Oregon Department of Agriculture to assess riparian habitat, the District also wanted to assess vegetation within 30 feet of the Gilbert River, to both establish a baseline condition and to identify reaches that can benefit from additional woody vegetation. In this case, surface elevation and vegetation canopy height derived from LiDAR, plus land cover, were used to assess and categorize existing plant communities in the riparian buffer zone. Lastly, known wetlands and ponds, some participating in the District-supported Sauvie Island Pond Project, were also mapped, along with hypothesized wet meadow areas -- derived from soils data, present day aerial imagery, and surface water on historic vegetation maps. For each habitat type, taxlots were ranked for percentage of land with high habitat potential, and landscape connectivity was analyzed using FRAGSTATS. This remote sensing exercise may be bolstered by future community engagement to refine and ground-truth results, for oak habitat, in particular, and will focus outreach efforts to landowners for participation in District habitat conservation and enhancement programs.

Keywords: Land/watershed management, Habitat restoration

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Mature forest characteristics influencing non-native invasive plant species abundance

Historic land use plays an increasingly important role in understanding and informing the control of non-native invasive species for habitat restoration. Using a unique monitoring program, we survey and analyze data from 87 randomly selected plots to test the sensitivity of non-native invasive plant species abundance to human proximity. The upland urban forest of the Greater Forest Park Region is a mosaic of current and historical human use which in many places has altered key characteristics of the forests' maturity and health. To better understand these threats and monitor the effectiveness of non-native invasive species removal, the Forest Park Conservancy has developed a habitat restoration monitoring program. Across 87 acres and within three project areas, a total of 87 plots with an 11 ft. radius were surveyed to collect high resolution data on each area's forest maturity and non-native invasive plant abundance. Characteristics of forest maturity collected include canopy cover, coarse woody debris, over-story tree diameter, soil organics, woody stem counts, plant species diversity and aerial cover. Data was entered into an Access Database and subsequently analyzed using Stata and ArcGIS Geostatistical Analyst to identify key variables in forest maturity influencing invasive plant aerial cover. Graphical and geospatial results suggest a relationship between conditions related to historical land use and invasive plant species aerial cover, and we plan to further explore these relationships through OLS regression analysis to determine the significance of forest characteristics in a fully-interacted model. The initial analysis reveals details of a forest's ability to reestablish in the face of pressures related to human proximity and illustrates the importance of forest maturity in the inhibition of invasive plant species. These results will add additional information to understanding invasive plant species propagation and vigor in upland urban forest habitats.

Keywords: Habitat restoration, Plant ecology

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Managing Laminated Root Rot at Nadaka Nature Park

In 2010 the City of Gresham and Oregon Department of Forestry conducted field work documenting the presence of laminated root rot in Nadaka Nature Park, a 12 acre natural area located in West Gresham. Laminated root rot (LRR), *Phellinus weirii*, is a fungal pathogen impacting conifers in the Pacific Northwest. Douglas fir, Mountain hemlock, Western hemlock, Grand fir, and Pacific silver fir are highly susceptible to infection while cedars and pines are more resistant and deciduous trees are immune. LRR decays the roots and often leads to death and toppling of infected trees. This presents a particular problem in small urban natural areas like Nadaka where tree fall is a potential hazard and a liability to land managers. Since controlling LRR usually involves removing some infected live trees, LRR in urban greenspaces creates the additional challenge of addressing community concerns with tree removal. As part of the Nadaka Nature Park and Garden Project, the Audubon Society of Portland and Columbia Slough Watershed Council contracted with Wolftree Inc. in the spring of 2013 to develop a treatment plan for the LRR at Nadaka. The plan consisted of a tree removal and replanting prescription to reduce potential tree-fall hazards, control the spread of LRR, and where possible, create wildlife snags. Wolftree Inc. worked with local high school youth to assess the spread of LRR. Audubon Society of Portland worked with local youth to inventory Douglas firs on site providing a baseline of forest conditions. Engaging the community in LRR management in this way helped build neighborhood awareness of LRR and address potential concerns with tree removal. Nadaka Nature Park presents a model for community-based management of urban natural areas with LRR.

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

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Nyberg Marsh: urban watershed retrofit, habitat restoration, and partnership opportunities

To better define watershed management trajectories at Nyberg Marsh, the Wetlands Conservancy (TWC) and Kingfisher Ecological Services are investigating stormwater retrofit, habitat restoration, and partnership opportunities within the 1.1 square mile urban watershed located in Tualatin, Oregon. In 2013, we surveyed 21 residential, commercial, and institutional properties, identifying storm drainage retrofit opportunities and potential riparian and stream restoration. Most development in the watershed pre-dates the advent of on-site stormwater management requirements and over 95% of building downspouts and parking lot drainage systems route to underground storm drain networks. Most Nyberg properties have one or more watershed improvement opportunities that include downspout disconnection, raingarden installation, improved lawn/landscaping practices, riparian plantings, parking lot retrofits, or other practices. Several locations along tributaries have remnant undeveloped open space where larger-scale stormwater retrofits could occur. The storm drain system is divided into six parallel subbasins which drain independently to the marsh or stream, have similar land use patterns, and afford opportunities for contrasting management treatments. As redevelopment occurs, TWC is seeking partnerships with landowners, agencies, and others to implement stormwater retrofits and habitat restoration that support downstream improvements in hydrologic regime and water quality. Although landowner incentives are currently limited, TWC is exploring collaboration models that remove regulatory uncertainty, foster stewardship, and incentivize green infrastructure investments. This initial assessment provides information to explore Nyberg partnerships that seek to harmonize built and natural environments.

Keywords: Land/watershed management, Environmental policy, Habitat restoration, Hydrology, Water quality

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Dose of reality: What can we learn from pet owners to guide more effective environmental stewardship of pharmaceutical and personal care products (PPCPs)?

Improper disposal of unused human and pet pharmaceuticals and personal care products (PPCPs) are an emerging public and watershed health threat around the world. PPCPs are used by people in increasing volumes every year. More than one-third of households in the USA owned pets in 2011 and that trend is increasing (AVMA, 2012). Since the mid-1990's, a limited but increasing number of studies (Morace, 2012 & Boxall, 2012) have consistently documented low concentrations of PPCPs accumulating in watersheds and their acute impacts to aquatic organisms. Current programs on reducing the entry of PPCPs into watersheds take a precautionary approach. They direct stewardship actions such as voluntary take-back programs, not flushing unused human medications, and PPCPs waste reduction. Unfortunately, these programs are typically only used by a small segment of the population. These programs are also not geared towards pet owners and little research exists on what motivates people - specifically pet owners - to take stewardship actions with their PPCPs. We are conducting research through an online survey to: 1) determine pet owners' current PPCPs use and disposal trends, 2) examine and identify attitudes, actions, concerns, barriers, and solutions to PPCPs use and disposal, and 3) use research results to guide further research, education, and policy to improve stewardship of PPCPs use and disposal.

Keywords: Environmental social sciences, Environmental education, Water quality

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Improving efficiency of invasive plant management in urban and rural settings using optimized field data workflows.

Invasive plant management on a large scale often requires organizational sophistication, especially in urban areas, due in part to the large number of land manager relationships and invasive plant data that must be collected, maintained, and utilized. Here, data collection often involves tracking land manager permissions and preferences; outreach efforts; and plant observations, surveys, and treatments. Additionally, increased use of contractors, infestation size, and number of staff involved often makes manual data management, including those partially-based on electronic tools, very time consuming. Newly developed tools connected to cloud services are increasing the efficiency and reducing costs of field data management for many applications relative to existing tools. This talk describes the use of one such tool, Fulcrum, in combination with several other tools to create an automated data collection workflow for an existing invasive plant management program in Clackamas County. This strategy was used to convert a fieldmap and field sheet-based process utilizing manual data entry in the office into a paperless, smartdevice-based solution supporting offline data presentation and collection with automated data integration into existing databases. This project resulted in improved field decision making and situational awareness, enhanced field day flexibility, reduced time spent on data entry and data integration into existing databases, allowed for new data tracking and reporting requirements to be integrated rapidly, allowed for easy expansion of photo monitoring, and supported expanded use of contractors among other benefits. These benefits have additional implications for land managers, including reducing overhead associated with expanded monitoring data collection supporting adaptive management strategies and in the use of citizen science.

Keywords: Land/watershed management, Habitat restoration

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The Red Cinder Ecoroof: Non-irrigated vegetated roof system for dry summer climates

The Red Cinder Ecoroof design is based on several years of study and testing. The goal has been the development of a viable, non-proprietary vegetated roof that is self-sustaining, utilitarian, low cost and low maintenance without the need for irrigation. The new ecoroof system relies on the resiliency of nature and each part is inseparable from the others. Early experimentation at numerous small scale locations provided the basis to test the system on actual buildings. Four Portland buildings have the new ecoroof system, starting with the first in 2010, another in 2011 and two in 2012. All have survived the 2012 driest summer on record for the city of Portland. These ecoroofs have endured drought with no maintenance and NO IRRIGATION. Modification to the design for even drier western cities is being explored. New test projects are planned for selected central and southern California cities.

Keywords: Water quality

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Expanded Monitoring and Treatment of Knotweed in the Salmon Creek Watershed by Eradication Nation

Clark Public Utilities' StreamTeam has restored riparian habitat in Clark County for more than twenty years. To address the increasing problem of invasive species, StreamTeam, with the help of a grant from the National Fish and Wildlife Foundation, created Eradication Nation in 2011. The main goal of this community-based program is to address the threat of non-native invasive plant species in the Salmon Creek watershed while building participation through a network of local partners and volunteers. Eradication Nation's main target is Japanese knotweed because it displaces native riparian vegetation and ultimately creates poor habitat for fish and wildlife. Previous efforts focused on controlling knotweed at existing restoration sites in the lower third of the watershed. In 2013, with funding from the Centennial Clean Water Fund, Eradication Nation began outreach, survey, and treatment activities in rural areas of the upper watershed. Surveys revealed Rock Creek, one of the Salmon Creek headwater tributaries, to be a main contributing source of knotweed in the watershed. This endeavor provided valuable lessons learned, including effective ways to gain landowner cooperation and more efficient surveying techniques. Eradication Nation expanded outreach, contacting more than 9,000 people over the summer through mailings, site visits, and attending community events. Staff, AmeriCorps members, and volunteers surveyed more than 29 stream miles in the headwaters of Salmon Creek and treated 18,908 knotweed stems with a combination of stem injections and foliar spraying. Future plans for Eradication Nation include surveying the remaining tributaries of Salmon Creek and continuing to expand outreach efforts.

Keywords: Habitat restoration, Conservation biology, Environmental education

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Valuing Water Quality In Urban Watersheds: A Comparative Analysis Of Johnson Creek, Oregon And Burnt Bridge Creek, Washington

This study uses the hedonic price method to investigate the effect of five water quality parameters on the sale price of single-family residential properties in two urbanized watersheds in the Portland-Vancouver metropolitan area. Water quality parameters include *E. coli* or fecal coliform, which may affect human health; pH, dissolved oxygen, and stream temperature, which impact fish and wildlife populations; and total suspended solids, which affect water clarity and aesthetics. Properties within ¼ mile, ½, mile, one mile, or more than one mile from Johnson Creek are estimated to experience an increase in sale price of 13.71%, 7.05%, 8.18%, and 3.12%, respectively, from a one mg/L increase in dissolved oxygen levels during the dry season (May-October). Estimates for a 100 count per 100 mL increase in *E. coli* during the dry season are -2.57% for properties within ¼ mile of Johnson Creek, -0.84% (½ mile), -1.14% (one mile), and -0.69% (greater than one mile). Results for properties in Burnt Bridge Creek include a significantly positive effect for a one mg/L increase in dissolved oxygen levels during the dry season for properties within ½ mile (4.49%), one mile (2.95%), or greater than one mile from the creek (3.17%). Results for other water quality parameters in Burnt Bridge Creek are generally consistent with *a priori* expectations.

Keywords: Economics, Water quality

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Data Basin: Using an Open Source Web-Based Platform for Project Management, Data Sharing, Communication, and Geospatial Analysis

Many projects—be they research or restoration—require the expertise and collaboration of multiple partners. The ability to share geospatial data, conduct analysis, and create high-quality exportable maps that clearly communicate project purposes to various audiences greatly contributes to better team dynamics and overall project success. However, such tools are often either expensive or over-simplistic. Data Basin (www.databasin.org) was created to overcome these barriers. The core of Data Basin is free and provides resources to create custom maps, group workspaces for collaboration, open access to thousands of biological, physical, and socio-economic geospatial datasets, and tools for drawing, analysis, and commenting. Data Basin's tools are designed to meet specific needs of scientists, managers, and policy-makers, yet Data Basin does not require extensive technical training. For example, Data Basin can be used to facilitate data sharing and workflows for multi-institutional research projects, restoration initiatives with multiple partners, and monitoring programs. Data Basin is designed to further science-based research and inform policy decisions by facilitating information sharing and empowering social networks.

Keywords: Environmental education, Land/watershed management

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Healthy Trees, Healthy People: Assessing the relationship among urban trees, nitrogen dioxide, and human health

Models estimating the removal of air pollutants by the urban forest typically use data from field studies in pristine forest environments and may not accurately represent air quality in urban areas. In this study, we empirically measured NO2 at ~170 sites in the Portland, Oregon (USA) Metro area, and used land-use regression (LUR) to estimate the impact of urban trees on NO2 while controlling for other NO2 inducing factors, including roads, railroads, elevation and vegetation. We then estimated the health impact associated with trees through the reduction of NO2 using BenMAP, an analytical program from the US Environmental Protection Agency designed to calculate the health impacts of pollution reduction. The LUR model captured 71% of the variability in the sampled NO2. This model indicates that every 1-hectare of trees within 450m upwind of a sampling site is associated with a 0.2 ppb decrease in NO2. On average, in Portland, there is a 14% reduction in NO2 attributable to trees. Results from the BenMAP model suggest that trees within Portland resulted in ~10,000 fewer cases of asthma exacerbation in 4 to 12 year olds and ~50 fewer emergency room visits from respiratory causes for all ages, on an annualized basis. Our study shows that trees in an urban area are associated with a reduction in ambient NO2, and consequently improved human respiratory health. These results are consistent with earlier studies, yet go further by quantifying the reductions in NO2 due to trees based on *in situ* urban measurements and by estimating the consequent respiratory impacts of this reduction.

Keywords: Air quality, Land use planning

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It Takes A Community: One Million. One Year. One Water.

As local and federal restoration funding sources dry up we are challenged to find new ways to leverage existing dollars to restore and steward large-scale restoration projects. Since 2004, many community groups within the Tualatin basin have worked together to restore watershed health on over 15,000 acres. The success of these projects is a reflection of a series of innovative approaches that weave community values and existing funding sources together in a manner that maximizes ecological uplift and supports long term stewardship. During this presentation, we will describe the mechanics of this program and the factors that need to be considered for success. In addition, the audience will be challenge to consider new opportunities to expand funding streams for natural areas restoration in the greater Portland Area.

Keywords: Land/watershed management

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Portland's New Watershed Health Index

After 3 years of development and 3 years of data collected through the Portland Area Watershed Monitoring and Assessment Program (PAWMAP) the Bureau of Environmental Services is ready to release its first watershed specific and city-wide watershed health index (WSHI). WSHI was designed to reduce the complex data gathered through PAWMAP into a visually understandable format. The index is based on measures directly tied to Portland's Watershed health goals. This presentation will provide background on the development of WSHI, the first index results, and plans for using this tool to communicate the state of Portland's watershed health to the public.

Keywords: Land/watershed management, Conservation biology, Environmental education, Habitat restoration, Hydrology, Water quality

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Modeling Effective Shade to Prioritize Riparian Restoration Efforts in the Johnson Creek Watershed

The influence of stream temperature on the survival and reproductive success of anadromous salmonid populations has become an increasingly concerning issue in the Pacific Northwest. Enhancing the height, density and extent of riparian vegetation is widely accepted as one of the most effective strategies for reducing stream temperatures, while also providing numerous ancillary benefits. Effective shade is defined as the percentage of direct beam solar radiation attenuated and scattered by riparian vegetation before reaching the stream surface and is a commonly used criterion for choosing where to restore riparian vegetation. This project aimed to prioritize sites for riparian restoration through effective shade modeling within the geographic extent of the Johnson Creek watershed. Model inputs included a limited set of channel morphology and near stream vegetation attributes and were sampled from high spatial resolution LiDAR derived raster datasets. A separate raster was created to depict restored conditions, in which the maximum height of near stream vegetation was set equal to 27 meters. Effective shade simulations were performed along the mainstem Johnson Creek and all tributary streams over the duration of a single day in August. Model outputs were used to prioritize restoration efforts at the taxlot and subwatershed scale. Under a restoration scenario, 544.9 acres would be restored resulting in the additional solar flux attenuation of 209,118.9 watts/m2*d-1. Restoring only 22% of all taxlots, 21% of all restorable acres, or 50% of all subwatersheds would accomplish 50% of the solar reduction target. Prioritizing at the taxlot scale, as opposed to subwatersheds, promotes a higher level of efficiency in the prioritization of restoration efforts. All taxlots should be further screened prior to final prioritization for opportunistic prospects such as landowner willingness, community support, or proximity to existing restoration projects.

Keywords: Habitat restoration, Water quality

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Carnage and Mayhem on the Urban Landscape Part 2: Analysis of Urban Wildlife Phone Data from Audubon's Wildlife Care Center

Audubon Society of Portland's Wildlife Care Center is the only facility in the Portland Metro Region that is available 365 days/ year to respond to the public's questions and concerns regarding urban wildlife. The Wildlife Care Center treats approximately 3,000 injured wild animals and responds to more than 10,000 wildlife related calls annually. Over a two-year period beginning in November 2011, Audubon tracked phone calls to the center using a standardized data collection form. Information collected included: caller I.D. information, date and time of call, location of caller, species being referenced, issue or concern being raised, response provided, caller satisfaction, and additional call detail narrative. A data set of over 12,000 calls was created. The data set was analyzed using a variety of parameters including temporal (hour, day, week and month) and spatial distribution of calls, type of call by species and issue(s) being raised, information provided and caller satisfaction. As an example, analysis could be conducted on the number and percent of calls pertaining to birds striking windows, temporal and spatial distribution of those calls, specific species impacted, information provided by Audubon and whether the caller found that information useful in addressing the issue. This information is valuable in documenting human -wildlife interact on our urban landscape, identifying existing and emerging threats to wildlife, prioritizing urban wildlife policy and management initiatives, and refining and targeting educational outreach programs to better serve the public and protect urban wildlife populations. Audubon will continue collecting phone call data to the Wildlife Care Center. In this presentation, we summarize the first two years of data collection and discuss how we plan to modify the research going forward. This project complements research that has been conducted since the 1980s regarding the animals brought to the Care Center for treatment.

Keywords: Environmental social sciences, Animal ecology, Environmental education, Environmental policy

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Building Effective Cross-Purpose Volunteer Programs in Urban Natural Resources: Analysis and Redesign of Metro's Volunteer Services Program in Natural Areas, Parks, Conservation Education & Historic Cemeteries

Volunteer engagement has a long tradition in urban ecology and stewardship. However, volunteer programs are often challenging to implement effectively in natural resources agencies. Volunteer services programs must frequently balance multiple goals, work across different departments, adapt to changing agency needs, volunteer dynamics and patterns, interests, and populations. As a result they often suffer from fracture and lack of strategic vision and management. We used a systematic process to develop a new program and tools to increase volunteer engagement and equip the program to grow with increased land management needs. We combined a strategic planning approach with nine facilitated team meetings, intensive interviews, and assessment of best practices in 17 other agencies to identify strategic issues, appropriate program structure, and tools for managing for multiple goals across internal hierarchies. The new program model is being adopted to magnify volunteer engagement in Metro's natural resources management. By replicating this systematic strategic analysis, decision-making regarding models and best practices from agencies, and tools for monitoring and managing multiple goals across departments, other natural resources agencies may increase volunteer engagement and cohesion in volunteer program management.

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

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Preservation and Restoration of Rare White Oak Savanna

Neighbors for a Liviable West (NLWL), a small nonprofit organization, has been working on the preservation and restoration of a rare White Oak Savanna in West Linn, Oregon for 10 years. Fourteen acres of the upper Savanna have been acquired and restored. Currently, we are working on preserving the lower 5.65 acres so that it can be restored. Many naturalists, scientists, and other specialists have assisted us. This abstract addresses the types of information received from these experts and how this data helped us to achieve our goals. Dr. Richard Mishaga, who had been doing an informal field study of the vertebrate species in the Savanna area for several years, furnished us with a list of more than 100 vertebrates identified in the area. Dr. Mishaga has led numerous field seminars in the Savanna and hundreds of of high school and primary students have volunteered and learned about Savanna flora and fauna during their site visits. Wendell Wood, a well respected naturalist with decades of experience, was another expert that we consulted with in 2009 and 2012. He listed the native species that had reemerged as a result of the thousands of community restoration volunteer hours (6,700 hours to date). The work of these experts were cited among the many reasons that the funding sources (Metro, Oregon State Parks and Recreation, City of West Linn) approved the acquisition grants in 2009. They were important factors in the second Metro grant that was awarded in the summer of 2013. We also discovered water running underground in culverts that had been diverted during construction of the street in 1975. We had Jonathan Rhodes, a hydrologist, assess the situation and he wrote a report on his findings. This water underground is Bernert Creek and daylighting it is a project to be done once the lower 5.65 acres are preserved. It has been estimated that the number of vertebrate species will double when Bernert Creek is flowing above ground again.

Keywords: Habitat restoration, Environmental education

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Habitat and Landscape Factors Influencing the Presence of Five Pond Breeding Amphibian Species in Highly Urbanized Ponds in Gresham, OR

Habitat use by amphibians in highly urbanized areas is often misunderstood, in large part because available habitat is typically fragmented and degraded to a point where habitat use patterns are inconsistent with populations in less developed areas. In order to better understand the habitat requirements of five native (*Ambystoma gracile, Ambystoma macrodactylum, Pseudacris regilla, Taricha granulosa, Rana aurora*) and one non-native (*Rana catesbeiana*) pond breeding species in urban areas, occupancy data were collected at 100 sites throughout Gresham, OR, over five years (2008 and 2013). Data were collected for local (N=8) and landscape (N=10) characteristics for each site, and a multivariate approach was used to identify patterns of species occupancy and potential environmental drivers. A multiple linear regression approach was used to identify the most important occupancy drivers for each species, and a piecewise regression approach was used to evaluate possible threshold effects of environmental drivers. We found that occupancy was positively correlated with hydroperiod and distance to nearest pond for all species. In addition, occupancy was negatively correlated with fish presence, percent invasive vegetation, and distance to forest patches of most sizes. Depth, while positively correlated with all species, had the strongest correlation with *T.granulosa, R. catesbeiana*, and *A. gracile*. These results indicate that the habitat needs of these species are complex and that in order to retain breeding populations in urban areas, all of these needs should be considered in habitat restoration efforts.

Keyword: Animal ecology, Wildlife biology

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Eradication of Ludwigia peploides from the Blue Heron Wetlands of NE Portland: Project Update

Ludwigia peploides, aquatic primrose-willow is an exotic emergent aquatic weed that is rapidly expanding its range in Northwestern Oregon. *Ludwigia peploides* ssp. montevidensis was observed in the Blue Heron Wetlands (BHW), a three acre mitigated wetland in the East Columbia neighborhood of Northeast Portland in 2006. By fall 2012, *L. peploides* was present in 2.3 acres of the wetland, with 1.1 acres possessing a high density of cover (> 50%). The BHW Restoration Project was established to completely eradicate *L. peploides* by fall 2014. To quantify the efficacy of herbicide application, fifteen 6 x 6m test plots were established in areas that experienced year-round soil saturation. Biomass sampling and density mapping were carried out before and after application. Chemical treatment on September 26, 2012, consisted of a 3% concentration of glyphosate (Aquamaster® with Competitor®). On August 5, 2013, high density areas (> 50% cover) of L. peploides were reduced by 63%, moderate density areas (5-50%) were reduced by 60% while sparse density areas (< 5%) increased by 330%, compared to pre-application densities. Heavy infestations of *L. peploides* remained where flowering occurred earlier in the season in response to soil drying. Chemical application was repeated on August 8, 2013 to yield better control on bank areas. Final data collection showed declines of *L. peploides* in treatment plots compared to control plots. Chemical treatment resulted in mean biomass samples of 1.22 g/sample, compared to 25.26 g/sample in the control group. Application of 3% glyphosate in early fall yielded suitable control for dense infestations of *L. peploides* in late drying or perennially wet areas of the BHW. Hand pulling or chemical application earlier in the growing season is recommended to control areas of sparse infestation or where *L. peploides* flowers earlier in the season. Information from this project can be used by regional land managers in the eradication of *L. peploides*.

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

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Environmental Impact of Fine Particulate Matter from Brooklyn Railyard

Black carbon, nitrogen oxides (NOx), ozone (O3), carbon dioxide (CO2), and particle size distribution and concentrations, were collected from a sampling site at a warehouse 2,751 feet from the Brooklyn Rail yard in Portland, Oregon in Fall 2013. The sampling site consists of a 2-wavelength aethalometer used to measure black carbon (BC), a CO2 analyzer, a chemiluminescent NOx analyzer, a spectroscopic O3 analyzer, an Aerotrak Particle Counter, and a weather station. The data provides insight into how truck and train activity at the rail yard affects air quality in the surrounding area. BC concentrations are observed in the range of 0-10 μg/m3, total PM2.5 (fine particulate matter) 10-25 μg/m3and during nighttime temperature inversion events, NOx regularly reaches 80 ppb. By comparing peaks of BC to NOx or CO2, emissions factors are calculated, providing information on the efficiency of engines at the Brooklyn Railyard. These emissions will be monitored over a seasonal cycle, during which the Railyard has committed to replace several poor-performing engines with new, efficient models, to assess the impact of that change on air quality.

Keywords: Air quality, Environmental policy, Transportation

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Riparian Vegetation Assemblages and Associated Landscape Factors Across an Urbanizing Metropolitan Area

While diverse, native riparian vegetation provides important functions, it remains unclear to what extent these assemblages can persist in urban areas, and under what conditions. We characterized forested riparian vegetation communities across the Portland-Vancouver metropolitan area and examined their relationships with surrounding land cover. We characterized vegetation at 30 randomly selected riparian areas on both public and private property in the metro area. At each site we recorded vegetation at 1-cm intervals along 3 transects using the line-intercept method. Land cover was characterized at 2 scales: within 500 m of each site and across the entire watershed. Multivariate analyses were used to evaluate relationships between species composition and land cover patterns. A classification tree was created to determine landscape predictors of riparian community type. Results indicate a strong relationship between watershed land cover and riparian vegetation diversity and structural complexity. Specifically, our classification tree showed that ≥15% forest cover within the watershed was required for structurally diverse riparian communities dominated by native plants. Non-native species, including *Hedera helix* (English ivy) and *Phalaris arundinacea* (reed canary grass), were dominant in sites with lower forest cover in the surrounding watershed. These results suggest that, even with forested riparian stream buffers, maintenance of sufficient forested area at the watershed scale is necessary for the persistence of native riparian vegetation assemblages that provide desired ecosystem services.

Keywords: Plant ecology, Conservation biology, Land/watershed management

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Parking Forests: Parking Lots as if Mother Nature Designed Them

Tualatin Riverkeepers secured funding from an Environmental Protection Agency grant through Department of Environmental Quality to use trees in two parking lots to manage stormwater. Usually parking lots are built on heavily compacted soils, a harsh environment for trees, but new technologies are changing that. At THPRD Sunset Swim Center and Portland Community College (PCC) Sylvania Campus, contractors constructed linear tree wells using engineered “structural soil” that supports the weight of pavement and vehicles, but allows tree roots to grow and water to infiltrate. Structural soil is a mix of large gravel, soil and other beneficial amendments. Using the structural soil allowed the addition of the trees to the parking lot without losing any parking spaces. The Sunset Swim Center tree wells were installed in a new pervious concrete parking that allows rain water to pass through the pavement and infiltrate into the ground. More than 650,000 gallons of rain falls on this parking lot in a typical year. None of that rain will become polluting, erosive stormwater runoff. The PCC project site is on a smaller scale and has some significant differences and additional partnerships. The tree wells at PCC will capture runoff from the adjacent impervious parking lot. Volunteers coordinated by our nonprofit partner Depave, removed 400 square feet of asphalt for the linear tree wells. Native Douglas fir trees were planted by students this fall. Water quality monitoring of stormwater running through the tree wells will be performed by Portland Bureau of Environmental Services. Additional monitoring and surveying on the site will be performed by PCC students as part of their science and engineering curriculum.

Keywords: Water quality, Environmental policy

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