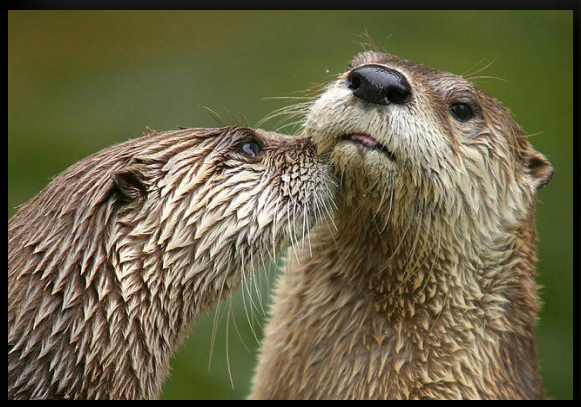





11th Annual Urban Ecology and Conservation Symposium



Proceedings
February 11, 2013



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11TH 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 11, 2013

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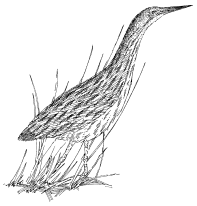

URBAN ECOSYSTEM RESEARCH CONSORTIUM (UERC)
PORTLAND, OR – VANCOUVER, WA
METROPOLITAN REGION

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
Tualatin Hills Parks & Recreation District
U.S. Fish and Wildlife Service
Urban Greenspaces Institute

Website

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.

2013 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
Bureau of Environmental Services, City of Portland
Metro
Urban Greenspaces Institute

2013 URBAN ECOLOGY & CONSERVATION SYMPOSIUM
AGENDA

8:00 **REGISTRATION**

9:00 **WELCOME AND INTRODUCTION:** Lori Hennings, Metro, Sustainability Center

9:10 **ANNOUNCEMENT OF WORLD ENVIRONMENT DAY 2013: Elisabeth Guilbaud-Cox,** United Nations Environment Programme, Regional Office of North America

9:15 **OPENING KEYNOTE ADDRESS: Jonathan Soll,** Metro, Sustainability Center
The Intertwine's Conservation Strategy for The Greater Portland-Vancouver Metropolitan Area: A framework and tools for enhancing conservation practice

WILDLIFE IN THE REGION *Moderator: Cory Samia*

9:55	Laura Guderyahn	City of Gresham	Gresham's 10 years of biodiversity surveys: An efficient and effective way to manage sensitive species and engage the community
10:05	John Deshler	Portland Parks & Recreation	The Forest Park Wildlife Report
10:15	Elaine Stewart	Metro	Integrating habitat components into trails crossing urban environments to assist dispersal
10:25	John Gaddis	Tualatin Hills Park & Recreation District	Urban beaver management
10:35	Celeste Mazzacano	Xerces Society for Invertebrate Conservation	Citizen-science shows urban streams can sustain threatened native freshwater mussel populations

10:45 Q&A

10:55 **BREAK** *Raffle at 11:05*

UNDERSTANDING AND IMPROVING STREAM HEALTH *Moderator: Jennifer Thompson*

11:10	Vineet Apte	Westview High School	A fresh look at the water quality of Bronson Creek: Evaluation of urbanization's effects on total phosphorus concentrations from stormflow water samples in the Bronson Creek watershed
11:20	Robin Jenkinson	Johnson Creek Watershed Council	Who's pooping in Johnson Creek? Results and lessons learned from bacteria source tracking in the Johnson Creek Watershed
11:30	Chris Prescott	City of Portland	Monitoring watershed health in the City of Portland
11:40	Janine Castro	U.S. Fish and Wildlife Service & NOAA Fisheries	Science, policy, and pragmatism: Why programmatics should matter to you

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: David Maddox**, The Nature of Cities, NYC Natural Areas Conservancy, Sound Science LLC
Let's Create a Biophilic Urban Ethos at All Levels of Public Dialog

CONSERVATION CONNECTIONS *Moderator: Ted Labbe*

1:40	Mary Bushman	City of Portland	Re-naturing North Portland - lessons learned in Baltimore Woods
1:50	Mary Logalbo	West Multnomah Soil & Water Conservation District	Portland Urban Meadowscaping Pilot (PUMP)
2:00	Sarah Church	University of British Columbia	Bioswales and Rain Gardens: The social benefits of place-based urban design and planning
2:10	Katy Weil	Metro	Wildlife disease response - success based on collaborative regional partnerships
2:20	Q&A		

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

ECOLOGICAL PROCESSES AND DYNAMIC LANDSCAPES *Moderator: Igor Lacan*

2:50	Kathy Majidi	City of Gresham	Prioritizing protection and restoration investments within an evolving urban landscape: Gresham's natural resources master planning using a geo-processing model
3:00	Dean Apostol	MIG Inc.	Managing wildfire risk in Clackamas County Parks
3:10	Laura Taylor	Portland State University	Propagule pressure and disturbance drive the spread of an invasive grass, slender false brome (*Brachypodium sylvaticum*)
3:20	Bruce Roll	Clean Water Services	Can you handle the process? Case studies of stream stewardship in developed landscapes
3:30	Colin Thorne	University of Nottingham	Flood risk management in Blue-Green Cities - will Portland set the international standard?
3:40	Q&A		

3:50 **WRAP UP** *Closing remarks by Bob Sallinger, Audubon Society of Portland*

4:00 – 6:00 POSTER SESSION AND SOCIAL

POSTER PRESENTATIONS

AUTHOR(S)	TITLE
Dean Apostol, Tonia Burns and Barry Sims	Managing wildfire risk in Clackamas County Parks
Miki Barnes, Jim Lubischer, Ben Williams, Richard Angell, David Barnes	General aviation and lead pollution
Katie Bohren, Torrey Lindbo and Joseph Maser	The effects of utility pole placement and characteristics on pentachlorophenol concentrations entering Underground Injection Control (UIC) devices: City of Gresham, Oregon
Jill Bonanno, Robin Jenkinson and Noah Jenkins	Johnson Creek riparian reforestation strategy
Danielle Draper, Delphine Farmer and Juliane Fry	NOx effects on nighttime secondary organic aerosol (SOA) formation
Marion Dresner, Corinne Handelman and Steven Braun	Natural area stewardship in Portland, Oregon: Understanding volunteer motivations
Abbey Driscoll, Paul Ries, Mike Wetter and Heather Kent	The Portland/Vancouver Metropolitan Regional Urban Forestry Strategy
Scott Gall, Kammy Kern-Korot and Michael Ahr	McCarthy Creek: A whole watershed approach to resotration
Travis Goddard, Casey Gozart, Brent Davis and Julie Christian	Clark County's Growing Green Program
Lori Hennings, Ted Labbe, Eric Nielsen and Jonathan Soll	Developing a regional map of oak habitat: Intertwine Alliance Oak Mapping Work Group
Laura Holloway, Christina Piedrahita, Mehmet Balkan, Jake Bevis, Maysa Miller and Todd Rosenstiel	Ecoroofs and Photovoltaic Panels: Why plant biology matters
Roy Iwai	Fish use in Beaver and Upper Johnson Creek
Meghan Kearney	Connecting people with nature: National, regional and local outreach strategies
Laura Krause, Joshua Katz and Juliane Fry	Quantification of organic functional groups in ambient aerosol using ATR FT-IR
Bethany Lund, Rick Jayne and Aaron Shaw	Clark Public Utilities Salmon Creek Japanese Knotweed Control Program

AUTHOR(S)	TITLE
Mary Rose Navarro, JoAnn Herigel, Gail Shaloum and Kaitlin Lovell	Metro's Nature in Neighborhoods Capital Grants invest in projects that re-green communities
Briita Orwick	Pet storeowner survey: Preventing aquaria release into the wild
Hannah Prather and Todd Rosenstiel	Impacts of urbanization on epiphytic biodiversity and function across the Portland urban airshed
Meenakshi Rao, Hannah Prather, Jacinda Mainord, Shavon Caldwell, Linda George, Todd Rosentiel, Alexis Dinno and Vivek Shandas	Developing a land use regression model to predict intra-urban variability of NO2 in the Portland Metro area
Lauren Senkyr and Jennifer Thompson	Habitat restoration planning update for the Portland Harbor Superfund Site
Elaine Stewart, Chris Hagel and Adam Stellmacher	Oregon white oak release at Willamette Narrows
Benjamin Williams	The Willamette Valley & French Prairie: A historic assessment of a special agricultural resource
Candice Weems	The spatial distribution of parks and crime in Seattle, Washington: A study of environmental inequality
Lea Wilson	Attitudes towards ecosystem services in urban riparian parks

MORNING KEYNOTE ADDRESS

Jonathan Soll
Science and Stewardship Division Manager
Metro Regional Government, Sustainability Center
Portland, OR

The Intertwine's Conservation Strategy for The Greater Portland -Vancouver Metropolitan Area: A framework and tools for enhancing conservation practice

The greater Portland-Vancouver region is blessed with natural riches. Located at the confluence of two great western rivers and nestled between two mountain ranges, our region is justifiably proud of our natural heritage. We can also be proud of a 100 year heritage of resource conservation and land use planning. Salmon still spawn in our rivers. Rare species still occupy our natural areas. Representative flora and fauna can be seen minutes from most residents' doors. Furthermore, a wealth of public organizations, academic institutions and motivated and committed non-profits are working to improve the quality of life and the biodiversity of our region. We have national leaders in a broad suite of conservation fields and a population willing to financially support smart conservation efforts with their tax dollars. What we have never had was a comprehensive strategy for organizing and marketing our efforts and tools developed at the appropriate scale to empower those efforts.

The Intertwine's Regional Conservation Strategy for The Greater Portland-Vancouver Metropolitan Area (RCS) was an ambitious, partner-driven effort to begin filling that gap. The product of more than 2 years and the contributions of well over 100 individuals and dozens of organizations, the RCS represents the first effort to comprehensively assess the strategies needed to protect our natural systems and their residents close to where we live. The RCS provides a basic overview of our region's current condition, threats and desired future conditions; addresses issues like climate change and biodiversity corridors; equity and environmental education; conservation in natural areas, working lands and urban landscapes; ecosystems services and green infrastructure; and current species specific initiatives. In doing so it both documents and frames the work being done by our community.

The RCS is much more than a conceptual framework for action however. The RCS, in the form of its supplemental Regional Biodiversity Guide, also provides a comprehensive assessment of the flora, fauna, natural habitats and natural processes that represent and support our region's biodiversity, and provides carefully vetted species lists by habitat type. It also provides a watershed-level viewpoint of priorities and summarizes conservation land ownership by manager.

Last but not least, the RCS effort led to the production of land cover maps and data-driven habitat prioritization models that cover our entire region at a scale appropriate to our land use and land cover patterns and are useable at any geographic scale. Under the guidance of the RCS steering committee and a tech-savvy sub-committee, 5-meter scale maps of land cover were produced by Portland State University's Institute for Natural Resources (INR). This map layer was subsequently used by INR to develop raster-based models of habitat value for upland and riparian habitats. Because they are raster-based, our models can be applied to any geography without prejudice and should prove a useful tool for improving conservation decision making in our region.

Biography

Jonathan Soll is the Science and Stewardship Division Manager in Metro's Natural Area Program, part of the Sustainability Center. He leads the Metro science team responsible for setting natural area acquisition and restoration priorities and for developing and implementing restoration projects on Metro's portfolio of nearly 16,000 acres. Jonathan and his team are also responsible for representing Metro on conservation science issues and working with partners on projects throughout the region.

Jonathan's training includes a biology degree from Reed College and a Master's degree in Forest Ecosystem Analysis from the University of Washington, College of Forest Resources, plus nearly 25 years in the school of hard knocks doing practical conservation biology and natural resources management. Jonathan's conservation work has focused on three main tracks: restoration ecology, especially controlling invasive species in remnant high quality habitat, conservation planning and monitoring for enhancing management effectiveness and developing conservation priorities for large landscapes.

Before joining Metro in 2009, Jonathan worked for the Nature Conservancy for 16 years; the last 10 as Portland Area Preserves Manager and Willamette Basin Conservation Director. Prior to resettling in the Willamette Valley in 1999, he served as Central Washington Project Manager for the Washington Field office of The Nature Conservancy where he managed biodiversity inventory and analysis projects on the Hanford Nuclear Reservation and the Yakima Training Center.

Jonathan is also husband of Melissa Rowe Soll, father of Jasper and Aviva, avid gardener, hack guitarist, cook and lover of subalpine wilderness. Jonathan's favorite wild habitats include oak savanna, open oak-pine-fir woodland and subalpine meadows. If forced to pick a favorite site from the Portland - Metro area, he would choose the Willamette Narrows Area for its oak trees, basalt bluffs and sense of timelessness.

AFTERNOON KEYNOTE ADDRESS

David Maddox
Founder & Editor, The Nature of Cities
Director of Science, NYC Natural Areas Conservancy
Chief Scientist, Sound Science LLC
New York, NY

Let's Create a Biophilic Urban Ethos at All Levels of Public Dialog

Good science is essential. So too is public involvement. Urban ecological initiatives involve ecologists, designers, lawyers, architects, technologists, and policy makers. But, they must also include the public who uses and benefits from urban green spaces. Yet information and engagement tends to be very top down. How can we improve engagement and a two-way flow of knowledge? Social media are nice, but I'm already way over 140 characters. Ideas include: create forums for crowd-sourced discussion of environmental concerns; integrate NGO's as "bridge organizations" to government; expand, and make effective, participatory science; understand why people use (or don't use) local and regional green spaces; involve the public in local and regional ecological planning; and, create mechanisms to share knowledge among cities. Useful and mainstreamed knowledge is key to creating a truly biophilic urban ethos, and the exchange must be facilitated at all levels of public dialog.

Biography

David Maddox is committed to the health of the natural environment, urban resilience, the application of ecosystem services for human welfare and livelihoods, and the effective and efficient monitoring and evaluation of these issues. As Founder and Editor of TheNatureOfCities.com, Co-Founder of Sound Science LLC (http://www.sound-science.org), and Director of Science for the New York City Natural Areas Conservancy, his current work is in the development of useful knowledge for design and management of social-ecological systems in urban landscapes.

ABSTRACTS SUBMITTED

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Managing wildfire risk in Clackamas County Parks

Wildfire is a important ecological factor in most Northwest Oregon ecosystems, including conifer forests, oak woodlands, and prairie grasslands. North Clackamas Parks and Recreation District and Clackamas County Parks recently completed a two year project that resulted in a wildfire management plan for parks and natural areas in both jurisdictions. A two step screening process that began with over 80 sites was used to determine which posed the highest potential risk. Major risk factors include: extent and connectivity of flammable vegetation, terrain, park size, adjacent land uses, and fire fighting access. Both GIS and field survey data were used to assess risk. Field projects to reduce fire risk and move parks toward desired future ecological conditions were completed in 2012 for seven parks, including Madrone Wall, Three Creeks, and Mount Talbert. Risk reduction projects included brush and tree removal to help restore oak woodlands.

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

Vineet Apte

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A fresh look at the water quality of Bronson Creek: Evaluation of urbanization's effects on total phosphorus concentrations from stormflow water samples in the Bronson Creek watershed

In 2003, a master's thesis paper was published at Portland State University (Creech 2003) that detailed the effect of impervious area/urbanization and the best management practices plan (Clean Water Services) on water quality, specifically total phosphorus concentrations. Contradictory to a majority of published literature, this paper stated that an increase in impervious area over time improved water quality by normalizing water temperature and decreasing total phosphorus concentrations. In order to reexamine Creech's claim, total phosphorus concentration data from the influent stormflow pipe at Stoller Middle School (Bethany, OR) was collected from the Clean Water Services Database. When urban development in the survey region was assessed, qualitative analysis and examination of land use patterns showed that development had grown significantly during 2001-2008. Between 2003 and 2008, the trend in total phosphorus concentration data for the stormflow pipe demonstrates a positive correlation (R2=.91) between urbanization over time and total phosphorus concentrations. This result indicates that it is imperative for the best management practices plan to include stormflow data in sensitivity analysis and focus on residential sources of phosphorus in order to mitigate the effects of urban development on the level of organic pollution.

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

Miki Barnes[1], Jim Lubischer[2], Ben Williams[3], Richard Angell[4], David Barnes[5]

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General aviation and lead pollution

General aviation piston-engine aircraft are responsible for nearly 50 percent of the lead released into the air in this country. This toxic substance was eliminated from automotive fuel more than 15 years ago. Nonetheless, despite well known negative health and environmental impacts, lead is still added to aviation fuel. EPA documentation reveals that there is a significant correlation between higher lead concentrations in the air and proximity to airports where piston-engine aircraft operate. Residents throughout the Willamette Valley and in other parts of Oregon are impacted by lead emissions from the more than 450 airports throughout the state. Hillsboro Airport (HIO), where piston-engine aircraft operations comprise the majority of the more than 200,000 annual take-offs and landings, ranks 21st in lead emissions of nearly 20,000 airports in the U.S. Smaller airports also contribute substantial lead to the environment. The Aurora Airport, for example, ranks third in the state in lead emissions. General aviation airports like HIO and Aurora that serve, in large part, private flight training companies, recreational hobbyists, and air taxi flights are often major producers of this pollutant. Commercial jets, by contrast, use jet fuel, which does not contain lead. This paper examines the detrimental effects of lead pollution on health, particularly that of children, and also looks at scientific arguments for reducing this pollutant. In addition, the business, political, and legislative policies that continue and promote lead pollution in the aviation industry are explored.

Keywords: Air quality, Environmental policy, Transportation

Katie Bohren[1], Torrey Lindbo[2], Joseph Maser[3]

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The effects of utility pole placement and characteristics on pentachlorophenol concentrations entering Underground Injection Control (UIC) devices: City of Gresham, Oregon

Pentachlorophenol (PCP) is a fungicide that has been banned for general use, but is still used for treating wooden utility poles. PCP-treated utility poles have been linked to concentrations in urban stormwater that can exceed the Safe Drinking Water Act limit of 1 ug/L. PCP is a known carcinogen and can cause liver and kidney damage in humans over time. With the use of underground injection control (UIC) devices as an alternative method to treat and dispose of stormwater, the potential exists for groundwater contamination of PCP. In this study 60 UIC device contributing areas were surveyed for the presence and characteristics of utility poles in Gresham, Oregon. A positive correlation was found between utility pole surface area in a UIC contributing area and PCP concentration in stormwater. A stronger correlation exists for surface area of utility poles surrounded by concrete and PCP concentration in stormwater. The year of the last inspection by the electrical company could also be an indicator of PCP concentration in stormwater, as additional treatment compound is often injected into utility poles during these inspections. The intensity of the rainfall event during stormwater sample collection, in combination with these other attributes, may impact how much treatment compound is able to leach from the pole. Recommendations for future research include ongoing monitoring of PCP in stormwater and identifing utility poles surrounded by concrete that might contribute higher PCP loads to UICs. An effective solution for existing utility poles is when sidewalks are built or replaced, maintaining or adding a soil or vegetation buffer around the utility pole.

Keywords: Hydrology, Land/watershed management, Sustainable development

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Johnson Creek Riparian Reforestation Strategy

Johnson Creek Watershed Council is focusing its restoration planning on the enhancement of riparian areas throughout the watershed. The goal for this year is to have created a watershed-wide riparian restoration strategy by July 2013. The Johnson Creek Riparian Reforestation Strategy will put forth an action plan for achieving 80% shade cover from riparian forests along Johnson Creek in the next 40 years. This shade level is needed to meet the temperature TMDL for Johnson Creek, as assessed by Oregon DEQ in 2006. This is the first time that there has been a concerted effort to restore riparian areas throughout the entire watershed, and it requires collaboration with many jurisdictions, conservation districts, non-profits, businesses, and private landowners. Steps to create the strategy are (1) assess maintenance (weed control and inter-planting) needs for sites in the watershed at which restoration work has been done in the past by connecting with site managers or conducting site visits, (2) use data from the cities of Portland and Gresham, ODA, and heat-source modeling data from DEQ and an ongoing PSU masters project to compile a map of riparian conditions throughout the watershed and (3) prioritize areas most in need of, or that would gain most benefit from restoration and maintenance. This prioritization will guide outreach and implementation actions, which will begin in late summer 2013.

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

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Where have all the young trees gone? A big picture look at the lack of seedlings and saplings in urban forests

We take a big picture look at the lack of seedlings, saplings and young trees in urban forests using our research in Forest Park in Portland, Oregon. Broshot, who measured vegetation at 25 sites in Forest Park, recorded significantly fewer live seedlings, saplings and young trees and significantly more dead seedlings, saplings and young trees in 2003 than in 1993. The percent mortality of western red cedar seedlings that were planted at 9 sites in Forest Park in 2005 ranged from 11 to over 70%. Investigations into the cause of seeding death has discounted predation by deer, elk or invertebrates, leaf disease, soil moisture, site aspect, and light as factors. The site with the highest mortality is located directly above the St John's Bridge, suggesting air pollution. More recent work with lichens has provided evidence that nitrogen deposition related to air pollution may be the cause. We will outline our past work and have preliminary results from our 2012 lichen survey analyses to support our hypothesis that pollution is a cause of the lack of young trees.

Keywords: Conservation biology, Plant ecology

Mary Bushman[1], Marissa Dorais[2], Barbara Quinn[3], Betsy Valle[4], Eric Roswell[5]

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Re-naturing North Portland - Lessons learned in Baltimore Woods

The Baltimore Woods Corridor is located in north Portland, stretching north of the St Johns Bridge for 3/4 mile. It is a wooded buffer between residential and industrial neighbors along the river. Baltimore Woods is a vision for an urban paradise realized through citizen advocacy, and diverse tools in restoration. Just three years ago Baltimore Woods was a patchwork of un-cared-for properties. Unattractive to most observers but a haven in the eyes of a few neighborhood believers: known as the “Friends of Baltimore Woods” (FOBW). FOBW have devoted their energy to preserving and restoring the special habitat values of the corridor, ensuring access to nature for children and nearby residents. Strong partnership resulted in success for Baltimore Woods. FOBW motivated partners large and small with their enthusiasm including: Neighbors, Columbia Land Trust, SOLVE, Depave, Bureau of Environmental Services, Parks and Recreation, Office of Healthy Working Rivers, Port of Portland, and Metro. Over 10 acres of new publicly owned property was acquired to protect in perpetuity a corridor of Oregon white oak, maple and madrone trees, native shrubs and native wildflowers. Four acres are currently being restored to native prairie habitat (St. John's Prairie!), including 1.5 acres which were under pavement. Partners took 3 approaches to site preparation for restoration of native prairie species and completed data analysis of the approach through intensive time lapse photography. The site is also the first large-scale depave to a natural area (1.5 acres), and the first controlled burn in an industrial/residential neighborhood in Portland.

Keywords: Habitat restoration, Hydrology, Land/watershed management

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Science, policy, and pragmatism: Why programmatics should matter to you

When river restoration practitioners talk about the most significant challenges they face in project development and implementation, the topic often turns not to design or construction, but rather to regulations and permitting. Practitioners have typically viewed regulations as barriers to implementation, rather than tools to improve project quality. Because of federal and state laws, stream restoration projects must have a stack of permits prior to construction - everything from a 404 permit, to a Biological Opinion, to state fish passage approval - yet the agencies tasked with natural resource management want to encourage and support stream restoration. To this end, streamlining tools *intended* to get good restoration on the ground, while also reducing permitting uncertainty and approval timelines, have been developed. In just the past year, major aquatic restoration programmatic biological opinions, such as the Aquatic Restoration Biological Opinion for Washington and Oregon, the Idaho Conservation Programmatic for all of Idaho, and the Habitat Improvement Program Biological Opinion with Bonneville Power Administration for the entire Columbia Basin, have been developed or updated. Instead of the static programmatics of the past, these adaptively managed tools are intended to be nimble, responsive, and represent the state-of-the-science. If you are involved in a stream restoration project in Idaho, Washington, or Oregon, you will likely be working with one of these “streamlining tools.” I will discuss how and why these programmatics were developed, their potential use in the Portland Metro area, and opportunities to provide feedback on their efficacy and suggestions for their improvement.

Keywords: Environmental policy, Habitat restoration

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Valuing health benefits and stewardship in urban parks

According to the United Nations Population Division, 70% of the world's population will live within towns and cities by 2030. People in large cities will have smaller living quarters and generally less access to open space and nature. As more people live in cities, the importance and value of urban parks will increase in the 21st century. Urban parks house green infrastructure that provides a suite of ecosystem services, including flood protection, biodiversity, carbon sequestration and water quality. When these lands are highly prioritized and adequate steps are taken to ensure ecological sustainability and biodiversity, the links between parkland and economic prosperity will become evident in the forms of improved ecosystem services, increased social capital, improved health and education, a stronger local economy and a higher quality of life for residents across many decades. In light of recent international economic downturns and the governmental budget reductions, justification for continued park funding is now more important than ever. In 2011, Earth Economics partnered with the Metro Parks Tacoma to provide an analysis of the ecosystem service, health and social values of the 70 parks in Tacoma, Washington State (USA). With an emphasis on 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 included estimations of the health benefits from physical activity and air purification in urban parks along with the value of the community contribution to parks and the unique park education programs. In total, Tacoma parks were found to provide between $21.8 and $32.2 million in benefits each year.

Keywords: Air quality, Economics, Environmental policy

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Bioswales and Rain Gardens: The social benefits of place-based urban design and planning

Sustainable stormwater management facilities such as bioswales and rain gardens are one way in which cities are simultaneously addressing the need to replace or repair stormwater infrastructure while also meeting regulatory obligations. Retrofitting the pattern of neighborhood development through the implementation of infrastructure like bioswales is a place-based urban planning and design strategy that also addresses sustainability and resilience while reflecting the city as *part of* rather than *separate from* the ecosystem. This paper presents results of 42 semi-structured interviews collected through an exploratory qualitative case study of Portland Oregon's Tabor to the River program. These findings focus on Green Streets (bioswales) as small scale nature and a visible natural system, and their potential social benefits toward place-based understanding that might translate to a place-based ethic. Results demonstrate there are social benefits to sustainable stormwater management facilities that range from increased aesthetics and traffic calming, to the cultivation of place-based awareness. Implications toward policy and program development include 1) The need for improved and continued transparency and reporting of Green Street intent, siting, and operation; 2) The importance of multiple points of contact and education, especially at points of daily life, in fostering place-based understanding, and 3) The integration of less engineered and more “natural” facilities incorporated into the vision and goals for the City in order to facilitate connection with nature. In all, this research further informs a shift to softer infrastructure solutions in general and the broader societal impact of such infrastructure and their supporting policies and programs.

Keywords: Environmental education, Environmental social sciences, Sustainable development

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The Forest Park Wildlife Report

In 2011 Portland Parks & Recreation funded the creation of The Forest Park Wildlife Report, a compilation and analysis of all available data on Forest Park wildlife that was completed in fall 2012. The report provides baseline information on wildlife species and habitat, identifies gaps in wildlife information, identifies threats to wildlife populations, and recommends next steps in the study of park wildlife to park managers, academic researchers and citizen scientists. The report includes an inventory of vertebrate and invertebrate species, and describes relative abundance, distribution, breeding status, species losses, special status and non-native concerns, population trends, and wildlife habitat, to the extent possible given the available data. Information on wildlife in the park was fairly robust. Moths, beetles, mayflies, slugs and snails are among the most diverse and abundant invertebrate groups. Birds and mammals are the most diverse vertebrates. Mammalian species are dominated by rodents, carnivores and bats, and are mostly nocturnal and small. Bird diversity is relatively evenly split between 10 avian families, and each contributes four or five breeding species to the park. Park wildlife are overwhelmingly native species, especially in the forest interior. Non-native invasive plants and wood boring insects are ongoing threats to park wildlife. Recommended next steps for wildlife research include straightforward citizen science projects to determine the presence of rubber boa snakes and northwestern salamanders, and complex explorations into species losses, avian population declines, species reintroductions, frog breeding sites, insect diversity, bat habitat use, and wildlife response to habitat restoration, dogs, humans and illegal activities in the park.

Keywords: Animal ecology, Conservation biology, Wildlife biology

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Monitoring canopy cover in Portland using aerial photo interpretation

To monitor trends in Portland's urban forest canopy, Portland Parks & Recreation established a protocol for measuring canopy change using point interpretation of aerial photos. Although previous studies have provided important estimates of canopy cover within the city, differences in methodology preclude direct comparison of results for the purpose of detecting change. Canopy cover was measured in 2000, 2005, and 2010 citywide and in commercial, industrial, open space, and residential zoning classes. Citywide canopy cover was 27.3% in 2000, 28.0% in 2005, and 29.9% in 2010. Across zones, canopy was highest in the open space zone and ranged from 53.9% in 2000 to 55.3% in 2010. Residential zone canopy cover ranged from 29.8% in 2000 to 33.1% in 2010. Canopy was lowest in commercial and industrial zones. Commercial zone canopy ranged from 9.1% in 2000 to 12.5% in 2010. Industrial zone canopy ranged from 6.4% in 2000 to 7.9% in 2010. From 2000 to 2010, canopy cover increased citywide and in all zoning classes. Citywide canopy cover increased by 2.6%, commercial by 3.4%, industrial by 1.5%, open space by 1.5%, and residential by 3.3%. All changes were statistically significant (McNemar's test, $p < 0.05$) and represent an addition of 2,384 acres of canopy. The upward trend is positive and encouraging for the urban forest. The protocol adopted in this study is an important step in a long-term commitment to tracking canopy trends within the city and the next measurement will be taken in 2015.

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

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NOx effects on nighttime secondary organic aerosol (SOA) formation

Nighttime secondary organic aerosol (SOA) formation was investigated in a series of chamber studies. A selection of monoterpenes, including a-pinene, ß-pinene, .3-carene, and limonene, were oxidized either via NO3 radical or O3 + NO2 to simulate an aerosol formation mechanism likely to occur in locations with abundant biogenic volatile organic carbon (BVOC) emissions that also have influences from anthropogenic NOx. Aerosol yields and growth rates were measured, and chemical composition was investigated using FTIR and ESI-MS.

Keywords: Air quality

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Natural area stewardship in Portland, Oregon: Understanding volunteer motivations

We designed and conducted a survey of volunteers who worked in parks managed by Portland Parks and Recreation in Portland, Oregon to understand natural area volunteer commitment and motivation, the effect that volunteering has on participants' behavior and attitudes toward the environment. A number of questions asked volunteers about their attitudes towards aspects of stewardship and whether or not they had participated in a variety of private sustainable behaviors and public sphere environmental behaviors. We analyzed participant's responses in the light of the City of Portland's vision 2020 plan. Participants were sampled over the course of late winter and spring of 2012 during 18 different Portland Parks and Recreation stewardship events. Frequency of volunteering ranged between those participating for the first time and those volunteering more than 10 times per year. Frequent participants tended to feel both connected to the site where they had worked and that their work in natural areas contributed to solutions to environmental problems. Volunteer stewardship is part of a larger set of sustainable behaviors; significant percentages of volunteers also remove invasive plants in their own yards, plant native species, conserve water in their yards, and advocate for natural areas by contacting elected officials. Having an opportunity to do something useful to help the environment was a main motivation in environmental stewardship. Understanding the motivational impacts from volunteer restoration work is valuable to managers as they maintain the volunteer programs; volunteers make positive social as well as environmental contributions to restoration efforts.

Keywords: Environmental education, Environmental social sciences, Habitat restoration

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The Portland/Vancouver Metropolitan Regional Urban Forestry Strategy

The Portland/Vancouver Metropolitan Regional Urban Forestry Strategy is a new project to promote healthy urban forests in the Portland/Vancouver metro area. This strategy was prompted in response to the *Vibrant Cities and Urban Forests* report published by the U.S. Forest Service last year, recommending the creation of regional urban natural resource plans. The objectives of the Regional Urban Forestry Strategy are to increase urban tree canopy in the Portland/Vancouver area, foster regional collaboration around trees, and expand the management capacity of our urban forest. This strategy will be completed over the course of several years through a regional ecosystem analysis and needs assessment, stakeholder workshops and forums, and local projects focused on the health of the urban forest as a whole. Already, the Regional Urban Forestry Strategy has sponsored a forum in which over 150 natural resource professionals, elected officials, and community leaders from the area gathered to discuss urban forestry issues. In addition, this strategy will provide a replicable template for other metropolitan areas looking to advance regional urban forestry efforts as part of the *Vibrant Cities and Urban Forests* initiative. Through this process, the project partners hope to provide a collaborative environment for best management practices, current research, and alternative planning approaches to be shared while advancing urban forestry programs through technical and educational assistance and peer-to-peer discussions. Finally, this strategy hopes to help local jurisdictions achieve successful urban forestry programs that increase the health of our urban forests while reaping the ecosystem benefits trees provide.

Keywords: Land use planning, Land/watershed management, Sustainable development

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Urban beaver management

Beavers are an important component of a healthy riparian system. However, when human activities and beaver habitat needs intersect, management challenges can occur. The Tualatin Hills Park and Recreation District's (Beaverton, OR) Natural Resources staff have used a variety of pipes, fences, and vegetation management techniques to help people live with an active beaver population in an urban environment. Staff will present photos and descriptions of techniques that worked and what didn't including restoration plantings, living with wildlife tips, and observations regarding stream gradients.

Keywords: Land/watershed management, Wildlife biology

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McCarthy Creek: A whole watershed approach to restoration

McCarthy Creek, a salmon-bearing tributary to Multnomah Channel, occupies a 2,800-acre rural watershed 12 miles northwest of Portland. It is bisected by a busy railroad and Cornelius Pass Road. Most of the watershed is privately owned forest and rural residential, but recent Metro purchases have brought public ownership and easements to 600 acres. The West Multnomah Soil & Water Conservation District (WMSWCD) began actively working in the area in 2007 after discovering a major infestation of Japanese knotweed (Polygonum cuspidatum). Subsequent water quality data indicated relatively high sediment and temperatures, and the need for better riparian buffers. Electroshocking in 2012 revealed juvenile coho and Chinook, confirming salmon spawning and reinforcing the importance of outreach and restoration in the entire watershed. Since adding McCarthy Creek to the District's Healthy Streams Program, restoration of the most denuded and weed-infested riparian areas is underway at nearly 50% of the sites in the target reach. 220 acres have been added to forest management plans; knotweed along the creek was monitored and treated; work parties at the Native American Rehabilitation Association continue; and a stream clean-up this fall removed 750 pounds of trash. Future plans include removal of a partial fish passage barrier near the mouth of McCarthy Creek in 2013, a joint effort with the USDA Natural Resource Conservation Service, additional habitat and barrier mapping, and wetland restoration. Water quality data monitoring results, the approach to outreach, progress on restoration to date, and future plans will be presented.

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

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Clark County's Growing Green Program

Clark County's Growing Green program is designed to identify unused or under-utilized County property which can be re-vegetated or reforested. The program aims to reduce storm water impacts, reduce ongoing maintenance commitments, and increase both water quality and habitat resource quality. The County has planned and executed more than 15 Growing Green projects planting more than 66,000 native plants within the County. Many of these projects were within areas developed at urban densities. The program included 12 public volunteer planting events where 326 volunteers have donated more than 1,200 public service man-hours. In all, the program has supported 36 planting projects responsible for planting native vegetation on more than 121 acres of County property over its two year life. Future plans include a goal for planting an additional 50 acres of land per year. In addition, the County is working to form partnerships which can help leverage environmental enhancement efforts within Clark County's jurisdiction. Partnerships are being pursued with both government and non-profit organizations for 2013, and the County is highlighting an Adopt-a-Site program. The program utilizes money from the County's Clean Water Fee, Conservation Futures funds, and various grant funding opportunities. Each Growing Green project is designed by County staff and includes site analysis and design, site preparation, planting, and a program for short term ongoing maintenance to ensure the plants are adequately established and the chances of success are greatly improved.

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

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Gresham's 10 years of biodiversity surveys: An efficient and effective way to manage sensitive species and engage the community

In order to meet the goals of regulations such as the Endangered Species Act, Migratory Bird Treaty Act and state and regional conservation strategies, and to ensure municipal operations and projects safeguard sensitive species and habitat, jurisdictions need a mechanism for documenting species richness and population density. Assessing this data over time affords the opportunity to properly manage any sensitive species found on jurisdictional lands, and to incorporate habitat considerations in utility project planning. The City of Gresham began biodiversity surveys with this purpose in mind in 2002, first documenting wetland, riparian and upland plant species on public lands, and moving to different animal taxa each year from 2006 to the present. The success of these surveys is seen not only in the amount and accuracy of the data collected, but also in the number of citizen volunteers recruited to help with the program and the sense of stewardship instilled in communities where surveys are conducted. Gresham's biodiversity survey efforts have proven to be one of the city's most successful programs in inspiring Gresham residents' support of natural resource initiatives. Further, the data collected by the city continues to be integrated into master and land management plan development, CIP construction project planning, and City operations practices. Future surveys will focus on new wildlife taxa as well as resurveys of previous taxa every 10 years in order to detect species and population richness changes over time.

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

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Developing a regional map of oak habitat: Intertwine Alliance Oak Mapping Work Group

The Intertwine Alliance Oak Mapping Work Group (OMWG) is a multi-partner effort to develop a comprehensive map of Oregon white oak habitats for the greater Portland metro region. Although several oak mapping efforts have been conducted in or near the region, they address various geographies, at varying levels of precision and accuracy. Owing to high biodiversity and imperilment of oak habitats, the Intertwine Alliance’s new Portland-Vancouver Regional Conservation Strategy has prioritized development of region-wide maps to better guide future conservation efforts, including habitat connectivity. The OMWG has recently completed a field-based oak mapping feasibility assessment and compiled existing data sets, which are being used to develop an approach that couples remote sensing with targeted field surveys. We will present preliminary oak distribution maps, summarize findings from the feasibility assessment, and illustrate potential applications for the data.

Keywords: Conservation biology, Plant ecology

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Advancing an equity agenda for a community-based environmental stewardship grant program

Since 1995, the Community Watershed Stewardship Program (CWSP) at the Portland Bureau of Environmental Services (BES) has provided small grants - up to $10,000 - for community groups to carry out watershed stewardship projects (e.g. restoration, stormwater management, monitoring). To date, CWSP has funded over 220 projects, with the dual goals of improving watershed health and enhancing civic participation in stewardship activities. In recent years, the City of Portland and BES have adopted equity goals aimed at, among other objectives, rectifying geographic and demographic disparities in the distribution of public funds. This presentation outlines CWSP's efforts over the past several years to apply an equity lens to its grant program, and puts that work in the context of recent academic literature on: 1) public participation in environmental stewardship, and 2) community benefits derived from urban environmental projects. Research methods include categorizing and analyzing all applications received in the last three CWSP grant cycles. The data show that stewardship projects involving underrepresented communities almost uniformly entailed a clear community benefit outcome, in addition to watershed health outcomes. Projects that did not involve underrepresented communities were much less likely to entail community benefits. These findings indicate that participation in stewardship work, particularly among underrepresented communities in Portland, is not always environmentally-motivated. It is recommended, therefore, that an equity agenda for a public entity seeking to engage community partners in stewardship work include active support for projects that achieve environmental outcomes while also addressing community-identified goals that may not be environmentally-motivated.

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

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Ecoroofs and Photovoltaic Panels: Why plant biology matters

Ecoroofs and photovoltaic (PV) panels are increasingly being used together as a way to optimize the benefits of green technologies on rooftops. However, effects of shading by PV panels on ecoroof function are unknown. Our study used an ecological approach to measure differences in sunny and shaded ecoroof environments. Four 4.6 by 3.7 meter trays with a 17.8 cm substrate depth were constructed on a third floor patio and planted with either *Sedum spp.* only or *Sedum spp*. in addition to small shrubs and grasses (*Sedum*-plus). PV panels were installed on each tray to create both sun and shade environments. After a three year establishment period, species composition was significantly different between sun and shade sides. Aboveground biomass, canopy height, leaf area index, and specific leaf mass were also measured and found to be different between sun and shade sides. Changes in these plant metrics influence ecoroof functions like carbon sequestration, particulate matter interception, and building energy savings. Shading by PV panels also affects soil properties. *Sedum* trays were found to have higher soil organic matter, fine root density, and fungal biomass in the sun than in areas shaded by PV panels, while *Sedum*-plus trays have higher fine root density and fungal biomass than *Sedum* alone. Species composition and light environment work together to build soil properties that in turn determine the stormwater management capabilities of an ecoroof. To optimize ecoroof function, the effects of shade on plant biology need to be considered.

Keywords: Plant ecology, Soil science, Sustainable development

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Can you handle the process? Case studies of stream stewardship in developed landscapes

Restoration of natural processes is a primary goal and focus of design in many stream restoration projects. For a variety of reasons, these approaches are expected to provide more effective and resilient ecological benefits at a lower cost over the long term. The technical framework and practical guidance for process-based approaches has been evolving rapidly through both science and practice. Much recent work on stream functions in developed areas has focused on hydrologic influence “up the pyramid” to geomorphology, water chemistry and ultimately biology. However, biological elements in the form of native vegetation and American beaver can also be major drivers of natural systems to reduce the impact of altered hydrology, create diverse habitats and improve water quality. The potential magnitude of changes created by these drivers at a given project is often underestimated and can produce unanticipated results, prompting tough questions to land managers responsible for balancing infrastructure protection and environmental goals. Large scale and long term case studies are needed to evaluate approaches and capture lessons learned. This is especially important for developed landscapes that come with constraints on allowing dynamic processes to occur once they have begun to function. From more than a decade of implementing large scale watershed restoration programs in the Tualatin River basin, we will present the story of three projects that successfully jump-started natural processes in ecologically productive ways but eventually provoked the question “Can you handle the process?” We will describe the projects, interim outcomes and ongoing saga of management issues involved in restoring natural processes on developed landscapes.

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

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Fish use in Beaver and Upper Johnson Creek

Over 15 different fish species were found during the fish surveys of Beaver and Upper Johnson Creek conducted between Fall 2010 and Spring 2012. The study documented the extent and distribution of fish use in two watersheds impacted by agriculture and urban development. We found evidence of coho pre-spawn mortality, a shared life-history with beavers and freshwater mussels, and fish use in surprising urban habitats. This compilation of photographs taken in the field using the Wild Fish Conservancy's “Photarium” - a miniature aquarium used to photograph fish - shows native and introduced fish in great detail alongside their habitat.

Keywords: Fisheries

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"Who's pooping in Johnson Creek?" Results and lessons learned from bacteria source tracking in the Johnson Creek Watershed

In summer 2012, a Bacterial Source Tracking (BST) study was conducted throughout the Johnson Creek Watershed to detect and locate sources of fecal contamination. *E. coli* data collected over the past 20 years had shown that Johnson Creek consistently exceeded State water quality standards in both wet and dry weather. These bacteria standards were established to protect human health, so this study focused on summertime fecal contamination at publically accessible locations along the mainstem (29 sites), as well as contributions from each tributary (47 sites). We were most concerned with human fecal contamination, and since birds had been shown to be a major source of *E. coli* in other watersheds, we also tested for avian fecal contamination. On August 13, water samples from 80 sites throughout the watershed were tested for *E. coli*. Fifty of the 80 sites were selected for further DNA-based source analysis using three human-specific Bacteriodetes markers and one avian-specific marker. Results showed trace or quantifiable amounts of human fecal contamination at 14 sites. The avian marker analysis was less conclusive. We found the application of BST to be challenging due to inherent uncertainties that require a loosely quantitative interpretation of the data. We've also learned that *E. coli* may not be a good proxy for fecal contamination in the Johnson Creek Watershed. Indeed, we've been left with more questions than answers, and the realization that the science related to the detection, source identification, and epidemiological risks of fecal contamination is fraught with uncertainty and still evolving.

Keywords: Land/watershed management, Water quality

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Connecting People with Nature: National, regional and local outreach strategies

The purpose of this research report was to find initiatives across the country with a goal of connecting people to nature. Using extensive internet searches, over fifty national, regional and local campaigns encompassing government, non-profit and private initiatives were found and reviewed. Many initiatives were involved with national, state or local parks, with a strong emphasis on community and place-based outreach. Infrequently, groups focused on specific audiences and demographics such as senior citizens, blacks or Latinos for example. Most groups, however, placed an emphasis on youth and families, the local community, or a general audience. Many groups focused on an overall "get outdoors" platform while others centered around a specific aspect of nature as their driving force, i.e. birding, watersheds, or forests, for example. Common themes across initiatives included: providing educational programming, events, and volunteer/internship opportunities to local communities. Similarly, many successful initiatives utilized engaging media tools including eye-catching webpages and active social media presence. Lastly, a less common, but noticeable strategy in many groups was incorporating creative projects involving art, culture, music and more to encourage people to connect with their natural world. Overall, this report provides an overview of the strategies being used around the country to get people outdoors, and provides a toolkit on how others can utilize these strategies to their advantage in their own communities or workplaces.

Keywords: Environmental education, Environmental social sciences

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Quantification of organic functional groups in ambient aerosol using ATR FT-IR

Organic aerosol particulate matter is known to create both health and environmental problems; however, the overall composition of ambient air is still a mystery. Primary pollutants, like ozone and nitrates, can oxidize biogenic volatile organic compounds (VOCs), creating molecules with many different, chemically reactive, functional groups. These functional groups then react with each other to create larger molecules, called secondary organic aerosols (SOAs). Although SOA accounts for a very small fraction of our air, they are still problematic for our ecosystem and therefore need to be quantified. Quantification of functional groups in organic particulate matter has been sought after and techniques have been created to do so. One technique is creating standard curves using attenuated total reflectance Fourier-transform infrared (ATR FT-IR) spectroscopy. This technique allows for the measurement of distinct functional groups at specific signals. These curves can then be used to quantify functional groups, giving a clear picture of the concentrations of these groups in the air. The correlation of these functional group concentrations to the concentrations of oxidants and their precursors, like ozone and NOx, could help the understanding of oxidation in ambient air.

Keywords: Air quality

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Portland Urban Meadowscaping Pilot (PUMP)

Portland Urban Meadowscaping Pilot (PUMP) is a collaborative effort to develop lawn replacement recommendations to increase storm water infiltration and wildlife habitat in Portland's urban landscape. As homeowners become more aware of the environmental impacts of their landscape choices, naturescaping programs are receiving more requests for lawn replacement options. Although common, lawns provide little benefit to storm water infiltration, water quality, or wildlife habitat and require polluting inputs such as fertilizers and mowing. The goal of PUMP is to provide public education, technical support and assistance with the planning, planting and monitoring of meadowscapes on residential landscapes and in public parks to increase wildlife habitat and stormwater infiltration in the urban realm. PUMP consists of an advisory committee with representatives from West Multnomah Soil & Water Conservation District, City Nature Division of Portland Parks & Recreation, Columbia Land Trust/Backyard Habitat Certification Program (BYHCP) and Xerces Society. Partners bring a diverse background including storm water management, horticulture, native landscaping and entomology. The Portland Urban Meadowscaping Pilot includes data from 6 BYHCP participants and 2 Portland parks. Each participant has agreed to annual monitoring of their site for the next 5 years. Continuing analysis of the monitoring data will be used to determine best management practices for installing and maintaining urban meadows. In addition to answering practical questions PUMP aims to cause a paradigm shift in what people think of as a beautiful “lawn”. A Regional Stakeholders Report on Pollinator Conservation in the Portland Metro Area recently highlighted the need for PUMP.

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

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Clark Public Utilities Salmon Creek Japanese Knotweed Control Program

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 Community Salmon Fund grant from the National Fish and Wildlife Foundation, created Eradication Nation in 2011. Eradication Nation has made an impact on invasive species by increasing community awareness, as well as recruiting and training volunteers to treat Japanese knotweed within their community. Eradication Nation's main target is Japanese knotweed because it aggressively colonizes floodplains, displaces native riparian vegetation, and ultimately creates poor habitat for fish and wildlife. Currently, the most effective way to remove Japanese knotweed is through the use of herbicide over at least two years. Manual removal is ineffective, but a biological control is in development and may be an option in the future. Eradication Nation, including AmeriCorps members and community volunteers, treated more than 200 acres through a combination of stem injections and foliar spraying. More than 40 landowners received knotweed control assistance, and through our outreach efforts more than 3,000 people were contacted. Community awareness has been and will continue to be increased through mailings, site visits, community events, and our new website with an interactive map that allows users to locate and report new infestations. Future plans for Eradication Nation include expanding to the headwaters of the watershed, along with continuing knotweed treatment and monitoring in our current project area.

Keywords: Conservation biology, Environmental education, Habitat restoration

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Prioritizing protection and restoration investments within an evolving urban landscape: Gresham's natural resources master planning using a geo-processing model

In an effort to more systematically track restoration needs and inform restoration investment decisions, the City of Gresham's Natural Resources Program developed a "living" Natural Resources Master Plan that continually incorporates new survey data to update prioritization of protection and restoration needs for wetlands, streams, and publicly owned natural areas within the current city and future annexation areas. The master plan structure provides a method for comparing opportunities across the three watersheds in Gresham, and for comparing opportunities within a particular watershed. This GIS-based restoration planning approach maintains a current natural resources inventory and needs assessment, updated as new digitized data are created. An operator can integrate new species survey information, stream condition surveys, floodplain modeling, stream shade analyses, or new regulatory priorities into a geo-processing model to update the prioritization and costs of projects. Similarly, the model can be run to find the highest priority project fitting a funding opportunity or volunteer group interest. The model has been used to identify potential areas of overlap between natural resources conditions and future utility or transportation projects, allowing project planners to modify concept designs to protect higher value resources where possible. Mitigation opportunities for city projects with impacts to protected resource areas also can be identified through the tool, allowing permit reviewers to assess proposed mitigation in the context of local watershed needs. The 2013 model update will use recent juvenile salmon surveys, fish barrier surveys, and fish habitat potential assessments to prioritize fish barrier removal opportunities.

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

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Citizen-science shows urban streams can sustain threatened native freshwater mussel populations

Freshwater mussels are the most at-risk animals in North America. Although they play critical ecological roles in aquatic habitats and their life history is closely tied to native fish, relatively little is known about mussel populations in the Northwest. The role of urbanized watersheds as a refuge has not been generally assessed and reproductive status and connectivity of populations in Portland-area watersheds is unknown. Xerces Society, Johnson Creek Watershed Council, and City of Gresham used volunteer-based surveys to conduct an extensive assessment of freshwater mussels in Johnson Creek and selected tributaries. Despite multiple impairments, the watershed supports substantial numbers of western pearlshells (*Margaritifera falcata*) and floaters (*Anodonta*). Most are older and of similar age cohorts, but young mussels were also found. The upper watershed has more and larger mussel beds, but mussels persisted in some more degraded reaches in the lower watershed. Native mussel presence was negatively correlated with armored banks. The invasive Asian clam (*Corbicula fluminea*) is present at low numbers in Johnson Creek but is very abundant in Crystal Springs, an important tributary. This project filled large gaps in biodiversity data in the Johnson Creek watershed, effectively educated and engaged local stakeholders, and underscores the ability of citizen scientists to make meaningful contributions to our understanding of watershed biota. Future studies can be built on these data, including the relationship between changes in salmonid and mussel populations in the watershed, and the effects of habitat restoration on abundance of native mussels vs. Asian clams.

Keywords: Environmental education, Habitat restoration, Wildlife biology

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Metro's Nature in Neighborhoods Capital Grants invest in projects that re-green communities

Below a new overlook adjacent to a downtown center, trout swim past in a restored creek. In a busy park, a pedestrian bridge and 60 logs installed to improve fish habitat are new improvements. Impassable culverts are gone and streambanks are restored in a dense neighborhood. Three recent projects - Klein Point, Mt. Scott and Crystal Springs - exemplify Metro's Nature in Neighborhoods innovative Capital Grants program. All three improve people's experience of nature while contributing to significant restoration of fish passage and habitat along highly urbanized creeks. At Klein Point, part of the City of Milwaukie's new Riverfront Park, a trail and interpretive overlook were developed in conjunction with the Johnson Creek Watershed Council's work. The basalt wall overlook provides the perfect viewing area for in-water structures created that help threatened species of fish. [Project cost: $675,400. Metro grant: $225,000.] Mt. Scott Creek is within North Clackamas Park. The 60 installed logs both improve habitat and stabilize 320 feet of streambank, and the confluence with Camas Creek was restored. Two overlooks and an ADA bridge contribute to the community's access to nature. [Project cost: $450,222. Metro grant: $150,034.] The Crystal Springs Brannen Restoration project replaced three impassable culverts, restored 350 feet of streambank and adjacent riparian areas, and created a short viewing trail. [Project cost: $1,450,000. Metro grant: $311,480.] Using funds from the voter approved 2006 natural areas bond measure. Metro has awarded $6.6 million to 24 projects that involve the community, foster diverse partnerships and lead to more livable neighborhoods.

Keywords: Habitat restoration

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Pet storeowner survey: Preventing aquaria release into the wild

The pet, aquarium and water garden pathway is an important, but often overlooked route by which non-native species may enter natural waterways and pose an invasive species risk. Currently, one third of the world's worst aquatic invasive species are aquarium or ornamental species. To emphasize the role that aquarists and pet storeowners can play in preventing this invasion pathway in the future, the U.S. Fish & Wildlife Service helped to initiate the Habitattitude Campaign in 2004 and more recently the Don't Let it Loose Campaign. To measure storeowner knowledge about these campaigns, and to gauge their support for future alternatives to release programs, 200 pet storeowners within metropolitan areas in the Pacific Region (Hawaii, Washington, Oregon, Idaho) were surveyed using mailed paper questionnaires and follow-up telephone interviews. Surveys occurred during fall and winter of 2012. Preliminary results indicate that a majority of sampled pet storeowners are not aware of either campaign or the intended messaging. Storeowners do supply care sheets for most aquaria sales, but care sheets seldom offer recommendations for proper disposal or alternative options if or when a customer is no longer able to care for their purchase. Survey findings point to the weaknesses that these outreach campaigns may have, both in the clarity of the messaging and the way the message is disseminated to the target audience. Face-to-face aquarist interviews in Portland and Vancouver are planned for Spring 2013. The results of this study will pinpoint areas for improvement in preventing this invasion pathway.

Keywords: Environmental education, Environmental social sciences

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Impacts of urbanization on epiphytic biodiversity and function across the Portland urban airshed

Epiphytic lichens and bryophytes are an important component of Pacific Northwest forest ecosystems, contributing to nutrient cycling, essential forage, and overall biodiversity. However, growing urbanization has increased human influence on forested ecosystems; the long-term results of anthropogenic influence on forest health and biodiversity are not yet known. Characterization of epiphytic lichen and bryophyte communities are a well-recognized method for assessing the impacts of air pollution and anthropogenic influence on plant community structure and function. The movement of urban air pollution plumes across rural landscapes suggests that arboreal lichen and bryophyte communities may serve as early indicators of changing air quality and ecosystem function in downwind environments. In this study, I present results of a ground and arboreal epiphytic community analysis that extends along an urban to rural transect from the urban forest of Forest Park, Portland, Oregon to rural Estacada, Oregon. Three research sites with varying distance (0km, 74km, and 109km) from the urban center were sampled and epiphytic community composition was quantified. As predicted, ground-based surveys showed a shift in epiphytic community composition with distance from urban center, consistent with our understanding of airshed dynamics. The results observed here are consistent with observations made in other regional bioindication studies and suggests that an understanding of urban air pollution travel is essential for the preservation of epiphytic community structure and function in rural landscapes.

Keywords: Air quality, Plant ecology

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Monitoring watershed health in the City of Portland

The City of Portland recently redesigned its watershed monitoring to better support the Portland Watershed Management Plan. The new monitoring approach provides a number of design improvements, including coordinating watershed monitoring across all watersheds to make results more comparable; collecting all watershed measures at the same locations to support more powerful analysis of patterns in the data; and using a strong statistical design to increase the accuracy and efficiency of data collection. The findings from the program are consistent with previous monitoring efforts, but provide a more comprehensive and integrated assessment, much greater spatial resolution of patterns and a greater ability to look at relationships amongst variables and with land use. Water quality was markedly worse during storms than during seasonal non-storm sampling. *E. coli* and temperature were the constituents most frequently above water quality criteria, while exceedences of metals were infrequent and mostly observed for copper. Wood was very sparse in Portland streams, and the substrate results indicate a few riffle areas where sediment management may be needed. Although macroinvertebrate communities were generally poor, one site in Balch Creek met DEQ benchmarks for regional reference communities. Riparian bird communities were dominated by native species, sensitive and at-risk species were present, and a number of stations had no non-native species detected over the three bird surveys. Stream fish communities were also dominated by native species, although abundances were low. The program design, findings, their implications and future analyses will be described.

Keywords: Fisheries, Land/watershed management, Water quality

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Developing a land use regression model to predict intra-urban variability of NO2 in the Portland Metro area

Nitrogen dioxide (NO2) is an urban air pollutant created by anthropogenic combustion processes. Higher NO2 levels at the intra-urban scale lead to increased incidences of respiratory problems and the formation of secondary air pollutants. At the regional scale, high NO2 can lead to acid rain; while at the global scale, anthropogenic NO2 is affecting the nitrogen cycle. Measuring intra-urban NO2 and building an explanatory model is a first step in understanding and mitigating these impacts of NO2. During summer of 2012, we monitored NO2 at 190 sites in the Portland Metro area using passive Ogawa samplers. We have built a preliminary explanatory model for NO2 in Portland using land use regression (LUR). The LUR model (R2 = 0.74) shows that each 1m of freeway within a 50m buffer increased NO2 by 0.094 ppb, while each 1m of major arteries and arterials within a 50m buffer contributed 0.020 ppb and 0.017 ppb NO2 respectively. NO2 levels were reduced by the presence of vegetation: each percent of canopied area within a 450m buffer decreased NO2 by 0.086 ppb; each percent of non-canopied vegetation within a 150m buffer reduced NO2 by 0.141 ppb. We are further investigating whether vegetation structure parameters such as patch size and edge density are important in reducing intra-urban NO2.These results suggest that vegetation along roadways might provide a solution to addressing health impacts associated to air pollution. Further studies will be needed to determine the characteristics of the vegetation best suited for roadways in the study region.

Keywords: Air quality, Land use planning

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Habitat restoration planning update for the Portland Harbor Superfund Site

The Portland Harbor Superfund Site is a highly contaminated, industrialized section of the Willamette River (RM 1 to 11.8) that provides important habitat for potentially injured fish and wildlife including Pacific salmon and lamprey, piscivorous birds such as bald eagle and osprey, shorebirds such as spotted sandpiper, and water-dependent mammals such as mink and river otter. The Portland Harbor Trustee Council, comprised of eight federal, state, and tribal Trustees, is working to plan and carry out actions that will restore injured resources in Portland Harbor through a process called natural resource damage assessment. The overall goal is to restore, rehabilitate, replace, or acquire the equivalent of natural resources and their services that have been injured by contamination. Three alternatives for restoration planning were evaluated and are described in the Draft Portland Harbor Programmatic EIS and Restoration Plan (PEIS/RP) that was released for public review and comment in July 2012. The Trustee Council's recommended alternative involves an integrated habitat restoration approach. An important component of the plan is long-term monitoring and stewardship of restoration sites. The plan proposes active monitoring and maintenance activities for 10 years after project implementation. Stewardship is proposed to continue in perpetuity to ensure each restoration project's long-term success with continued benefits to injured resources long after projects are constructed. Public comments received on the draft PEIS/RP are now being considered and a final PEIS/RP is expected to be available in summer 2013.

Keywords: Environmental policy, Habitat restoration

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Oregon white oak release at Willamette Narrows

More than 95 percent of Oregon white oak (*Quercus garryana*) woodlands, savannas and upland prairies within the Willamette Valley have been lost and remaining stands are threatened by land conversion and neglect. Fire suppression during the last 150 years facilitated invasion by conifers and other trees that shade and kill oaks. Fuel loading often exceeds historic conditions and without treatment the risk of a stand-replacement fire is high, even for oak trees. The publicly owned Willamette Narrows complex has some of the region's largest remaining stands of Oregon white oaks. More than 250 other plants occur there, and nearly 20 percent of them are rare natives. We sought to remove competing trees to release oaks, improve stand health, reduce fire risk and improve habitat for associated plants and wildlife. We used metrics developed by other land managers, literature on locally occurring oak-associated wildlife, personal knowledge of the site and experience with other oak release work to develop a project plan. Formal surveys of breeding birds, pond-breeding amphibians and herbaceous vegetation documented pre-treatment conditions. Treatments were conducted in fall 2012 on more than 90 acres of oak woodland. More than 650 trees over eight inches dbh were treated as well as hundreds of smaller trees that were not measured. More than 100 of the trees were limbed or girded for snag creation, and about 200 trees were placed in nearby areas for down wood. Future work includes rehabilitation of areas where heavy equipment was used and wildlife and vegetation monitoring.

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

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Integrating habitat components into trails crossing urban environments to assist dispersal

Urbanization may block dispersal of native wildlife and plants at a critical time when climate change may require many organisms to shift their ranges. The Washington-Multnomah-Clackamas county area urban development is becoming contiguous from the Coast Range to Cascade Range. The network of riparian corridors, parks and natural areas within the urban area is essential for many species to begin needed movements and range shifts. However, organisms requiring open habitat will not be served by wooded corridors and patches. For them, urbanization's east-west extent may be a barrier to northward range shifts. Improvements in open habitats such as power line corridors may increase permeability for open country wildlife. Metro and partners are taking this approach with the Westside Trail, which follows a north-south power line corridor for approximately 12 miles from the Tualatin River to the Willamette River near Sauvie Island. A master plan for resolving gaps in the trail is under way and includes habitat restoration concepts. For example, the pollinator habitat module includes recommendations on native plants, plantings to provide food throughout the season, size and spacing of planted areas, and designing plantings to be seen by pollinators. Other subjects include modifying switchbacks on steep terrain to accommodate small animals and designing crossings (including bridges) to enable safer movement for wildlife. Incorporating conservation information at the master plan level presents an opportunity to apply the concepts and provide habitat along the full length of the trail corridor regardless of the jurisdiction that ultimately develops and maintains a given trail segment.

Keywords: Conservation biology, Habitat restoration, Land use planning

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Propagule pressure and disturbance drive the spread of an invasive grass, slender false brome (*Brachypodium sylvaticum*)

Invasive plants pose an increasing threat to urban natural areas which experience higher levels of human-caused disturbance and invasive seed dispersal. We examined how propagule pressure, forest community structure and disturbance interact to influence the invasibility of forests at Milo McIver State Park by the newly-invasive grass, *Brachypodium sylvaticum* (slender false brome). Our goal was to identify factors enabling shifts from establishment to population growth in *B. sylvaticum* populations at the edge of its expanding range. Ecological sampling methods were used to identify trends in *B. sylvaticum* habitat and disturbance preferences, and an experimental study was performed to test the effects of disturbance and propagule pressure on *B. sylvaticum* seedling establishment in naturalized field sites. We found that disturbance of both the soil and vegetation were strongly associated with the occurrence of *B. sylvaticum* adults and seedlings in the forest understory. The seedling establishment plots revealed that higher propagule pressure, forest canopy composition and interactions between these variables and disturbance of vegetation and soil were strong predictors of *B. sylvaticum* seedling propagation and survival within established sites. Our study demonstrates how propagule pressure and plant community dynamics interact to shift the invasibility of Pacific Northwest forests that neighbor urban areas and facilitate the transition from establishment to population growth in the invasion of *B. sylvaticum*.

Keywords: Conservation biology, Plant ecology

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Flood risk management in Blue-Green Cities - will Portland set the international standard?

The aim of a Blue-Green city is to recreate a naturally-oriented water cycle, while bringing water management and green infrastructure together. This is achieved by combining and protecting the hydrological and ecological values of the urban landscape while providing resilient and adaptive measures to manage flood risk. Key functions include protecting natural systems and restoring streams, mimicking pre-development hydrology, reducing imperviousness, and increasing infiltration, surface storage, and water retentive plants. However, barriers to achieving these goals remain because the functionality of decentralized flood risk management solutions is often underestimated and Blue-Green approaches are seldom integrated into overall planning. To address these and other issues, the UK Engineering and Physical Sciences Research Council has funded a 3-year research project aimed at developing new strategies for managing urban flood risk as part of wider, integrated urban planning intended to achieve environmental enhancement and urban renewal, in which the multiple benefits of creating Blue-Green cities are rigorously evaluated. While the Blue-Green Cities project is primarily a UK initiative, Portland has been selected as a “sister city” because it has long been a national and international leader in sustainable development - the Green side of the equation. Hence, Portland is ideally positioned to integrate the Blue with the Green. This talk will provide an overview of the UK Blue-Green Cities research project and what this means for the Portland Metro area.

Keywords: Environmental policy, Habitat restoration, Hydrology

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The spatial distribution of parks and crime in Seattle, Washington: A study of environmental inequality

Urban parks offer benefits to the community it serves, but are also known to be places of disgust and in some areas have been declining in quality over time; thus prompting the motivation to look at parks through the lens of environmental justice and criminology. Examining environmental justice and environmental criminology together can help us understand how injustices within the parks and planning departments may ultimately play a role in the idea that certain parks are crime generators, which can further encourage environmental injustice. The main objective of the study was to (1) assess the distribution of park types as they relate to neighborhood characteristics - race, household income, and educational attainment, and (2) to explore and assess the relationship between crime and park type. Using a GIS, I spatially analyzed the relationships between park type and neighborhood characteristics in Seattle, Washington. In addition, a buffer analysis was used to measure the abundance of crime within 800m of each park type. Findings suggested that minorities, low-income and poorly educated individuals have a lack of access to certain parks but are positively associated with recreation parks. In terms of the crime, findings show a slight significance in recreation parks being generators of crimes. While other parks did show an abundance of crime in some locations overall they were not generators of crimes. Understanding the impacts of the environmental backcloth on the presence or lack of certain public parks may lead to better planning and access to parks by all regardless of neighborhood characteristics.

Keywords: Environmental social sciences, Land use planning

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Wildlife disease response - Success based on collaborative regional partnerships

Response and recovery efforts at Smith and Bybee Wetlands Natural Area proved successful in keeping a recent avian botulism outbreak from affecting thousands of migratory birds. In the late summer and early fall of 2012, Metro collaborated with the Oregon Department of Fish and Wildlife, USDA-Wildlife Services, and the Audubon Society of Portland to remove approximately 3,000 dead or dying waterfowl and wading birds, and treat and release approximately 150. The lengthy period without rain this summer, combined with warm temperatures, contributed to an unusually high level of the avian botulism toxin. Even healthy, adult birds that would normally survive exposure to this type of botulism were affected. Using noise equipment and pyrotechnics provided by The Port of Portland and USDA-Wildlife Services, Metro diverted healthy birds away from the area. Without efforts to move birds off the lakes it was anticipated that thousands more would have died, including several species of concern. Oregon Department of Fish and Wildlife directed management of the botulism outbreak, and Metro lead the response and recovery effort, contracting with USDA-Wildlife Services for technical assistance in hazing efforts. The Port of Portland donated equipment and expertise, as well as crew support for salvage. All of the partners involved had unique expertise and abilities which in combination proved highly successful in managing what could have been an even more substantial loss of wildlife. Each partner worked well with the others, and showed what valuable wildlife conservation effort can come from a cohesive network.

Keywords: Environmental social sciences, Wildlife biology

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The Willamette Valley & French Prairie: A historic assessment of a special agricultural resource

This presentation will educate the audience about the rare agricultural resource that comprises the Willamette Valley, and particularly French Prairie--which sits at the north end and abuts metro-Portland. The Valley soils were the result of deposition during the Ice Age Missoula Floods, and resulted in among the finest quality soils in the world. Many Oregonians are unaware of the scope of agriculture in the Willamette Valley and the importance of French Prairie in particular. French Prairie is the heartland of Oregon agriculture, and as it sits so close to metro-Portland, is among those surrounding areas most under development pressure. Thus this material is of significance and relevance to those interested in environmental education and policy and land use planning. The goal of this presentation is to provide an overview of the historical developmental processes, the resultant agriculture made possible, and the potential for permanent loss of these high-value agricultural lands due to expansion of the metro-Portland urban area.

Keywords: Environmental education, Environmental policy, Land use planning

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Attitudes towards ecosystem services in urban riparian parks

Urban riparian parks provide an important access to point to nature for urban dwellers, but they are also an important "green infrastructure" providing ecosystem services through their design and management. Design and management, however, are determined by the attitudes of people towards ecosystems. What are the attitudes of urban riparian park users towards ecosystem services? Are these attitudes different between two types of urban riparian park space? What is the relationship between design and management goals and the attitudes of park users towards ecosystem services? In this study, design and management goals were determined through interviews with park officials. The attitudes of urban park users towards refugia, aesthetics, microclimate regulation, stormwater regulation, recreational opportunities, and educational opportunities were evaluated using the tripartite model of attitudes (affect, cognition, and behavior). A questionnaire was administered to 104 urban riparian park users between two different parks in Tempe and Phoenix, AZ: a classically developed park; and a habitat rehabilitation area. All components of attitude were found to be positive, however attitudes towards refugia, stormwater, recreation, and education, were statistically different ($p<0.05$) and more positive in the habitat rehabilitation area. Park users supported management goals, though they valued stormwater regulation less than did managers. In addition, qualitative responses suggest that the nature of park use and human interaction differ between the two parks. These differences between parks suggest support for green infrastructure but also a variety of integrated designs to expand and diversify both ecosystem services and the opportunities for social-ecological interactions.

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

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