

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Sharing Data, Making Connections

Organized by the

Urban Ecosystem Research Consortium (UERC)

Held at

Smith Memorial Center, Portland State University

Portland, Oregon, USA

January 23, 2004

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About the Urban Ecosystem Research Consortium (UERC)

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.

Advocacy Statement

The role of the UERC is not to provide a political or advocacy platform, but to offer a forum for professionals to exchange information regarding urban ecology and its application to resource planning and management. Those wishing to participate in the annual symposium are encouraged to submit results-based or informational abstracts, which are subject to committee peer-review. During the annual symposium individuals and groups may leave information materials at the table provided by the UERC.

Primary UERC activities include:

- Annual symposia
- Steering committee meetings
- Working group meetings
- Contact list of researchers
- WWW-based compendium of information (UERC abstract archive and news updates)
- UERC listserv

Symposium organizers: UERC Steering Committee

The steering committee organizes the symposium and includes academic institutions, government agencies (city, regional, state and federal), and non-profit organizations. Currently, the steering committee is composed of 11 individuals from a variety of institutions. This allows us to reach into many important sectors of the natural resources community in the Portland-Vancouver metropolitan area:

- Jennifer Budhabhatti, Metro
- Lori Hennings, Metro
- Kelli Larson, Oregon State University / Metro
- Holly Michael, Oregon Department of Fish and Wildlife
- Noelwah Netusil, Reed College
- Vicky Ridge-Cooney, City of Vancouver
- Bob Sallinger, Audubon Society of Portland
- Lauri Shainsky, Portland State University
- Jennifer Thompson, U.S. Fish and Wildlife Service
- Karen Wegner, Oregon State University
- Alan Yeakley, Portland State University

Working groups

In addition to the steering committee, the UERC has developed working groups around primary topic areas to increase involvement in more specific areas of concern. At present there are 3 active working groups that meet approximately once every 2 months. The active working groups are:

- **Applied Research Working Group.** Purpose is to provide direction and support for urban ecosystem research.
- **Planning and Coordination Working Group.** Purpose is to create an information-sharing network for data collection and application.
- **Data Management Working Group.** Purpose is to track, house and provide access to information.

How to become involved in the UERC: The UERC's mission and goals will be met through the voluntary efforts of interested individuals. To participate or find out more, you can:

- To facilitate networking, add yourself to the list of UERC contacts. Send an email to Jennifer_Thompson@fws.gov for details.
- Join the list-serve hosted by Oregon State University to exchange information and receive notices about upcoming events by subscribing yourself at:
<http://lists.oregonstate.edu/mailman/listinfo/urban-erc>.

*Visit the UERC web site hosted by Portland State University for more information at
<http://www.esr.pdx.edu/uerc>*

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(top right)--Studying ecology--Charlotte Marshall.

(bottom left)--Urban canoeing--Metro photo archives.

(bottom right)--Urban peregrine--Bob Sallinger.

Symposium Agenda

<i>TIME</i>	<i>SPEAKER/FUNCTION</i>	<i>TITLE</i>
8:00-9:00	<i>Morning Social</i>	Registration and Poster Setup
9:00	Jennifer Thompson	Welcome and Introduction
9:20	Bob Sallinger	Keynote Address – “Portland’s Peregrines”
		<i>HUMAN DIMENSIONS – Vicky Ridge-Cooney (moderator)</i>
9:50	Kelli L. Larson	An Investigation of Resident’s Attitudes about Water Resource Management and Protection in Metropolitan Portland, Oregon
10:00	Noelwah Netusil	Does ownership matter? Examining the Relationship between Property Values and Privately and Publicly Owned Open Spaces, Streams and Wetlands
10:10	Amber J. Keyser	Role of Citizen Involvement in Bluebird Conservation
10:20	Marion Dresner	Science Inquiry Skill Improvement through Use of Terrestrial Protocols for Middle and High School Science
10:30	Cory Samia	Monitoring Reptiles and Amphibians with Volunteers at “Critter Count,” an Annual One Day Event
10:40	<i>Break (hosted) & Raffle</i>	
		<i>FLORA AND FAUNA – Noelwah Netusil (moderator)</i>
11:00	Luis A. Ruedas	Mesoscale Population Fluctuations in Urban Parks’ Small Mammals: Conservation Implications of Disease Load and Ecology
11:10	Michael Murphy	Preliminary Analysis of Variation of Forest Tree Community Structure Among Portland’s Parks and Greenspaces
11:20	Jennifer Budhabhatti	Highway Crossing Structures for Metropolitan Portland’s Wildlife
11:30	Mark J. Perkins	Bat Distribution within the Metro Urban Growth Boundary
11:40	Al Smith	Status of Smith-Bybee Lakes Mussel Populations in 2000-2001
11:50	Carrie Stevenson	Habitat Enhancement and Wildlife Monitoring at Vanport Wetland
12:00	<i>Lunch (hosted) & Raffle</i>	
1:00	Judy Walton	Keynote Address – “Sustaining the Livable City: The Challenge Ahead”
		<i>AQUATIC AND RIPARIAN HABITAT – Jennifer Budhabhatti (moderator)</i>
1:30	Torrey Lindbo	Quality Assured Data and Watershed Education – Monitoring Streams of the Portland/Vancouver Metropolitan Area
1:40	Kendra Smith	Healthy Streams Plan for the Tualatin Basin
1:50	Kurt Carpenter	Pesticides in the Lower Clackamas River Basin, 2000-01
2:00	Jennifer B. Walsh	Fish Passage in the Lower Clackamas River Basin
2:10	Scott Burns	Urban Stream Study, Newell Creek, Oregon City, Oregon
2:20	Aaron M. Hook	Stormflow Dynamics of Dissolved Organic Carbon and Total Dissolved Nitrogen in a Small Urban Watershed
2:30	Michael Kent	A Metacercaria (Apophallus sp., Heterophyidae) Associated with Skeletal Lesions in Cyprinid Fishes from Willamette River, Oregon
2:40	<i>Break (hosted) & Raffle</i>	
		<i>CONSERVATION AND MANAGEMENT – Karen Wegner (moderator)</i>
3:00	Kevin Martin	GIS Modeling of Significant Riparian Resources
3:10	Deb Lev	Vegetation Inventory of Portland Natural Area Parks
3:20	Mart A. Hughes	Non-Native Weeds in the Portland Area Natural Resource Lands
3:30	Toby Query	Selecting Native Plants for Low Maintenance Restoration Projects
3:40	Frank Opila	Utilizing Technology in a Wetlands Monitoring System for Weather, Water Quality & Wildlife
3:50	Marshall Johnson	Cedar Mill Wetland Habitat Enhancement: Alternative Reed Canarygrass Control Methods
4:00	Jennifer Budhabhatti	Keeping Trails Green in the Region
4:10	Lori Hennings	Damascus UGB Expansion Area – Gathering Baseline Data and Developing a Long-term Monitoring Strategy
4:20	Alan Yeakley	Wrap Up
4:30-7:00	<i>Social & Poster Session</i>	Poster Session: Jennifer Budhabhatti and Lori Hennings (coordinators)

Poster Presentations

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*Presenting author in the case of multiple authors

Keynote Speakers

Bob Sallinger

“Portland’s Peregrines”

Bob Sallinger has worked for the Audubon Society of Portland since 1993. Between 1996 and 2003, he served as director of the Wildlife Care Center Program and since 2003 has served as director of the Urban Conservation Program. During his time with Audubon, he has treated over 30,000 injured wild animals, the vast majority originating from within the Portland-Vancouver Metropolitan Region. Since 1994, he has coordinated the Society’s Peregrine Watch Program, which facilitates research, monitoring, and educational outreach for Portland’s peregrine falcon population.

In 2001, Mr. Sallinger was the principal investigator on a study of anthropogenic impacts on urban nesting peregrine falcons. He has been awarded a Special Recognition Award from the U.S. Fish and Wildlife Service for “Outstanding efforts to conserve and manage the endangered peregrine falcon.” He has a B.A. in biology from Reed College and is currently attending law school at night at Lewis and Clark.



Judy R. Walton

“Sustaining the Livable City: The Challenge Ahead”

Judy R. Walton is Executive Director of the Education for Sustainability Western Network. She holds a Ph.D. in geography from Syracuse University, and is adjunct professor at Portland State University, where she will be teaching a course in sustainable cities. Her research interests are in urban sustainability, American cultural landscapes, and community and sense of place.

Dr. Walton was a green building consultant on Bainbridge Island, Washington in the mid-1990s, and a leader in campus sustainability efforts at Humboldt State University from 1999 through 2002. Dr. Walton’s publications include several scholarly articles and a chapter in the textbook, *Cities of the World*. She has an M.A. in geography from San Diego State University (1992) and a B.A. in political science from the University of California San Diego (1979).

Abstracts Submitted

01

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Comprehensive Ecosystems Management on a Small Tract

We developed a comprehensive and sustainable ecosystem management program for 32 hectares (80 acres) of wildland that is part of Menucha Retreat and Conference Center, a church-owned property near the outskirts of Portland, Oregon. This property is in the Special Management Area (limited development lands) of the Columbia River Gorge National Scenic Area. It is representative of estates and other land holdings near or within metropolitan areas. The project area is predominantly a mesic western hemlock association and includes a variety of disturbed and undisturbed sites such as early successional mixed coniferous and deciduous woodlands, an old growth coniferous stand, riparian zones, a spring-fed stream, and cliff-talus associations. Animals and plants found on or near the property include 41 species that are federal and state listed threatened or endangered species, candidates for listing, or sensitive species. This report integrates essentials of ecosystem management with organizational management systems to produce a goal driven and adaptive total resource management program that involves several communities of interest and transcends jurisdictional and disciplinary boundaries. The program aim is to produce ecological conditions that are sustainable while being consistent with the interests and goals of conferees, neighbors, the larger metropolitan community, and First Presbyterian Church. The program also complies with or exceeds local, state, and federal land and resource management requirements. This comprehensive approach demonstrates an interdisciplinary, multi-value strategy for planning, implementing, and monitoring ecosystem management on smaller tracts of land.

Keywords: Environmental social sciences, Land/watershed management

02

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Modeling Streambed Heating in Shallow Streams

The Oregon Department of Environmental Quality is moving forward to develop TMDLs to address water quality concerns and threatened and endangered species habitat requirements in water bodies throughout Oregon. Approximately 940 water body segments are listed as water quality limited for stream temperature. CE-QUAL-W2 Version 3 is a two-dimensional water quality and hydrodynamic model capable of modeling watersheds with interconnected rivers, reservoirs and estuaries and accounts for the impact of riparian vegetative and topographic shading on stream temperature. One important aspect of modeling stream temperature is how to model the short-wave solar radiation that penetrates the water surface and impacts the channel bed or substrate, which can significantly affect temperature predictions under low-flow stream conditions. Algorithms were added to CE-QULA-W2 incorporating dynamic vegetative and topographic stream-side shading and dynamic three-dimensional streambed heating. The Bull Run River-Reservoir system is a 264 km² watershed located 41.8 km east of downtown Portland serves as the city's primary drinking water source. The watershed consists of two reservoirs, Bull Run Lake and river sections above and below the reservoirs. Fieldwork was conducted in the Bull Run River during the summer of 2002 to monitor streambed temperatures, meteorological conditions, and stream temperatures.

Keywords: Hydrology, Water quality, Watershed management

03

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The Encyclopedia for Restoration of Pacific Northwest Ecosystems

The Society for Ecological Restoration Northwest Chapter and the Rivers Foundation of the Americas are co-sponsoring development of a book intended to be the most comprehensive text on restoration ecology in the Northwest region. This book will contain state-of-the-art information on ecological restoration for major ecosystem types in Oregon, Washington, Northern California, Western Idaho, Western Montana, Southwest British Columbia, and Southeast Alaska. It will provide background on the field of restoration, including scope, practice, history, and activities. There will be chapters covering nine of the major ecosystem types in this region, and additional chapters on special restoration topics, including: invasive species, wildlife reintroduction, prescribed fire, traditional ecological knowledge, urban restoration, watershed scale restoration, stream restoration, and others. The Encyclopedia will display current knowledge of restoring Northwest ecosystems in a manner that will help private practitioners, agency staff, policy makers, students, community activists, and others understand what is actually known about restoration, where it is being done, and what the results have been so far. The presentation will provide a brief overview of the project, with a more detailed focus on the content of the urban restoration chapter.

Keywords: Habitat restoration, Land, watershed management, Environmental Policy

04

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Upland-forest, Bird and Squirrel Community Relationships to Ecological Variables at Multiple Scales within Portland, Oregon

We surveyed diurnal breeding bird and Sciurid mammal communities at 22 (2002, birds only) and 48 (2003) remnant-upland-forest sites within the urban matrix of the greater Portland, Oregon metropolitan area. Our aim is to inventory and describe these communities and test hypotheses relating vertebrate communities to habitat, site configuration (size, shape, and edge) and surrounding landscape ecological variables. Site boundaries were delimited by forest edge and paved roads. From one to six randomly selected stations (depending on site size) were surveyed per site using variable-radius circular-plot morning point counts between 15 May and 18 July in 2002 and 2003. Site-scale vegetation and habitat variables were recorded at 314 m² circular plots (10 m radius) centered at each station and site configuration and landscape variables were determined using data from the Metro RLIS GIS database. Preliminary analyses of 2002 data indicate significant forest area relationships for resident, short-distance, and Neotropical migrant bird guilds as well as for several individual species. Non-metric multidimensional scaling ordination analysis of a similarity matrix of bird species abundance data suggests a relationship between bird communities and geographic region within the study area. Additional analyses of 2002 and 2003 (when sample size was more than doubled) data are currently underway, the most recent results of which we present here.

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

05

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Effects of Surrounding Land Use and Isolation on Plant Species Richness in Urban Forest Fragments

Managers of urban nature reserves interested in maintaining native plant species richness are faced with many challenges. Their sites have many edges, which are often characterized by disturbance. Urban reserves may be influenced by surrounding land uses and their subsequent edge effects. Although disturbance is a natural and important feature of most ecosystems, natural disturbance regimes such as fire are generally absent from reserves (Hobbs 1992); instead disturbance often comes from indirect anthropogenic disturbances. The age of forest fragments may also play an important role in shaping plant species richness. This is illustrated in the intermediate disturbance hypothesis (Connell 1978) which states that the highest levels of species diversity are found in areas with moderate levels of disturbance. With little disturbance over time, competitive exclusion reduces species richness. These situations create a conundrum for land managers who want to manage lands for native plant biodiversity since disturbance has also been shown to increase exotic (non-native) plant species. My poster will present some initial observations and methods of a study of plant species richness in urban forest fragments of Washington County, OR. The study will investigate the following statements: The longer a fragment has been isolated, the lower the native plant species richness and the higher the exotic plant species richness. Fragments will show a predictable pattern of native vs. exotic plant species richness depending on surrounding land use. The study began in summer 2003 and is expected to run through summer 2004.

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

06

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Highway Crossing Structures for Metropolitan Portland's Wildlife

We collected data on deer and elk road-kill in Clackamas, Multnomah, and Washington Counties to identify road-kill "hotspots." Incidents collected occurred from 1987-2002, but were concentrated primarily within the period 1996-2002. Sources included carcass pickup reports from city and county road maintenance departments and animal control agencies, animal rehabilitators' records, as well as ODOT animal-vehicle accident reports. A total of 2,200 incidents were collected. Most complete data were from Clackamas and Washington County Road Maintenance Departments, with Clackamas County reporting 1,451 deer/elk killed from 1996-2002 and Washington County reporting 354 deer/elk killed from 1999-2002. Data for Multnomah County were incomplete. Data for state and federal highways were incomplete as state road maintenance departments no longer maintain records for wildlife carcass pickup. Only 9 of 21 city road maintenance departments in the tri-county area keep carcass pickup records. Lack of record keeping represents a lost opportunity to obtain data on deer and elk populations, their movement routes and numbers killed by vehicles. Collected data were mapped and "hotspots" analyzed for correlation with landscape characteristics, but no correlation was identified. Results indicated that mortality is non-random and peaks in the fall. Further field studies are required. Students in PSU's Master of Urban and Regional Planning program used this data to produce the Metro publication, "Wildlife Crossings: Rethinking Road Design to Improve Safety and Reconnect Habitat." This is a comprehensive manual for siting, designing, and funding wildlife crossing structures in the urban/suburban/rural mix of metropolitan Portland. This publication is available to the public.

Keywords: Habitat restoration, Land use planning, Wildlife ecology

07

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Keeping Trails Green in the Region

The Metro Regional Parks and Greenspaces Department is coordinating with its local partners to build an interconnected system of trails and greenspaces in the Metropolitan Portland area. The system will provide access to more than 15,000 acres of publicly owned greenspaces. The 1995 bond measure has enabled construction of 150 miles of the proposed 650-mile regional trail system. Research has shown that trails can increase conflicts between humans and wildlife in riparian areas and can have negative impacts on water resources. Metro is in the process of releasing a publication titled "Green Trails: Guidelines for Environmentally Friendly Trails". This publication is intended to provide guidelines for planning, constructing, and maintaining green trails for planners, watershed and friends groups. The publication covers assessment of trail siting opportunities and constraints, sources and analysis of natural resource information and best practices for avoiding and minimizing trail impacts. It also provides information about environmental permits, best management practices for low impact construction, and environmentally friendly procurement and maintenance practices.

Keywords: Wildlife Biology, Fisheries, Hydrology

08

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A First Step: Beginning Groundwork for Hyperspectral Imaging of Metro Greenspaces

Metro's goal is to protect and restore the 8,000 acres acquired through the 1995 bond measure. Restoration activities have involved inventorying, and removing exotic species by both physical and chemical treatments. It is time consuming and expensive to monitor and quantify the success of various treatments over a long period of time. High tech methods are now available to monitor and quantify the success of treatments over a long term. In 1998, Metro used Landsat satellite images to create the urban forest canopy and vegetation maps for the tri-county area. These 30-meter resolution images, while providing a good foundation for coarse level mapping, were not fine-grained enough to distinguish between plant communities. Metro is investigating using hyperspectral images to distinguish and quantify plant communities and individual non-native species through out the region. Hyperspectral images provide ample spectral information to identify and distinguish spectrally unique materials, such as different species of plants. The first step involves using a portable hand-held spectrophotometer to gather reflectance spectra of target species over the growing season. This data will be used to create spectral signature libraries and determine what season is suitable to gather distinguishable signatures. The second step will use the spectral signature data to help select wavelengths for an airborne hyperspectral imager flight over the natural spaces. The collected images can then be analyzed with standard hyperspectral imaging analysis software for mapping of target species. Once this data is gathered, data-driven management of Metro natural spaces can begin. We are pursuing funding from the United States Fish and Wildlife/Metro greenspaces grants to fund the first step of this pilot project and are looking to partner with local and state agencies who are interested in performing similar work in the region.

Keywords: Habitat Restoration, Land Use Planning, Land/watershed management

09

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Urban Stream Study, Newell Creek, Oregon City, Oregon

We have been doing research in Newell Canyon for the past ten years and have completed maps on wetlands, geology, surface hydrology, soils, and landslides. We have been studying the watershed through a stream analysis for the past two years. We have seven permanent stream gaging stations and are studying the influence of stormwater and groundwater on the flow in Newell Creek, a stream with cutthroat and coho habitat. We have divided the main stream of the Newell Creek into five reaches: Reach 1 is the lowest one from Abernathy Creek upstream for 500 m. This has a fish habitat value of 122. Reach 2 is the next 650 m and has a habitat value of 150. It ends where the creek passes under Highway 213. Reach 3 is the next 1300 m and contains the prime fish habitat of 160 and has a good population of cutthroat, rainbow and some coho. Reach 4 is a series of 11 beaver dams and has a habitat value of 103 and continues upstream for 350 m. The last reach 5 is the last 430 m up to the Beavercreek Road and has a stream habitat of 111. We have summarized the amount of water entering the main stream from all of the tributaries and have a year of data. We also have suggestions for a sediment catchment basin in the upper reaches of the canyon. Sediment load, turbidity and temperature data has also been collected.

Keywords: Fisheries, Geology, Hydrology, Land/watershed management

10

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Pesticides in the Lower Clackamas River Basin, 2000-01

In 2000-01, the U. S. Geological Survey sampled the Clackamas River and its major lower-basin tributaries for 86 dissolved pesticides and selected breakdown products during storm runoff conditions. In all, 27 compounds, including 18 herbicides, 7 insecticides, and 2 pesticide breakdown products, were detected in 18 stream samples. The most commonly detected pesticides, in decreasing frequency, included atrazine, simazine, diazinon, metolachlor, and diuron, which variously occurred in 46-92% of samples collected from the tributaries. Of these, atrazine, simazine, and metolachlor, plus six other compounds, also were detected in the main-stem Clackamas River. Pesticides were consistently detected with greater frequency and at higher concentrations in the 4 lowermost tributaries (Deep, Richardson, Rock, and Sieben Creeks). In these streams, a total of 12 to 18 pesticides were detected per stream in samples collected during spring and fall. Pesticides always occurred with at least one other pesticide, and about half of the samples, including one sample from the Clackamas River in October 2000, contained six or more pesticides. Nine pesticides, including the insecticide diazinon and the herbicides 2,4-D, atrazine, dichlobenil, diuron, imazaquin, metolachlor, simazine, and trifluralin, were detected at relatively low concentrations in five water samples of Clackamas River water. Despite these detections, no pesticides were detected in three samples of treated Clackamas River water used for drinking. Concentrations of six compounds – carbaryl, chlorpyrifos, diazinon, dieldrin, malathion, and the breakdown product of DDT (*p,p'*-DDE) – exceeded established or recommended criteria for the protection of aquatic life in some of the tributaries, sometimes for multiple pesticides in one sample. Identifying the sources of pesticides detected in the Clackamas River Basin is difficult because of the diverse land use in the basin and the multiple-use nature of many of the pesticides detected. The planned future reporting of pesticide use in Oregon may improve studies related to patterns in pesticide occurrence in streams because only a small fraction of the thousands of pesticide products registered for use in Oregon were tested for in this study. Future monitoring also could benefit from knowledge of what pesticides are applied so that potential problems can be identified and managed.

Keywords: Land/watershed management, Water quality

11

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Productivity of an Urban Population of Giant Canada Geese (*Branta canadensis maxima*)

Growing populations of breeding Canada geese in urban areas and the associated conflicts with human residents have resulted in a call for wildlife management officials to consider population control measures. However, reproductive parameters needed to make informed management decisions are not available for these specialized populations of resident Canada geese. Additionally, the scale at which management actions would be most effective is unknown. Intensive management of local “problem areas” may be ineffectual if larger scale factors influencing production are not addressed. We report how coarse scale habitat factors that are easily identifiable in the field influence productivity. We identified from among 3 scales (local, 2 km, and 5 km) the level at which habitat structure and composition had the greatest effect on nest survival. Finally, impeding reproductive success on highly successful nesting locations, particularly islands, is one potential management tool. We identified simple metrics and categories associated with highly productive islands. By prioritizing these variables, we identified island categories for which removal or nest manipulation would have the greatest effect on production. During 2000-2002 we located and monitored 2,132 nests in the Chicago metropolitan area. Overall nest success was 43.5% (95% C.I. = 41.1% - 45.9%). Average clutch size was 5.5 ± 0.04 (SE). Average goslings leaving nest was 4.64 ± 0.05 . Nest success was highest on islands, muskrat lodges, and the mainland, respectively. Nests in commercial areas experienced higher nest success than lawn-dominated or natural land use types. Local influences, particularly nest-site type (island, mainland, or muskrat lodge), were most important in determining nest survival, followed by total edge and % water within 2 km of the nest. The interaction between island distance to shore and water body size received the most support in predicting island nest success.

Keywords: Animal ecology, Land use planning, Wildlife biology

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Assessment of Macroinvertebrate Communities of the Tualatin River Basin

Macroinvertebrate communities, physical habitat, and water chemistry were sampled from 63 stream reaches in the Tualatin River basin in fall 2001 to assess the condition of macroinvertebrate communities in relation to land use patterns and instream physicochemical conditions. Thirty seven low-gradient (<1.5%) and 26 high-gradient (>1.5%) reaches were sampled. High-gradient reaches ranged widely in condition; major gradients in community condition were strongly related to land-use types and a number of instream environmental variables. High-gradient reaches occurring primarily in forested catchments were characterized by high EPT (mayfly, stonefly, and caddisfly) richness, low proportions of tolerant organisms, a low collective tolerance to disturbance, and high overall taxonomic richness. These conditions ranged to the other extreme in heavily urbanized areas, where taxonomic richness was low, collective community tolerance to disturbance was high, and EPT richness was low. Metric values were strongly correlated with a number of environmental variables, including riparian buffer width, effective impervious area, and a number of instream attributes. Low-gradient reaches showed less variability in community composition. These reaches occurred exclusively in areas dominated by urban or agricultural land uses. Low-gradient reaches were characterized by low taxonomic richness, few or no EPT taxa, high dominance by a few taxa, and a large proportion of tolerant organisms. Community conditions in low-gradient reaches were also correlated with several environmental variables, particularly substrate and dissolved oxygen, as overall community tolerance to impairment increased with decreases in the condition of these measured variables.

Keywords: Land/watershed management, Water quality

13

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Science Inquiry Skill Improvement Through Use of Terrestrial Protocols for Middle and High School Science

Teachers in the Woods Program is designed to give PNW middle and high school science teachers an opportunity to develop significant knowledge and skills in ecological field studies over the summer, an opportunity for them to integrate more science inquiry project work into their teaching during the school year. Nearly all teachers developed and implemented field science projects for their students. Many of these projects were enduring and were improved upon over several years. Most of these projects involved the participation of a local natural resource agency or citizen's group. All projects involved use of a subset of field protocols. Breakdown of protocols used by this year's 37 teachers:

Soil monitoring: 11 classes
Terrestrial arthropods: 8
Tree and vegetation survey: 4
Wildlife: 5 (others did aquatic monitoring)

Eight categories of science inquiry skills, each using a 6-point scale were developed to help evaluate the benefits to students in doing a field project. Science inquiry skills include content and concepts, questions, design, and analysis, interpretation and reporting of data. In an initial study, five teachers assessed changes in a total of 155 students' skills. Student scores increased significantly in applying scientific concepts, formulating of field research questions, and designing a field investigation. Eighty percent had improved all skills. New emphasis is the further development of these protocols for wider distribution: Ecological Research for High School Science, A working model for University –Community research partnership for national application with an accompanying lab manual of terrestrial ecology and watershed processes for undergraduate environmental science.

Keywords: Environmental education, Soil science, Plant ecology

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Effective Integrated Vegetation Maintenance Plans Developed by The Watershed Revegetation Program

The City of Portland's Watershed Revegetation Program has been involved with long-term management of hundreds of acres within the Metro regional area for the past 8 years. We have developed integrated vegetation management strategies to address the diverse conditions of our sites which range in size from .2 to 100 acres and vary in habitat type from floodplain forest to oak savannah. With most restoration sites, the first treatment prescribed is a thorough site preparation cut. Whether it's an upland site infested with a variety of broadleaf weeds such as Himalayan Blackberry, Scotch Broom, Canada Thistle and Teasle, or a wetland choked by Reed Canary grass and Purple Loosestrife, an initial cut which clears the site of a majority of the existing non-native vegetation is implemented. We have developed many options to perform this initial cut, including hand crews using chainsaws and a variety of cutting implements operated by posi-track machines and tractors. After the initial site prep cut, the site is assessed again and a thorough integrated vegetation maintenance plan is prescribed to the site. Following treatments may include herbicide application, seeding with native grasses, follow up cutting treatments, planting with native trees and shrubs, tubing with vexar, mulching, irrigating and continuous monitoring. Timing of treatments is critical for successfully maintaining most vegetation and through years of observation and experience, we have developed ideal durations for follow-up treatments. We work extensively with reforestation contractors to perform many of our prescribed treatments. We now have proven, successful strategies for large-scale control of many of the noxious weeds we encounter on a variety of landscapes.

Keywords: Habitat restoration, Plant ecology

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Photo Monitoring Vegetation and Soil

Photo monitoring vegetation and soil uses a ground-based camera to document change. Assume people installing the photo location will not be the ones re-photographing it. This requires a protocol that includes: (1) A highway map to the monitoring location and a site specific map diagramming the camera and photo point locations. (2) Type and make of film such as color at ASA 200 speed and camera for example 50 mm lens on a 35 mm camera or specifications for a digital camera. (3) Specific instructions for doing the photography. (4) When to re-photograph including season and years. Use a size reference, such as a meter board, at the photo point to: (1) identify the topic of interest, (2) orient current and repeat photographs by placing the "1M" of the board in the camera focus ring, (3) obtain maximum depth of field at the topic by focusing on the "1M", and (4) provide a measured reference for analysis of change. Each camera location and its photo point must be permanently marked with steel stakes or fence posts because distance from camera location to photo point must remain the same for all repeat photographs.

Keywords: Habitat restoration, Land/water management

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2001 Springbrook Creek Urban Stream Restoration Project

Restoration of Springbrook Creek is part of the ongoing effort by the City of Lake Oswego to halt problematic stream entrenchment, erosion, downstream sediment transport to Oswego Lake, habitat reduction, loss of floodplain connectivity, etc, as well as to improve water quality and fish habitat throughout the urbanized watershed. The project site consists of a stream reach approximately three miles long coursing within a 1,219 acre urbanized watershed. Restoration design objectives were established to restore natural stream channel stability, reconnect the stream to its remaining natural floodplain while preventing flood damage to existing properties, dissipate stream energy by increased meander (sinuosity) and the designed placement of natural materials, raise the base hydrologic table to support riparian vegetation and to increase summer base flows, improve water quality, and improve native fish and wildlife habitat. Available survey and photographic data from the 1960's helped identify natural conditions. Bankfull discharge was determined for each section based on drainage area. Targeted channel design was to construct a Rosgen type B4c in sections where the valley form limits access to a broad floodplain, and a Rosgen type C4 where a broader floodplain was available. Sections of the existing straightened channel were abandoned in place of new channel meanders, with log/boulder revetments constructed to prevent stream flows from reacquiring the abandoned channel. Approximately 2,700 lineal feet of new channel was created. Native bed material of the correct range was introduced into the new channel. Dense plantings of native vegetation restored the native biota and habitat to the Springbrook Creek channel and associated floodplain.

Keywords: Fisheries, Habitat restoration, Hydrology

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Damascus UGB Expansion Area – Gathering Baseline Data and Developing a Long-term Monitoring Strategy

In 2002, more than 12,000 acres in the Damascus area were added to the Urban Growth Boundary (UGB). This is the largest single addition since the original UGB was established. The area's half-dozen or so subwatersheds, characterized by an assortment of rural and agricultural land uses in various condition, provide the perfect canvas for creating a new urban paradigm, begging the question: How can we urbanize so as to reduce the impacts on fish and wildlife? The way to answer this question is to document existing conditions, measure how they change under a variety of development paradigms, and statistically sort out the relationships. This area-specific knowledge of what works and what does not can then be interpreted to create a new model for ecologically sensitive urbanization. The primary goal of this project is to reduce the cumulative and site-specific effects of urbanization by identifying existing conditions, relating those conditions to land use, and developing a long-term monitoring strategy to identify adaptive management possibilities. The results will inform the initial planning process for the Damascus area, and may also prove useful to inform development in other areas. Fieldwork for collection of macroinvertebrates and physical habitat data was completed in fall 2003. We will conduct bird and habitat surveys in winter 2003-2004 to augment information learned about breeding birds from the 1999 field season (Hennings and Edge 2003, *The Condor*). Study streams include Rock, Richardson, Deep, Noyer, Kelly, and Butler Creeks, as well as numerous tributaries and the mainstem Clackamas.

Keywords: Conservation biology, Land use planning, Sustainable development

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Success of the Natural Resources Volunteer Program

The Natural Resources Volunteer Program at Tualatin Hills Park & Recreation District has made some amazing strides in natural area restoration over the last 2.5 years. The Natural Resources Volunteer Coordinator organizes volunteer projects with many different focuses, including invasive, non-native plant removal, native plantings, trail building, park clean-ups and any other miscellaneous projects that pop up. All of these volunteer projects are based on some sort of need, whether or not the need comes from the maintenance, planning and natural resources departments or the community has expressed a need. Many of the projects also fall under the goals outlined in the district's Natural Resources Management Plan. The volunteer coordinator position originally began as an AmeriCorps volunteer placement through the Northwest Service Academy and only this past August turned into a part-time staff position. The sheer number of volunteers involved, native plants planted, amount of invasive plants removed and money saved by the park district is enough to convince skeptics that volunteers in restoration can have a significant impact on our natural areas.

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

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Stormflow Dynamics of Dissolved Organic Carbon and Total Dissolved Nitrogen in a Small Urban Watershed

The objective of this study was to examine patterns of dissolved organic carbon (DOC) and total dissolved nitrogen (TDN) loading to a small urban stream under baseflow and stormflow conditions. We hypothesized that in an urban watershed, stormflow concentrations of DOC and TDN would be less than baseflow concentrations. These hypotheses were tested in a small urban watershed in Portland, Oregon. Data were collected on storms during spring 2003, a seasonally rainy period prior to the growing season. Results show that baseflow DOC concentrations in the stream (2.07 mg L^{-1}) were lower than stormflow concentrations of DOC (4.06 mg L^{-1}) (Mann-Whitney: $p < 0.001$) while baseflow TDN concentrations (0.72 mg L^{-1}) were higher than TDN concentrations during stormflows (0.59 mg L^{-1}) (Mann-Whitney: $p < 0.01$). Results did not indicate a change in concentration for either constituent in the shallow subsurface water during stormflows (baseflow subsurface DOC = 1.99 mg L^{-1} , TDN = 1.80 mg L^{-1} ; and stormflow subsurface DOC = 2.27 mg L^{-1} , TDN = 1.75 mg L^{-1}). Our results suggest that the response of this urban watershed to stormflows was similar to that found in previous studies of forested watersheds for DOC (i.e. stormflow concentrations increased for DOC). However, TDN concentrations do not appear to rise with stormflow in this urban watershed as has been shown in previous studies of forested systems. Future work will include applying a mass balance approach to each storm event sampled to partition sources of DOC and TDN loading during storm events in an urban watershed.

Keywords: Hydrology, Water quality

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Non-Native Weeds in the Portland area Natural Resource Lands

Analysis of Portland Parks and Recreation's (PP&R) 2003 natural resource vegetation survey is currently underway. The results are presented as a first approximation of the occurrence and extent of non-native weed infections in the metropolitan area. This survey and data are providing direction to PP&R's Ecosystem Management process and are providing the qualitative figures to determine the resources required to restore the PP&R natural resource lands to functional native communities. Our priority is to direct resources to the protection of the best habitats and the restoration sites that can be restored with the minimal effort. The qualitative metric for overall environmental health reveals that no high quality functional habitat exists in the sample set. The distribution of overall vegetation-unit health was skewed to the degraded state. Initial stewardship efforts are targeted towards the restoration of the areas in "good" condition to a "healthy" condition. These units generally contain less than 1% cover of one or more invasive species. The growth form and tenacity of the target weeds is being used to group species into treatment classes. The classes of Trees and Understory Trees and Shrubs appear to be the best targets for early restoration treatments. The invasive vines and giant perennial knotweeds should be targeted with other treatment regimes.

Keywords: Conservation biology, Habitat restoration, Plant ecology

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A Note on the Economic Management of Inventory or Resource under Stochastic Prices

The Markovian optimal policies are studied for the problem of economic inventory control or resource management in a finite time horizon. Under some conditions, in particular, when the prices are stochastic and there is a positive fixed setup cost K , the existence of $\{S, s\}$ -type Markovian optimal management policies is proved. When $K=0$, the optimal policies are of $\{S\}$ -type, in which case a comparison is made between the optimal policies under stochastic and deterministic prices. It turns out that under stochastic prices the optimal policies should be more conservative in order to maximize the present value of expected revenue.

Keywords: Conservation biology, Economics, Environmental policy

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Cedar Mill Wetland Habitat Enhancement: Alternative Reed Canarygrass Control Methods

Cedar Mill Wetland is a 16 acre remnant wetland within a rapidly developing landscape. This study is part of a larger effort to control invasive plants and enhance the native vegetation and wildlife habitat of Cedar Mill Wetland. Reed canarygrass is a well known invasive grass that is notoriously hard to control once it has become established. Common traditional control methods, such as glyphosate based herbicides, may have negative environmental impacts when used in wetlands. The study involves testing and evaluating a variety of alternative reed canarygrass removal and control techniques. Twenty-one test plots were set during the summer of 2003 on portions of the wetland that have been invaded and colonized by reed canarygrass. Treatments on the test plots include combinations of mowing with the following techniques: broadcast spray acetic acid based herbicide, cover with cardboard and black plastic, cover with two layers of black plastic, competitive native plantings, and mulch with 10-inch depth of wood chips. Test plots will be monitored by stem counts in the Spring, Summer and Fall of 2004. Additional research will be conducted to investigate the affect of reed canarygrass on wetland soils, as well as the effect of the various experimental treatments on soils. The intent of the study is to evaluate the success of alternative control methods which have less environmental impact on wetlands than traditional methods. The study is focusing on control techniques that are accessible for wetland maintenance and enhancement on a local community scale.

Keywords: Habitat restoration, Land/watershed management

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A Metacercaria (*Apophallus* sp., Heterophyidae) Associated with Skeletal Lesions in Cyprinid Fishes from Willamette River, Oregon

A high prevalence of skeletal deformities have been observed in various fishes from the Willamette River for many years. Surveys conducted have consistently shown that precaudal skeletal lesions are more prevalent near Portland (i.e., Newberg Pool), leading to the hypothesis that toxicant exposure may be the cause. The lesions are common in cyprinid fishes. Histological evaluation of northern pike minnows *Ptychocheilus oregonensis* showed that a metacercaria of a digenean trematode was directly associated with vertebral lesions in about half of the affected fish. All affected chiselmouth (*Acrocheilus alutaceus*) that were examined showed the parasite associated with vertebral lesions. The metacercaria was associated with vertebral lesions in a few peamouth (*Mylocheilus caurinus*) that we examined. The parasite was less prevalent in fishes without lesions. The metacercaria was identified as *Apophallus donicus*, previously reported in several fish species from the Willamette River. We also evaluated the association of the worm with the lesions using cleared whole fish. This technique allowed for better visualization of encysted worms and skeletal lesions in the same preparation, and this method also demonstrated that many of the skeletal lesions were associated with the worm. We have caused similar parasite induced lesions in the laboratory by exposing fathead minnows to *Apophallus* cercariae that we obtained from snails in Newberg pool. These studies indicate that the metacercaria is at least partially responsible for the high prevalence of skeletal deformities that have been seen for many years in cyprinid fishes from certain regions of the Willamette River.

Keywords: Fisheries, Water quality

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Metro's Fish and Wildlife Habitat Protection Program

Metro and its local partners are moving forward to address statewide land use planning goals to conserve, protect, and restore urban areas to support clean water and healthy fish and wildlife habitat. Two major planning efforts comprise this work: – Stream and Floodplain Protection (Goals 6 and 7; adopted 1998), and Fish and Wildlife Habitat Protection (Goal 5; underway). Metro is undergoing a 3-step process to achieve Goal 5: Step 1 - inventory fish and wildlife habitat (completed 2002); Step 2 - assess the economic, social, environmental and energy (ESEE) consequences of allowing, limiting, or prohibiting development on natural resources (nearly complete); and Step 3 - develop a program to protect, conserve, and restore habitat (by late 2004). In Step 1, Metro developed two sets of criteria to identify the location and quality of fish and wildlife habitat and used GIS to map landscape features associated with these criteria, such as the location of trees, shrubs, wetlands, flood areas and steep slopes. The two inventories were field-tested and then reconciled to produce a single habitat map. In Step 2, Metro developed conceptual program options to assist in analyzing potential ESEE consequences. In Step 3, Metro will develop a program to protect fish and wildlife habitat based on information from the inventory, analysis of ESEE consequences, and input from local partners and the public. The resulting program may include landowner incentives, land acquisition, public education, and new regulations. Public outreach and involvement continue to be important components of this process.

Keywords: Economics, Environmental policy, Land use planning

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Role of Citizen Involvement in Bluebird Conservation

Currently, the Prescott Bluebird Recovery Project is studying the role of citizen involvement in bluebird conservation. In a previous study, we showed that providing supplemental food to nestling bluebirds increased immediate survival (i.e. from hatching to fledging) and increased juvenile overwinter survival (from the time of fledging to recruitment into the breeding population the following year). However, when we followed these same individuals throughout their lifetimes, we showed that birds that were supplemented as nestlings had highly reduced reproductive success relative to their unsupplemented counterparts. In addition, supplemental feeding had a detrimental affect on subsequent adult survival. In a population model, we confirmed that under some conditions supplemental feeding could actually reduce population growth rate. Yet our assessment of supplemental feeding as a conservation strategy depends upon more than just our scientific findings. Nestling supplemental feeding is a critical part of citizen involvement in our project. Homeowners and volunteer nest monitors thrive on the personal connection with wild birds that results from interactions at feeding stations, and such enthusiastic support is the foundation of our success at bluebird conservation. Therefore, conservation management decisions depend critically on both the scientific results and the human perspective. We are currently studying this interplay and are actively seeking collaborators in the social sciences who can help us study the human element in a valid, quantitative manner.

Keywords: Animal ecology, Conservation biology, Environmental social sciences

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Long-term Monitoring of Riparian Revegetation Sites

Riparian revegetation projects are generally implemented under the notion of an improvement of water quality, soil stability and wildlife habitat. There have been very few long-term studies to back up these assertions with scientific evidence. The Watershed Revegetation Program has been actively managing open space riparian, wetland and upland areas within the Portland Metro Region since 1996. During this time, many project sites have been converted from exotic plant monocultures into sapling stands of native trees, shrubs and forbs. Currently, we are designing a study to evaluate sites before any treatment occurs and then monitor in five year increments. This study will attempt to examine project sites over time in relation to riparian forest development, channel morphology and biotic integrity. Some of the questions we would like to address in this study are: Are restoration activities linked to an increase in bird diversity? Do restoration activities have a beneficial impact on water quality (temperature and sediment primarily)? What impact does riparian buffer establishment have on channel complexity and configuration?

Keywords: Habitat restoration, Land/watershed management

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A Comprehensive Weed List for Metro Area Greenspaces

Naturalized exotic plants have had a devastating impact on the preservation and restoration of urban greenspaces. For that reason, the Technical Committee of the Interagency Weed Group (IWG) has worked cooperatively over the last several years to compile a comprehensive list of non-native plants which have naturalized in Portland Metro natural areas. The IWG is formed by staff from City of Portland (Parks Natural Resources, Parks Horticultural Services, Environmental Services, Urban Forestry), the Nature Conservancy, Tualatin Hills Parks and Recreation District and East Multnomah Soil and Water Conservation District. The most recent accomplishment of this group is to assist in the addition of 125 species to the Nuisance list on the Portland Plant List. The Portland Plant List (PPL) is a useful tool for local land managers and private citizens because it provides a regional reference for native and naturalized exotic plants. The PPL is also the primary mechanism used by the City of Portland to educate land managers, citizens and nursery managers about the spread and naturalization of invasive weeds. In addition to providing education about native and exotic plants, the Portland Plant List is also a regulatory document. It is referred to in a multitude of city planning documents and code such as Title 33 and Title 20. Requirements for control and abatement of exotic plants are referred to in the PPL's Nuisance and Prohibited lists. When the Nuisance List is updated in December of 2003, land managers working to restore native plant communities in E-zones will no longer have to file a Land Use Review for removal of those species (in E-zones).

Keywords: Environmental policy, Habitat restoration, Land use planning

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An Investigation of Residents' Attitudes about Water Resource Management and Protection in Metropolitan Portland, Oregon

Evidence suggests that although residents of metropolitan Portland, Oregon generally support water resource management and protection, significant opposition to specific water resource protection measures exists. Such disconnects between general and specific attitudes are common, and are often explained by poor measurement techniques or overly simplistic theories such as utilitarianism and the politics of self-interest. Alternative theories allow for multiple rationalities and view the attitudinal split as evidence of complex cognitive and decision-making processes. This project investigates the degree of attitudinal divergence among urban residents, in addition to explanations for varying environmental attitudes. Differences in the attitudes of participants and non-participants of place-based groups (i.e., watershed councils and neighborhood associations) are examined, because the frequent involvement of these groups in environmental decision-making raises questions about the extent to which their views are representative of those of the general public. Semi-structured interviews have been conducted with resource managers and planners as well as watershed and neighborhood activists to better understand the involvement of place-based groups in local governmental decision making about water resources. A scientific survey is being implemented to systematically collect information on water-related attitudes and explanatory factors. The hypotheses posed by this research will be presented along with preliminary research findings from interviews and the mail questionnaire.

Keywords: Environmental policy, Environmental social sciences, Water resources

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Vegetation Inventory of Portland Natural Area Parks

Portland Parks and Recreation began vegetation surveys during the summer of 2003, as a step in Portland's ecosystem management process for natural area parkland. Survey unit boundaries were initially defined using aerial imagery and adjusted in the field. The field methodology was designed to rapidly cover large areas using visual assessment techniques to identify vegetation community characteristics such as dominant and invasive plant species, management concerns, and overall ecological health to inform park management and citywide natural resource planning. Field data were entered into handheld PDA's and imported into a relational database, facilitating complex data querying, reporting, and geographic referencing for use in a GIS. Plant communities were classified using the National Vegetation Classification System while individual plant species were grouped into six cover classes. Eighteen management issues received ratings between 0 and 3; ecological health was rated on a scale of 1 to 5. From June to October 2003 over 2,400 acres were surveyed within 428 units; the average unit size was 5.7 acres. The most common management concern observed was non-native invasive species. Of 2,083 surveyed acres managed by Parks & Recreation as natural areas, 731 acres (35%) had trace or light levels of invasives, 623 acres (30%) had moderate levels, and 729 acres (35%) had heavy invasive infestations. Ecological health was rated as good in 30% of the units, fair and stable in 35%, fair but at risk in 27%, and severely degraded in 8% of units. No units were found to be in excellent condition.

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

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Quality Assured Data & Watershed Education –Monitoring Streams of the Portland/Vancouver Metropolitan Area

The Student Watershed Research Project (SWRPTM) is a long-term riparian and aquatic monitoring program that couples watershed education with the collection of high quality data. SWRP coordinates long term stream monitoring in the Portland/Vancouver Metropolitan area while offering training and technical assistance to teachers and volunteer monitors in other areas. SWRP conducts baseline monitoring of physical, chemical, and biological parameters at least twice a year at multiple stream sites. 12 years of quality assured data including water quality, macroinvertebrates, in stream habitat, and riparian vegetation are available on our web site: www.swrp.org. Some significant student findings from the previous year include:

- After finding high nitrate nitrogen concentrations (>4 mg/L N) in Crystal Springs Creek, follow-up student research found that the golf course was not significantly increasing nitrate concentrations. Collecting samples from 3 of the source springs suggested that the nitrate levels were elevated in the groundwater.
- On multiple occasions, students found excessive E. coli levels in North Fork Deep Creek, just downstream from the City of Boring. DEQ followed up on the student concerns and suggested that ditch cleaning might have been the culprit. Students found elevated E. coli levels (~1000 CFU/100 mL) again this October. Sampling was conducted within a week of the "first flush", so perhaps ditches are the source.
- Hourly summer stream temperature data was collected from several urban streams, including Johnson and Crystal Springs Creek in Portland, Fairview Creek and Beaver Creek in Troutdale/Gresham – all of which violate water quality standards for temperature.

Keywords : Environmental education, Land/watershed management, Water quality

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GIS Modeling of Significant Riparian Resources

The City of Portland's *Healthy Portland Streams* project is currently updating the City's existing natural resource inventories as part of an ongoing effort to ensure a clean and healthy Willamette River and tributary system. This key project task focuses on identifying and assigning significance rankings to landscape features that provide important riparian functions. The Bureau of Planning has developed an automated GIS-based model as one step in the inventory process. The model maps key landscape features and applies a set of decision criteria to rank riparian areas. Inputs to the model include updated stream geography resulting from a comprehensive re-mapping of stream centerlines within the study area. To date, the location of 152 miles of previously mapped streams have been revised and 86 stream miles have been added. Other inputs include vegetation information derived from 2002 1-meter multispectral imagery and updated wetland, waterbody, slope, and floodplain data. The decision criteria the model applies to identify and rank riparian resource areas are derived from recent research on the how these ecosystems function. The model output is a single GIS dataset containing information on mapped landscape features, the relative importance of individual riparian functions for specific areas, aggregate rankings reflecting the total number of functions present in a resource area and proximity to streams, wetlands, and water bodies. The dataset also contains a complete record documenting how each output area satisfies the specific model criteria. Project staff are coordinating with Metro and other agencies as this work proceeds.

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

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Assessment of Urban Aquatic Habitats in Portland, Oregon using Species-habitat Analysis

We evaluated the constraints of urbanization on habitat for coho salmon (*Oncorhynchus kistuch*) in Johnson Creek, a third order tributary to the Willamette River within the Portland, Oregon metropolitan area. A life cycle based, habitat-rating model, Ecosystem Diagnosis and Treatment (EDT), was used to evaluate the extent of habitat constraints, the spatial distribution of impacts and key limiting attributes. Habitat input data came from Oregon Department of Fish and Wildlife stream habitat surveys supplemented by water quality, flow and temperature information from various agencies. The rating of current habitat conditions was compared to reference conditions representing fully restored and fully degraded conditions in Johnson Creek and the lower Willamette River. These "bookends" provided a context for assessment of current conditions and defined restoration and degradation for the creek. Relative to these reference conditions, urbanization of Johnson Creek has altered habitat and severely constrained potential coho production. The combination of habitat constraints and high recent marine harvest can account for the near extirpation of coho from Johnson Creek. Conditions supporting viable life history trajectories were concentrated in a few reaches in the upper watershed beyond the range of channelization and severe urbanization. Key attributes limiting production in Johnson Creek were habitat diversity (primarily reflecting the lack of in-stream wood and channelization), water temperature and sediment. The analysis provided a mid-scale, life history based assessment of the effects of urbanization on salmon habitat, and demonstrated the utility of a salmonid life history approach as a basis for recovery of urban watersheds.

Keywords: Fisheries, Habitat restoration, Land/watershed management

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Preliminary Analyses of Variation of Forest Tree Community Structure among Portland's Parks and Greenspaces

As part of a study designed to inventory and describe the terrestrial and stream-dwelling vertebrates in 48 parks and greenspaces, we conducted analyses of plant communities within all sites. Study sites ranged in size from 1 ha to 2000 ha. Geographic coverage included areas east (Oxbow State Park) and west (Tualatin Hills Nature Park) of the Willamette River and extended from Forest Park in the north to Wilderness Park in West Linn. Points for sampling vegetation were based on randomly located 314 m² plots (circular plot with a radius of 10 m) that corresponded to sites used in our vertebrate sampling scheme. The number of sample points/park varied from two to over 10 (total number = 290 plots) and varied with the size of the park (mean of 7/park). Our analyses allowed us to quantify (1) tree species composition and structure (number and size of trees), (2) structure (both vertical and horizontal) and species composition of shrubs, and (3) species composition and cover by the herbaceous community. In addition, we measured the (4) amounts of coarse woody debris (logs and snags), (5) presence of English Ivy on vertical stems (both living and dead), and (6) canopy cover. Preliminary analyses demonstrate substantial variation in species composition and physical structure of forests within different parks. The contribution of invasive plants also varied greatly among parks. Park age, topography, and stand history are all probable contributors to differences in forest community structure and their effects will be discussed.

Keywords: Conservation biology; Habitat restoration, Plant ecology

34

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Does Ownership Matter? Examining the Relationship between Property Values and Privately and Publicly Owned Open Spaces, Streams and Wetlands

Several studies conducted in the Portland metropolitan area have examined whether the sale price of single-family residential properties is influenced by proximity to open spaces such as wetlands, natural areas, golf courses and urban parks. This analysis extends previous research by considering whether open spaces are privately or publicly owned and whether resources, such as streams and wetlands, are on private or publicly owned land. The analysis uses detailed structural, neighborhood, and amenity information for approximately 30,000 single-family residential properties sold in Multnomah County between 1999 and 2001. Results indicate that the relationship between property values and proximity to streams, wetlands, specialty parks, golf courses and cemeteries depends on whether the open space or resource is publicly or privately owned.

Keywords: Economics, Environmental policy

35

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What Policy might Save Portland's Oak Savanna?

Private ownership and the need for active management pose special challenges for saving the Willamette Valley's imperiled oak savanna through regulation. Oak savanna is disappearing not just to conflicting uses, but also to forces such as conifer invasion and invasive exotic vegetation. When land-use restrictions are applied based on the presence of oak savanna, they can inadvertently discourage good stewardship, by reducing the market value of property that contains oak savanna. The mere risk of such restrictions can discourage private landowners from controlling invasive vegetation. USFWS has already established a framework to address disincentives inadvertently created by the Endangered Species Act. However, Oregon's land-use rules lack such a provision and give local governments the authority and duty to consider regulating any property with significant wildlife habitat, while limiting consideration of ecological benefits from voluntary conservation and ecological harm from regulatory disincentives. To avoid inadvertently exacerbating the loss of oak savanna in the name of saving it, regulators might need to (1) clarify whether the primary goal of conservation policies is to conserve biodiversity or merely limit conflicting uses; (2) consider ecological benefits of voluntary conservation and ecological costs of regulatory disincentives; and (3) consider the net ecological cost or benefit of a broader range of policy alternatives. Alternatives include limiting new regulation of private land to riparian habitat, delineated solely by distance from water. This alternative might benefit oak savanna in the Portland area, which reportedly has 93% overlap between property inventoried as riparian habitat and upland habitat.

Keywords: Conservation biology, Environmental policy, Land use planning

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Utilizing Technology in a Wetlands Monitoring System for Weather, Water Quality and Wildlife

Jackson Bottom Wetlands Preserve in Hillsboro, Oregon is the home of the Wetlands Monitoring System sponsored by Intel. The system supports environmental education and resource management decisions within the 710-acre preserve. The system is composed of a weather station, a remote water-quality station and a remote video camera system. Near real-time information is available through Jackson Bottom's website www.jacksonbottom.org. At the new Education Center, information is presented in an interactive kiosk. All system components consist of scientific-grade instrumentation. The weather station at the preserve is the Columbia Weather Systems Capricorn 2000. It continuously measures wind speed and direction, temperature, barometric pressure, rainfall, relative humidity and solar radiation. The remote water-quality station includes a YSI 600R multi-parameter probe and an Instrumentation Northwest PS98i pressure transducer. The water-quality sensors measure pH, temperature, dissolved oxygen and conductivity. The pressure transducer measures water level. The remote station is powered by a 20W solar panel charging a 12V battery. A Campbell Scientific CR510 data logger is programmed to control the measurements. Data are measured and transmitted hourly to the base computer using spread spectrum radio telemetry (900 MHz). The remote camera system from SeeMore Wildlife provides continuous video that can be viewed in the Education Center. Visitors and researchers can remotely control the pan, tilt and zoom. Wireless technology, using a license-free spectrum (2.4 GHz), is utilized to transmit images from the camera. The camera system is programmed to provide a tour of the wetland, featuring points of interest such as the Bald eagle nest.

Keywords: Environmental education, Land/watershed management, Water quality

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No Fences: Developing a Resource Sharing Strategy for Natural Space Management

Many groups own and maintain natural spaces and parks. They have maps, records, histories, and to date, mostly unquantified natural resources. These groups may also have small teams of employees and many volunteers that help to maintain these natural spaces. They probably also all have limited financial resources, either from private and/or public funding sources. There are many resources that these groups have in common, that if shared wisely, would benefit every group, and the community. In the last 10-20 years, many technologies have become available to collect and store information, and recently with the creation of the internet, this information is available for the world to share. There is a finite amount of land, and we need to make smart decisions on how land is managed. Science and data-derived policy can be the driver of future land management, while technology can be the enabler. Several new project/resource sharing models have recently been created in the open source software community that could be duplicated in the land management community. Many businesses and groups donate funds to these groups for development of new open-source software technologies, that then are available for the benefit of everyone. By using a similar model for natural space management, with the assistance of technology, groups that maintain properties can pool funds to share common resources (equipment, expertise, software), research can be conducted, and information shared for the benefit of everyone involved, and the community.

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

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Bat Distribution within the Metro Urban Growth Boundary

I review bat distribution from historical records and a two-year survey, completed fall, 2003. A short discussion and preliminary statistics on bat affinities for varying habitats will be presented. I will also provide a listing of species detected and reproductive status of each species.

Keywords: Animal ecology, Conservation biology, Wildlife biology

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Reed College Canyon Restoration

Reed College is currently in its fourth year of implementing a long-term restoration strategy located in the upper headwaters of Crystal Springs. Reed lake is the site of the Crystal Springs headwaters, and is identified in the Johnson Creek Basin Protection Plan as "the only naturally occurring pond (or lake) remaining in the inner-city area." Crystal Springs is a critical, high quality ground water resource in the Johnson Creek system. This 23-acre site had been left to the natural consequences of non-native, noxious weeds. Throughout the restoration efforts, a great deal of energy has gone into controlling the non-native species and reintroducing native plant material. In 1999 the removal of an outdoor swimming pool made way for the installation of a fish ladder designed to make the waterway passable from spawning bed to upper rearing pond. The objectives for the project are to improve habitat for birds, animals, and aquatic species; create new spawning and rearing grounds for salmon and other resident fish species. In addition to its environmental potential, this project offers significant opportunities for public education. The canyon is widely used by residents of Westmoreland and the Reed community for passive recreation. It is also a resource for the Portland Public Schools: about 200 public school students visit each year for science courses or field trips.

Keywords: Land/watershed management, Habitat Restoration, Environmental Education

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Portland's Urban Forest Canopy, 1972-2002

Urban forest canopy was mapped within the 126 square miles (327 sq km) of the City of Portland. Three principal satellite data sets were analyzed: 1972 Landsat MSS data; A. P. Newman's 1991 *Vegetation Type* and *Vegetation Amount* maps (Geography Master's Thesis, Portland State University, 1997); and 2002 Landsat TM data. Study results indicate that total canopy cover for Portland reflects a slight but consistent increase over the 30 years of the study period, from 25.1% in 1972 to 26.3% in 2002. When canopy cover change is calculated for 1972-1991 and 1991-2002, only 6 neighborhoods show canopy loss in both time periods while 96 neighborhoods show canopy gain in one or both time periods. A notable pattern of canopy increase is found in many older neighborhoods of the inner Eastside, most likely due to a combination of factors, including: (1) growth over 30 years of the large, spreading trees that are common in the area; (2) new trees added by a City-sponsored program of tree planting in the 1970s and early 1980s; and (3) the planting activity of Friends of Trees since 1989. Based on the analysis, a recommendation was made to pursue a target canopy cover increase to 12% in Commercial/Industrial areas and 47% in Residential areas.

Keywords: Environmental social sciences, Land/watershed management.

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Selecting Native Plants for Low Maintenance Restoration Projects

The City of Portland's Watershed Revegetation Program has planted more than 2 million native seedlings covering over 35 species on over 350 different sites. We plant bareroot seedlings without adding soil amendments or irrigation, but have a long-term weed maintenance program. Currently we have 137 sites over 5 years old, many achieving closed canopy with a diversity of species. Selection of appropriate woody species can be the difference between failure and success of a revegetation project. It is important to match species with the current soil, hydrological, and shade conditions of the site. For compact and dry sites Willamette Valley Ponderosa Pine, Tall Oregon Grape, Oregon Ash, Spirea, Swamp Rose, Douglas Fir, and Oregon Oak have good success. Cottonwood can also do well. Fast growers that do well with moderate soil and some moisture include Red Alder, Red Elderberry, Snowberry, and Ninebark. Live stakes work for Willow, Red Osier Dogwood, Ninebark and Spirea if they have access to moisture most of the year. Plants that should be avoided: (We have planted these for many years and have little success!) Big leaf maple, Serviceberry, Madrone, Flowering Dogwood, Western Hemlock, Oceanspray, Mock Orange, Low Oregon Grape, and Salal. In extremely wet conditions Spirea, Swamp Rose, Twinberry, Willow, Ash and Red Osier Dogwood are very tolerant. The species with the broadest tolerance include Snowberry, Red Elderberry, Oregon Ash, Ponderosa Pine, Red Osier Dogwood, Spirea, Cascara, Ninebark, and Swamp Rose. These species are the most dependable survivors if maintained properly.

Keywords: Habitat restoration, Plant ecology

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Raindrops to Refuge, Sherwood Watershed Action Plan

Raindrops to Refuge (R2R) was initiated in the summer of 2001 by a group of concerned residents, and representatives from the City of Sherwood, Sherwood Institute of Sustainability, USFWS, Tualatin River Wildlife Refuge, Friends of the Refuge, Tualatin Riverkeepers, and the Sherwood School District. They were concerned about the impacts of increased growth on their community, watershed health, water quality, floodplain management, wildlife habitat and corridors, and its result on the Tualatin River National Wildlife Refuge and the Tualatin River. R2R created an Action Plan containing R2R's background, goals, objectives, and a series of strategies designed to protect, restore and enhance natural resources in three watersheds (Chicken, Cedar, and Rock Creeks), and engage and educate the public about issues related to watershed health. It was developed by and for numerous partner organizations, including public agencies, non-profit organizations, private landowners, businesses and citizens throughout the Sherwood area. It is intended to provide information on ways to get involved, provide a framework to support and focus the efforts of partners towards high priorities and needs, use and build on existing plans and local knowledge, and integrate it into one working document, and provide a means to track progress and changes over time. R2R's vision is for the City of Sherwood and the surrounding watershed communities to understand the importance of watershed protection and take actions that mutually benefit fish, wildlife, and people. Our mission is to inspire, educate and facilitate community actions to assess, restore and preserve ecological health of Sherwood's watersheds.

Keywords: Air quality, Animal ecology, Conservation biology, Economics

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Mesoscale Population Fluctuations in Urban Parks' Small Mammals: Conservation Implications of Disease Load and Ecology

Two important elements to a clear understanding of the population biology and community ecology are knowledge of the population biology of the constituent members of the ecological community under consideration, and a temporal component to the community analysis in question. Studies undertaken within single seasons fail to provide the temporal framework for analysis of population fluctuations, for example, which may be due to either biotic or abiotic factors. We started monthly monitoring of small mammal populations in October 2002 in order to assess the influence of zoonotic diseases on community ecological parameters and have now gathered enough data to begin to elucidate populational patterns at the temporal mesoscale level. Considered at the level of individual community, small mammal populations in Portland parks show an annual pattern of variation with respect to density: the highest densities occur around the autumnal equinox, while the lowest densities occur near the middle of Spring. However, these patterns were not homogeneous across parks: those with higher species diversities demonstrated a greater magnitude between maximal and minimal annual densities. In contrast to the community as a whole, the species with the greatest dominance across all parks, the deer mouse (*Peromyscus maniculatus*), showed much lesser annual variation in density. With respect to this variation in population density, we show that cyclical variations in numbers are an emergent property of the biological system when zoonotic disease is taken into consideration: even in the absence of external influences, population numbers will show cyclical patterns with periodic maxima and minima.

Keywords: Animal ecology, Conservation biology, Wildlife biology

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Portland's Peregrine Falcons

The City of Portland is currently home to 5% of the known peregrine falcon nest sites in the State of Oregon. Successful reproduction at these nest sites was far from assured. Anthropogenic impacts and problems associated with peregrine nesting on manmade structures have contributed to low reproductive success at urban peregrine nest sites across the United States. When falcons first appeared on Portland's Fremont Bridge in 1994 many biologists were prepared to write them off as educationally valuable but unlikely to contribute to the growing peregrine falcon population in the Pacific Northwest. Through a combination of research, educational outreach, monitoring and on the ground management, Portland has developed a comprehensive strategy to reverse this trend. Portland nest sites have successfully fledged at least 42 young and success at Portland's urban nest sites, as measured by the number of young successfully fledged per occupied nest site, exceeds statewide averages. The success of this program is predicated upon the recognition that urban nesting peregrines require different management strategies from their non-urban brethren.

Keywords: Conservation Biology, Animal Ecology, Wildlife Ecology

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Monitoring Reptiles and Amphibians with Volunteers at “Critter Count,” an Annual One-day Event

Since 2001, The Water Resources Education Center in Vancouver, Washington has held an annual event in April at which volunteers are trained by an expert field biologist to find and identify “herps,” reptiles and amphibians at four wetland sites in Clark County. The goals of this program, somewhat resembling Backyard Bird Count, are to raise public awareness about herps in urban natural areas and to use volunteers to collect data for a snapshot glimpse of these species. This event is marketed as an Earth Action Month offering to both the general public and to educators and students participating in the Water Center’s Watershed Monitoring Program. Monitoring sites are chosen based on: 1.) Safety and access; 2) Distance from the training site and 3) Potential success in finding “critters.” Sites selected have varied: a mitigation site at the Port of Vancouver, a storm water detention pond at Meadowbrook Marsh on Burnt Bridge Creek, upland terrestrial habitat, a limited access scout camp in more rural Clark County, and the Columbia River floodplain at a regional park. About 45 volunteers are trained each year. Site experts include biologists from the Northwest Ecological Research Institute and Clark College. Species identified include garter snakes (*T. ordinoides* and *T. sirtalis*), ensatinas, alligator lizards, western red-backed salamanders, Pacific tree frogs (adults and tadpoles), red-legged frogs and northwestern salamander hatchlings. These data will be submitted to the NatureMapping database maintained by the Washington Department of Ecology and University of Washington as it evolves to include herps.

Keywords: Environmental education, Habitat restoration, Wildlife biology

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Tools Provide Link to Analysis of Alternative Future Scenarios for the Willamette River Basin

Seventy percent of Oregonians live in the Willamette River Basin and our population is projected to nearly double in the next fifty years--the equivalent of adding three more cities the size of Portland. Here in the Metro Area, our recent 18,000-acre expansion of the UGB provides a first glimpse at the scale of land disturbance necessary to accommodate this much growth. Our challenge lies in retaining the integrity of our natural systems. To assist citizens in making informed decisions regarding their future, the Pacific Northwest Ecosystem Research Consortium was formed in 1996. A partnership between Oregon State University, University of Oregon, University of Washington and the Environmental Protection Agency, the Consortium conducted an exhaustive study of the Willamette River Basin, tracing changes on the landscape from 1851 to 1990. They worked with stakeholders to project the effects of changes on the landscape into the year 2050 under three scenarios—current land use laws, greater development, or greater conservation. Then they studied effects of each of these scenarios on the river, water use, streams, and terrestrial wildlife and identified high priority areas for restoration. The results are documented in *The Willamette Basin Planning Atlas*. This large format, full color publication is a marvelous compilation of information on the basin, but has had limited distribution. This presentation will show how researchers, decision makers and citizens can access the project’s data, metadata and maps through a new Digital Library at OSU that provides GIS capability to anyone with high speed internet service.

Keywords: Habitat Restoration, Land-use planning, Sustainable development

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Overlooked Animals: Native Freshwater Mussels in the Greater Portland Area

Native freshwater mussels in the Greater Portland area receive very little attention from biologists, much less the public. Yet they are very interesting and ecologically important animals. They filter huge amounts of water over their long lives, provide food for predators such as raccoons, river otters and muskrats, are an indicator of stream health and have a fascinating life history. Three species of mussels currently occur in the area: *Anodonta oregonensis* (Oregon floater), *A. californiensis* (California floater) and *A. nuttalliana* (winged floater). Shells have been found for two other species that likely also live here: *Margaritifera falcata* (western pearlshell) and *Gonidea angulata* (western ridgemussel). Depending on the species, they occur in the area's rivers, streams, sloughs and lakes. Two examples, Fanno and Rock creeks, both tributaries of the Tualatin River, in the southwest and west parts, respectively, of the area support populations of *A. oregonensis* with juvenile mussels found in both streams. This is a good sign because it means the habitat in these somewhat degraded streams meets their survival and reproductive needs. Smith-Bybee lakes in North Portland, on the other hand, probably lost their populations of mussels in the drought of 2001. An interesting historical note is that *A. oregonensis* and *A. nuttalliana* were first scientifically described as species by Isaac Lea in 1838 from the "Wahlamat near its confluence with the Columbia River".

Keywords: Animal ecology, Conservation biology Environmental education

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Status of Smith-Bybee Lakes Mussel Populations in 2000-2001

I surveyed the shores of Smith-Bybee lakes in North Portland, Oregon five times in August and September 2000 and 2001 for freshwater mussel shells when the lakes were very low or dry from drought. I found shells from recently dead native mussels of three species: *Anodonta oregonensis* (Oregon floater), *A. californiensis* (California floater) and *A. wahlamatensis* (Willamette floater). The mussels were likely scavenged by birds after dying from desiccation or high temperature. I found shells from 39 individual mussels, all very large adults. The percentage species composition at Smith-Bybee lakes was nearly the same as the species composition from Prescott Slough on the Columbia River near Rainier for the same years. Prescott Slough was also very low in 2000-2001. However the mean sizes of *A. oregonensis* and *A. californiensis* were significantly larger at Smith-Bybee lakes than at Prescott Slough. In addition, the size range for both species was greater at Prescott Slough due to multiple year classes in the populations. No successful mussel reproduction has occurred at Smith-Bybee lakes for many years. The reason is unknown. Since both lakes went virtually dry in 2001, the old, declining mussel populations are likely gone. All three species depend on attachment to fish gills at the larval stage (glochidia) for nurturing, protection, growth and dispersion. The mussel populations should eventually return to the lakes as long as fish from outside the lakes have access and as long as there is perennial standing water in parts of the lakes.

Keywords: Animal ecology, Conservation ecology

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Healthy Streams Plan for the Tualatin Basin

The Healthy Streams Planning Process was initiated in January, 2000 as a means to create a comprehensive, watershed-wide plan for stream enhancement and protection in the urban and urban fringe portions of the Tualatin River Basin. The watershed inventory collected ecological data on over 500 stream reaches and 340 stream miles. In addition, hydrologic and hydraulic models were developed, and fish and macroinvertebrate studies were conducted. Task forces reviewed district policies for opportunities to improve stream and storm water management. All data was input into a geographic information system (GIS) and subsequently analyzed using both GIS and a customized model developed by Oregon State University, called RESTORE. GIS was used to set priorities for reaches that merit early enhancement efforts, and RESTORE was used to systematically determine which best management practices should be implemented at each reach. RESTORE allows users to weight watershed goals (such as *improve salmon habitat, improve water quality*, etc.) and adjusts the resulting recommendations accordingly. The results of this work will guide Clean Water Services' and local jurisdiction's management of the Tualatin watershed to meet Endangered Species Act and Clean Water Act regulations now and into the future.

Keywords: Habitat restoration, Land/watershed management

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Controlling Japanese and Giant Knotweed on a Watershed Scale

Japanese and giant knotweed (*Polygonum cuspidatum* and *P. sachalinense* respectively) represent a major threat to the integrity and function of riparian areas and floodplains throughout not only the Pacific Northwest, but also much of the temperate world. It is already the number one riparian weed in Great Britain and is widespread in northeastern United States. The threat stems from knotweeds tremendous ability to spread vegetatively in floods and outgrow and shade out native species. Eventually native vegetation is lost. Since 2000, The Nature Conservancy has engaged in an effort to control knotweed in the Sandy River watershed. Our poster will present the results of our efforts, including: research comparing manual and a variety of herbicide-based control approaches, as well as outreach materials we have developed to increase community awareness.

Keywords: Environmental Education, Habitat restoration, Plant ecology

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Research and Monitoring of Urban Biodiversity with Non-specialists: Outcomes for Ecology, Management and Science Education

This poster reports on the pilot year of the Biomonitoring Project, a research collaborative where academics, resource professionals, teachers, high school and undergraduate students work together to identify a research problem addressing conservation of Portland's urban biodiversity. The goals of this project are to meet identified needs of land managers and urban ecosystems, the greater scientific community and students. This project tests the model that non-specialists can collaboratively contribute important scientific information necessary for conservation of urban biodiversity, while providing students the opportunity to develop scientific literacy by doing real science. Collaboration is a unique and important aspect of this model. It requires dialogue between the involved parties throughout the process. It is different from the "students as data collector" model, where the majority of the research design is determined without student input. The collaborative model was chosen over the data collector model as the preferred method to increase student engagement, ownership and achievement.

Keywords: Conservation biology; Environmental education

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Habitat Enhancement and Wildlife Monitoring at Vanport Wetland

Vanport Wetlands is a 90 acre mitigation site located in north Portland, which is owned and managed by the Port of Portland. With approximately 60 acres of wetland habitat and 30 acres of upland meadow and cottonwood forest, the Vanport site offers many habitat opportunities. To increase wildlife habitat throughout the site, we installed approximately 50 logs and stumps in the emergent wetland and shrub-scrub areas over the last 2 years and continue to stockpile wood for future placement. Other habitat enhancement features include bat roosting boxes and wood duck nesting boxes which are monitored regularly for use. We are currently looking into the feasibility of bluebird boxes in the upland meadow and woods. In order to better understand wildlife use on the site, mitigation managers are developing a Wildlife Monitoring Plan that will include specific techniques and date ranges for each monitoring need. Specialized monitoring for amphibians began in 2001, nesting waterfowl and bat surveys began in 2002, and a special migratory songbird survey was conducted in 2003. A red-legged frog egg mass survey is scheduled for February of 2004. Another aspect of our Wildlife Monitoring Plan includes collaboration with other agency professionals such as ODFW and USFW in order to increase interaction between agencies. In addition, two local birders contribute to casual wildlife observations which are recorded at least once per month. Since November 1999 the Vanport site has provided some level of habitat for 117 bird species, 16 mammals, 3 amphibians and 1 reptile species.

Keywords: Animal ecology, Habitat restoration

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Evaluation of Wildlife Corridors and Core Habitat in an Urban Watershed

Surrounded by heavy urbanization, the Columbia Slough provides an important corridor in the Portland-area landscape. It connects the Sandy River delta and forests to the east with Forest Park, West Hayden Island, and Sauvie Island to the west. Very few such corridors remain in the Portland metropolitan area. Metro worked with the Columbia Slough Watershed Council to evaluate the quality of the wildlife corridor along the length of the slough, as part of the council's watershed action plan. We evaluated the slough's corridors and core habitats for wildlife by examining a series of aerial photos at a fine scale. We also looked for corridors connecting the slough with the Columbia and Willamette rivers, and for large blocks that could serve as core habitat. The aerial photos included overlays of restoration projects, bridges and culverts, and a 50-foot-wide riparian zone. This work resulted in a number of preliminary findings, including:

- Considerable progress has been made in establishing a band of woody vegetation along the length of the Columbia Slough.
- Significant gaps in the corridor exist.
- Several culverts are barriers to wildlife movement.
- Several nearly complete connections exist between the slough and the Columbia and Willamette rivers.
- There are multiple sites in the watershed that are suitable for core habitat for breeding, overwintering and/or resident wildlife.

Next steps in this work include:

- Evaluate the effects of trail installations on the corridor's integrity.
- Prioritize and implement the 14 projects that were identified with this process.

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

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Pacific Northwest Native Freshwater Mussel Workgroup

The status of the seven species of freshwater mussels native to the Pacific Northwest has received very little attention, despite the fact that freshwater mussels are considered to be the most endangered group of animals in North America. On February 19, 2003, a workshop on freshwater mussels was held in Vancouver, Washington that consisted of presented papers and a panel discussion. The purpose of the workshop was to initiate discussion on the regional population status of freshwater mussels. The workshop was attended by 91 participants of very diverse backgrounds. From this meeting, the Pacific Northwest Native Freshwater Mussel Workgroup was founded. The goal of the Workgroup is to "Ensure that freshwater mussel research, management, and educational activities are coordinated, prioritized, and are consistent with identified information needs." The Workgroup will meet at least four times annually. Recent accomplishments are the establishment of a website (<http://columbiariver.fws.gov/musselwg.htm>), the planning of two mussel educational courses scheduled for next year in Portland, OR and Ellensburg, Washington, and the planning of the second annual mussel workshop. This workshop will be held in western Washington with the purpose of continuing discussion on the status of freshwater mussel research, management, and education. The annual workshop will rotate throughout the Pacific Northwest to ensure maximum participation and information distribution. The Workgroup intends to raise the awareness of the status of freshwater mussels and assure that the mollusk knowledge base continues to build.

Keywords: Animal Ecology, Conservation Biology, Environmental Education

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Urban Conservation Treaty for Migratory Birds in Portland

The Portland/Vancouver metropolitan region provides habitat for over 200 bird species, including about 50 neotropical migrants, and over 20 designated with at-risk State or Federal status. To recognize the importance of the region's migratory birds, the serious challenges they face, and the need for cooperative conservation efforts, the U.S. Fish and Wildlife Service (Service), the City of Portland (City) and over 20 partners signed an Urban Conservation Treaty for Migratory Birds (Treaty) in May 2003. By signing, partners acknowledged that Portland is an important part of the Pacific Flyway, and the City's urban habitats provide critical resting, feeding and nesting areas. The City has become the fifth city after New Orleans, Chicago, Philadelphia, and Houston to pilot this national program that highlights the important role of urban areas in more global bird conservation efforts. A bird-focused action plan will be carried out over the next three years to raise awareness of the importance of migratory birds in Portland's diverse urban ecosystems; share and increase knowledge about the needs and ecological functions of migratory birds; recognize and promote existing efforts to conserve and enhance the health of local migratory bird populations; and identify and pursue new actions to ensure their diversity is maintained over time. New partners are invited to participate by signing onto the Treaty, sharing and collecting bird data, and getting involved in projects.

Keywords: Environmental education, Habitat restoration, Wildlife biology

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The Role of Beaver in Hydrologic Manipulations and Water Quality at Cedar Mill Wetland Preserve

The Wetlands Conservancy (TWC) has initiated on-going studies of seasonal hydrologic fluctuations, beaver use, native and invasive plant species, and wildlife use at Cedar Mill Wetland Preserve. One of the study objectives is to research the role that wetlands adjacent to urban streams have on water quality, temperature and groundwater low flow recharge. As development in Washington County increases, the importance and need for the storage and water quality functions provided by the 16-acre Cedar Mill Preserve also increase. Additionally, the Cedar Mill Preserve has an active beaver population, which plays a role in the hydrologic fluctuations and subsequent TWC adaptive management of the site. The Cedar Mill Preserve beaver study is documenting if and how beaver dam building activities have impounded water which has slowed erosion from run-off and reduced stream siltation, helped recharge ground water, expanded the areas of flooded soils, impacted establishment of non-native invasive plant species and provided additional or enhanced habitat for birds, amphibians, and other forms of aquatic wildlife. Little is known or documented about beaver's affect on hydrologic fluctuations, temperature, water quality and groundwater low flow recharge and habitat enhancement. Baseline water quality data has been collected on Johnson Creek and Cedar Mill Wetland water levels, pH, dissolved oxygen, temperature, turbidity, nutrients since December of 2002. The beaver data collected is being compared and integrated with the baseline water quality data. TWC is working with Metro Parks and Greenspaces to standardize methods for monitoring and comparing beaver activity and effects on hydrologic fluctuations in the metro region.

Keywords: Hydrology, Water quality, Wildlife biology

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Fish Passage in the Lower Clackamas River Basin

The Clackamas River Basin Council (CRBC) has been targeting fish passage in five subbasins of the Lower Clackamas River. We completed the first phase in Clear and Foster Creek in summer 2002 and are currently evaluating barriers in Deep, Goose, and Eagle Creek drainages, areas of which are slated for inclusion in Portland's expanding UGB. The Lower Clackamas Fish Passage Assessment is notable for the following accomplishments: Field surveys on over 95% of identified stream crossings; Crossing prioritization based on objective, quantifiable data; Establishment of baseline monitoring data; Outstanding private, county, state, and federal stakeholder cooperation; Education and outreach efforts that have led to increased CRBC visibility; Successful grant applications and community cooperation to repair/replace highest priority crossings. We identify crossings on fish-bearing streams using stream, road, and tax lot GIS overlays and aerial photos. All landowners are contacted in a four stage process that involves the consultants, CRBC, and cooperative neighbors. In Clear and Foster, 159 stream-road crossings were surveyed, of which 81 were prioritized as partial or complete barriers to fish passage. In Deep, Goose, and Eagle Creeks, a modified rapid protocol was applied on 164 crossings. Prioritization will occur in late 2003. Prioritization factors together barrier severity, fish species, upstream habitat length, distance to mainstem, channel habitat type, and cost of repair options. Basins differ in land management, basin topography, ownership types, and fish populations. The assessment protocol applies equally well despite these differences and is an effective prioritization tool to efficiently implement restoration work.

Keywords: Fisheries, Habitat restoration, Land/watershed management

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Sustaining the Livable City: The Challenge Ahead

Portland is widely regarded as a "livable city," known for its high degree of civic engagement, European-style urban amenities, innovative planning ideas, and passion for nature. But this reputation is of relatively recent origin, and more tenuous than it might appear. I suggest that Portland is at a crossroads, facing a number of serious challenges to a sustainable future. Chief among these are the twin pressures of prolonged economic recession and a changing political climate. In the face of rising anti-tax and anti-land use sentiment, how can the city make wise, forward-thinking decisions and continue to build on its vision? How can the drumbeat of economic development be reconciled with environmental protection? And how can Portland sustainably accommodate a rapidly increasing and ever more diverse population? Add to these challenges a growing "anti-Portland" mood in rural Oregon, and the future looks far from rosy. However, I hold out some hope based on several current efforts. Key to success will be crossing institutional, disciplinary, and conceptual divides.

Keynote Speaker; all keywords are relevant

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Portland Water Atlas: Understanding the Living Web of Water through the Lens of Art, History and Science

The major water problems that exist in the Portland Metropolitan Region - combined sewer overflow, non-point source pollution, endangered salmonids and polluted groundwater - result from a community value system that does not acknowledge water as the vital element of life. Instead our engineering and landscape systems treat water as a commodity and a waste product. To create healthy communities with functioning ecologies we need to place clean water at the top of our priority list. This means we develop design criteria that keep water clean and healthy, and we develop communities that express a high cultural value for water. We have spent many years understanding the ecological and community problems created by our built environments, but we must take this understanding and create a cultural shift that makes water visible, healthy and connected. The Portland Water Atlas is a tool to gather knowledge about our urban water environment and communicate with the public. The creation of the atlas will broaden community knowledge about their watersheds and water resources and share our vision of making healthy water choices central to our urban planning and design. The Atlas will become a rich, multi layered spatial database of case studies, cultural resources, historic streams layers and existing water projects. Accessible, artistic, inspirational and informative, the Portland Water Atlas will provide a framework in which every decision about stormwater can be appropriate and we can make informed decisions about water, and the lessons learned can become part of the collective knowledge of our community.

Keywords: Environmental education, Hydrology, Land/watershed management

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Planning, Restoration and Monitoring of a Rare Geyer Willow Wetland in the Willamette Valley

The last intact Geyer willow (*Salix geyeriana*) wetland in the Willamette Valley was acquired by Metro for protection and restoration in 2001. The site, near Banks, OR, includes about 180 acres of wetlands, and is unique on several counts. Sitting atop a foundation of thick peat soils formed by centuries of plant matter trapped by numerous beaver dams, the wetlands support the last intact stand of *S. geyeriana* in the Valley, as well as other native shrubs and herbs. Northern red-legged frogs (*Rana aurora, aurora*), northwestern pond turtles (*Clemmys marmorata marmorata*) and other sensitive wildlife species also occur here. The site has been substantially altered by agricultural practices and features, most notable being a large drainage ditches running down the center of the wetland (the channeled remnant of Park Farms Creek). Invasive species such as reed canarygrass (*Phalaris arundinacea*) and bullfrog (*Rana catesbeiana*) also threaten the site. Restoring a more natural hydrology and tracking the effects on the native and exotic plant communities are major goals for this site. Preliminary plans and data are presented. Metro is drawing upon the work and expertise of several partners to restore the site including the Tualatin Riverkeepers, Natural Resources Conservation Service, Oregon Watershed Enhancement Board and the U.S Fish and Wildlife Service. The most important partners, however, may come from the local beaver population. Initial restoration objectives include reintroducing trees and shrubs to allow beavers to once again take over management of the wetlands hydrology.

Keywords: Habitat restoration, Hydrology, Plant ecology

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Eradicating Japanese Knotweed from the Clackamas River Watershed

The floods of 1996 and 1997 damaged more than property in the Willamette Valley. In the Clackamas River Basin and others in the Willamette Valley, the floods served as a carrier for a new regional weed problem. Japanese knotweed, introduced to the northwest as an Asian ornamental plant was widely spread by the late 90s floods. Knotweed possesses several traits that make it a formidable threat to riparian habitat. Established infestations can form expansive monocultures several meters tall. Knotweed has passed beyond levels of effective control in many other regions of the world, and action is needed now to avoid the same fate in the PNW. Metro began its effort in the Clackamas in 2001. Supported by OWEB, and the Nature Conservancy, Metro has sent crews of interns, AmeriCorps and other volunteers onto rafts and kayaks to map and kill this ODA B-List noxious weed. Exhaustive mapping revealed over 500 distinct patches (microsites) of knotweed within a 12-mile stretch of the river downstream of the River Mill Dam. Fortunately, limited surveys into the river's headwaters (primarily U.S. Forest Service lands) revealed only a few isolated infestations, all appearing to have arisen from imported fill material. Based upon these findings, Metro began sequentially treating knotweed infestations from the River Mill Dam progressively downstream. Bolstered by a relatively new stem-injection technique (being refined by Metro and TNC under an Experimental Use Permit from ODA) the crews have made great progress and effective eradication is predicted by 2005 over 90% of the watershed.

Keywords: Habitat restoration, Plant ecology

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Publications Related to Abstracts

- Cole, M. B. 2002. Assessment of Macroinvertebrate Communities in Relation to Land Use, Physical Habitat, and Water Quality in the Tualatin River Basin, Oregon. Unpublished report prepared for Clean Water Services, Hillsboro, Oregon. 38 pp.
- Connell, J.H. 1978. Diversity in Tropical Rainforests and Coral Reefs. *Science*. 199:1302-1310.
- Dresner, M and A. Moldenke "Authentic Field Ecology Experiences for Teachers" *American Biology Teacher.*, Vol.64,(8),02.
- Dresner, M and E. Worley . 2003. "Learning Ecology as a Scientist, Student, and Teacher: Lasting Impacts of a Professional Development Experience" resubmitted to *Journal of Research in Science Teaching*, August 2003.
- Hall, F. C. 2002. Photo Point Monitoring Handbook: Part A – Field Procedures and Part B – Concepts and Analysis. General Technical Report PNW-GTR-526, USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 134p, illus.
- Hobbs, R.J., and L.F. Huenneke. 1992. Disturbance, Diversity, and Invasion: Implications for *Conservation Biology*. 6:324-337.
- Keyser, A.J. and D.E.L. Promislow. In review. Supplemental feeding can reduce population growth rate in western bluebirds.
- Keyser, A.J. and L. Siefferman. In review. Viability selection in highly-ornamented males.
- Keyser, A.J., M.T. Keyser, and D.E.L Promislow. In press. Life history variation, Demography in Western Bluebirds. *The Auk*.
- Metro Fish and Wildlife Habitat Program Economic, Social, Environmental and Energy Analysis (ESEE). Available online at: http://www.metro-region.org/library_docs/nat_resource/executive_summary.pdf
- Metro Parks and Greenspaces, 2004. Green Trails: Guidelines for Environmentally Friendly Trails.
- Metro's Goal 5 Resource Maps and GIS data. Available online at <ftp://ftp.metro-region.org/dist/gm/goal5demography> in western bluebirds. *The Auk*.
- Metro's Technical Report for Goal 5. July 2002 draft. Available online at: http://www.metro-region.org/library_docs/nat_resource/tech_report_goal5.pdf
- Poracsky, J. and M. Lackner. 2003. "Urban Forest Canopy in Portland, Oregon, 1972-2002: Final Project Report." Portland State University Cartographic Center (maps@pdx.edu)
- Poracsky, J. and M. Lackner. 2003. "Urban Forest Canopy Collaboration in Portland, Oregon," pp. 473-81 in Proceedings, *Public Participation GIS Conference*, URISA, Portland, OR, July 20-22, 2003.
- Portland State University, 2003. Wildlife Crossings: Rethinking Road Design to Improve Safety and Reconnect Habitat. Portland State University, Planning Workshop
- Robison, E.G. and J. Walsh, 2003. Clear and Foster Creek Fish Passage Assessment and Prioritization Project. Prepared for the Clackamas River Basin Council, Clackamas, Oregon 97015. 68 pp.
- Walsh, J. 2003. Interactive Fish Passage Assessment Tool.
<http://www.upstreamconnection.com/client/clack/starthere.cfm>
- Willamette River Basin Planning Atlas, Trajectories of Environmental and Ecological Change, edited by David Hulse, U of O, Stan Gregory, OSU and Joan Baker, EPA. Published by Oregon State University Press.