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**Abstracts**

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## Oral Presentation Abstracts

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### A - F

**THE SEARCH FOR TALLGRASS PRAIRIE REMNANTS, GRASSLAND BIRDS, ORNATE BOX TURTLE, AND AROGOS SKIPPER IN THE ARKANSAS VALLEY OF ARKANSAS.**

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Tallgrass prairie is one of Arkansas' rarest community types resulting from centuries of conversion to agricultural use and urban development. Grassland dependent species have also declined dramatically due to this large scale habitat loss, degradation, and fragmentation. Despite this loss, prairie remnants remain scattered across the state with the largest tracts of unplowed prairie found in the Arkansas Valley Ecoregion. The area supports several relatively large tracts of protected prairie and other remnant prairie tracts of unknown status on privately owned land. Two years of surveys to determine the size and quality of prairie remnants and potential remnants were conducted in conjunction with surveys for wintering and breeding grassland birds and rare grassland dependent animal species: the

Ornate Box Turtle (*Terrapene ornata ornata*) and the Arogos Skipper (*Atrytone arogos*). Potential remnants were mapped based on aerial photography, soil maps, and site surveys from the 1980s and 1990s. Permission was granted to access privately owned tracts, remnant size was estimated using GIS, and floristic inventories were conducted to assess quality. Remnants were ranked based on presence of prairie grasses (*Andropogon gerardii*, *Schizachyrium scoparium*, *Sorghastrum nutans*, *Panicum virgatum*) and presence of conservative forbs restricted to unplowed prairies. A combination of survey methods was used to determine the distribution and abundance of grassland birds, population size of the Ornate Box Turtle, and distribution of the Arogos Skipper. The results are discussed and will provide critical data for conservation action strategies and focus conservation efforts to high priority areas.

**KEY WORDS:** TALLGRASS PRAIRIE, GRASSLAND BIRDS, ORNATE BOX TURTLE, AROGOS SKIPPER, ARKANSAS VALLEY

**FIRE REGIMES OF NATURAL PROTECTED AREAS IN TROPICAL AMERICA.** Ernesto Alvarado. School of Forest Resources, University of Washington, Seattle, Washington. [alvarado@u.washington.edu](mailto:alvarado@u.washington.edu).

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America is by far the most diverse region of the world. Eight of the eighteen ecologically mega-diverse countries are located on this continent. Throughout tropical America, during the last few decades large areas of forest, range, aquatic and marine ecosystems have been designated as biosphere reserves or natural protected areas to preserve this biodiversity. Conservation policies for those areas have been established following the classic ecology paradigm of equilibrium. More recently, it has been recognized by a new generation of conservationists in the region that those landscapes have been subject to historical disturbances, both natural and anthropogenic. Conservation of such ecological diversity creates the urgency to develop new conservation and management policies that are grounded on solid understanding of the dynamics of the ecosystems, which are targeted for conservation. This presentation will discuss the historical fire regimes associated to several ecosystems in tropical America and their implication for biodiversity conservation. Natural fire regimes, as conceptualized for temperate ecosystems are not directly applied to tropical ecosystems that have been produced by a complex interaction of climate, soils, natural disturbances and land use patterns. We will also discuss the potential effects of climate change on future fire regimes and fire management implications for some of those ecosystems. The discussion will be centered on Mexico's dry shrublands, cloud and tropical forests, Bolivia's Chiquitano forest and the seasonally dry Amazon forest of Brazil.

**KEY WORDS:** FIRE REGIMES, TROPICAL FIRES, BIODIVERSITY CONSERVATION, NATURAL PROTECTED AREAS

**LESSONS LEARNED THROUGH COOPERATIVE CONSERVATION OF A RARE FRAGMENTED HABITAT.** Hannah Anderson. The Nature Conservancy of Washington. [handerson@tnc.org](mailto:handerson@tnc.org).

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The South Puget Sound program of The Nature Conservancy, Washington Chapter has been engaged in cooperative conservation efforts for many years. Our ecoregional focus has targeted conservation of prairies and oak woodlands of the Willamette Valley-Puget Trough-Georgia Basin ecoregion and recovery of the species that occur on this rare and declining habitat. The geographic scope of our work traverses two US States and a Canadian Province and engages myriad public and private entities including the Department of Defense, US Fish and Wildlife Service, state natural resource and wildlife agencies, academics, and non-profit organizations. We employ a three-tiered framework of Information Transfer, Linking of Entities, and Generating Incentives to promote recovery and conservation of rare species and habitats. This approach has yielded an engaged collaborative of professionals working toward shared goals on multiple sites. We will share the details of our approach, the on-the-ground work itself including the innovative Fort Lewis Army Compatible Use Buffer (ACUB) program, as well as the results of a national survey regarding the utility and use of cooperative conservation techniques. We will share the lessons we have learned about the relative successes and other outcomes of specific cooperative techniques.

**KEY WORDS:** PARTNERING, COOPERATIVE CONSERVATION, PRAIRIES, GRASSLANDS

**IDENTIFYING AQUATIC RIVERINE CONSERVATION OPPORTUNITY AREAS.** Gust M. Annis<sup>1</sup>, David D. Diamond<sup>1</sup>, Michael E. Morey<sup>1</sup>, Scott P. Sowa<sup>2</sup>, Tim A. Nigh<sup>3</sup>. <sup>1</sup>Missouri Resource Assessment Partnership (MoRAP), University of Missouri. [annisg@missouri.edu](mailto:annisg@missouri.edu); [diamondd@missouri.edu](mailto:diamondd@missouri.edu); [moreyme@missouri.edu](mailto:moreyme@missouri.edu). <sup>2</sup>The Nature Conservancy. [ssowa@tnc.org](mailto:ssowa@tnc.org). <sup>3</sup>Missouri Department of Conservation. [Timothy.Nigh@mdc.mo.gov](mailto:Timothy.Nigh@mdc.mo.gov).

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The Missouri Aquatic Gap Project was the springboard for development of a hierarchical classification of riverine ecosystems, predicted species distributions, riverine stewardship characterizations, and indices of potential human threats. These datasets were subsequently modified and used in combination with other information to identify aquatic conservation opportunity areas (COA) throughout Missouri as part of a statewide Comprehensive Wildlife Conservation Strategy (CWCS). The Missouri Aquatic Gap Ecological Classification Hierarchy was adopted as the geographic framework for developing the conservation plan, while land stewardship, species models and other data were used to guide the selection of COAs. The objectives for selecting aquatic COAs were to 1) represent one example of each

sub-watershed type within each major watershed; 2) represent the dominant stream types of each size category (i.e., headwater, creek, small river, and large river) within each sub-watershed type and; 3) represent two populations of all federal and state listed species, endemic species, and characteristic species within each major watershed. A total of 158 aquatic conservation opportunity areas were identified by regional teams of biologists working real-time via use of a set of pre-loaded GIS data layers. These captured all distinct aquatic ecosystems in the state and multiple populations of all fish, mussel, and crayfish species. The COAs represent the diversity of watersheds, aquatic systems and species throughout Missouri within a small area: approximately 5% of the total stream miles in the state. Datasets used for this analysis are currently under development across the entire Missouri River Basin via the GAP Analysis Program.

**KEY WORDS:** AQUATIC GAP ANALYSIS, CONSERVATION OPPORTUNITY AREA, MISSOURI RIVER BASIN

**THE TARBOO-DABOB BAY WATERSHED PROJECT.** Peter Bahls<sup>1</sup>, Melisa Holman<sup>2</sup>, and Janet Kearsley<sup>3</sup>. <sup>1</sup>Northwest Watershed Institute. [peter@nwwatershed.org](mailto:peter@nwwatershed.org). <sup>2</sup>The Nature Conservancy of Washington. [mholman@tnc.org](mailto:mholman@tnc.org). <sup>3</sup>Washington State Department of Natural Resources. [janet.kearsley@dnr.wa.gov](mailto:janet.kearsley@dnr.wa.gov).

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A flagship project for Puget Sound restoration efforts, the Tarboo Watershed Project represents a new approach to conservation of species and ecosystem functions that bridges gaps between freshwater and estuarine systems and terrestrial and aquatic environments. The Tarboo-Dabob Bay watershed is recognized as a priority ecosystem for conservation of biodiversity (The Nature Conservancy 2004). Following a watershed assessment, Northwest Watershed Institute (NWI) and project partners began restoring salmon streams and floodplain wetlands along Tarboo Creek by purchasing land and conservation easements from willing landowners, removing fish passage barriers, re-meandering streams and installing large woody debris, restoring riparian forests, and plugging ditches to restore wetland hydrology. In downstream Tarboo-Dabob Bay, the Washington Department of Natural Resources (DNR) Natural Heritage Program conducted an intensive scientific analysis and a public process that resulted in expansion of the boundaries of the existing Dabob Bay Natural Area to include steep slopes and other critical contributing areas totaling about 3600 acres. In addition, The Nature Conservancy, NWI, and DNR are implementing a range of prioritized shoreline acquisition and restoration projects, including removing bulkheads and restoring coastal streams and decommissioning shoreline roads within the expanded boundaries to target factors limiting healthy ecosystem function in the Tarboo nearshore.

**KEY WORDS:** TARBOO CREEK, RESTORATION, DABOB BAY, WATERSHED, SALMON

**MAP IT! ZAP IT! MAP IT AGAIN! – EDDMAPS INVASIVE SPECIES MAPPING TOOLS.**

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EDDMapS was designed to provide a more accurate picture of the distribution of invasive species. EDDMapS allows land managers, agencies and others to set priorities for early detection and rapid response (EDRR), as well as formulate overall invasive plant management action plans. It is a tool to develop more complete local, state and regional level distribution data of invasive species, identify “leading edge” ranges of new invasive threats, provide a means of implementing EDRR, and help corroborate threats and refine invasive species lists and management priorities. EDDMapS has implemented by the Southeast Exotic Pest Plant Council, Florida Exotic Pest Plant Council, Everglades Cooperative Invasive Species Management Area, Mid-Atlantic Exotic Pest Plant Council and the Alaska Exotic Plant Information Clearinghouse. This presentation will highlight new features of EDDMapS and examples of how it is being used to fight invasive species.

**KEY WORDS:** MAPPING, MANAGEMENT PLANS, SPECIES LISTS, EDRR

**POST-TORNADO SALVAGE LOGGING INITIALLY INCREASES PLANT DIVERSITY BUT DECREASES FLORISTIC QUALITY IN AN OAK-SHORTLEAF PINE FOREST.** J. Stephen Brewer. Department of Biology, University of Mississippi. [jbrewer@olemiss.edu](mailto:jbrewer@olemiss.edu).

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After a natural disturbance, land managers often quickly initiate timber recovery operations that may have a greater impact on the ecosystem than the disturbance itself. In situations in which fire suppression has resulted in canopy closure, severe disturbances such as tornadoes potentially provide an opportunity for restoring open oak-pine woodlands, provided the groundcover vegetation remains intact. I present initial (1<sup>st</sup>-year) data comparing the effects of tornado damage with the combined effects of tornado damage and salvage logging on groundcover plant communities in mixed oak-pine forests in north Mississippi. Pre- and post-storm groundcover plant species composition in permanent 10 x 30 m plots in forests spanning a gradient of storm damage intensity was quantified and compared with post-storm composition in plots in adjacent salvage-logged areas established after the storm. Results of permutation MANOVA revealed a modest but significant effect of the storm on composition in unsalvaged plots. The storm appeared to have a greater (positive) effect on flowering of species already present, however, than on composition per se. In contrast, initial compositional differences between salvaged and unsalvaged plots were substantial. Species richness was slightly higher in the salvaged plots than in unsalvaged plots, but this difference was caused by a dramatic increase in the number of weedy species in salvaged areas. The

abundance and richness of herbaceous plants indicative of open woodlands was lower in salvaged areas. Initial findings suggest that opportunities to restore open oak woodlands could be hindered or delayed by post-storm logging that disrupts the groundcover vegetation.

**KEY WORDS:** GROUNDCOVER VEGETATION, RESTORATION, HABITAT INDICATORS, SOIL DISTURBANCE

**WASHINGTON INVASIVE SPECIES COUNCIL PUGET SOUND PROJECT.** [Wendy Brown](#)<sup>1</sup>, Barbara Chambers<sup>2</sup>, Chris Christopher<sup>3</sup>, Dana Coggon<sup>4</sup>, Doug Daoust<sup>5</sup>, Alison Halpern<sup>6</sup>, Bob Koch<sup>7</sup>, Mary Mahaffy<sup>8</sup>, Brid Nowlan<sup>9</sup>, Niles Seifert<sup>10</sup>, Melodie Selby<sup>11</sup>, Ted Smith<sup>12</sup>, Susan Spinella<sup>13</sup>, Pat Stevenson<sup>14</sup>, Mary Toohey<sup>15</sup>, and Lisa Veneroso<sup>16</sup>. <sup>1</sup>Washington Recreation and Conservation Office. [Wendy.Brown@rco.wa.gov](mailto:Wendy.Brown@rco.wa.gov). <sup>2</sup>U.S. Department of Agriculture. [Barbara.A.Chambers@aphis.usda.gov](mailto:Barbara.A.Chambers@aphis.usda.gov). <sup>3</sup>Washington Department of Transportation. [Christc@wsdot.wa.gov](mailto:Christc@wsdot.wa.gov). <sup>4</sup>Kitsap County. [Dcoggon@co.kitsap.wa.us](mailto:Dcoggon@co.kitsap.wa.us). <sup>5</sup>U.S. Forest Service. [Ddaoust@fs.fed.us](mailto:Ddaoust@fs.fed.us). <sup>6</sup>WA State Noxious Weed Control Board. [Ahalpern@agr.wa.gov](mailto:Ahalpern@agr.wa.gov). <sup>7</sup>Franklin County. [Rkoch@co.franklin.wa.us](mailto:Rkoch@co.franklin.wa.us). <sup>8</sup>U.S. Fish and Wildlife Service. [Mary\\_Mahaffy@fws.gov](mailto:Mary_Mahaffy@fws.gov). <sup>9</sup>Washington Invasive Species Coalition. [Bnowlan@seanet.com](mailto:Bnowlan@seanet.com). <sup>10</sup>U.S. Coast Guard. [Niles.I.Seifert@uscg.mil](mailto:Niles.I.Seifert@uscg.mil). <sup>11</sup>Washington Department of Ecology. [Msel461@ecy.wa.gov](mailto:Msel461@ecy.wa.gov). <sup>12</sup>Washington State Parks and Recreation Commission. [Ted.Smith@parks.wa.gov](mailto:Ted.Smith@parks.wa.gov). <sup>13</sup>U.S. Customs and Border Protection. [Susan.spinella@dhs.gov](mailto:Susan.spinella@dhs.gov). <sup>14</sup>Stillaguamish Tribe. [Pstevenson@stillaguamish.nsn.us](mailto:Pstevenson@stillaguamish.nsn.us). Washington Department of Agriculture. [Mtohey@agr.wa.gov](mailto:Mtohey@agr.wa.gov). <sup>16</sup>Washington Department of Fish and Wildlife. [Lisa.veneroso@dfw.wa.gov](mailto:Lisa.veneroso@dfw.wa.gov).

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This project implements the top priorities of The Washington Invasive Species Council's strategic plan "Invaders at the Gate". Including: a baseline assessment for informed decision-making and measurement, accessible information available for greater coordination and rapid response, and an education campaign to increase public awareness and prevention efforts.

The project is specific to the Puget Sound Basin and will be completed by December 2011. The project will 1) determine both the extent and impact of invasive species in Puget Sound and identify any gaps in protection and control. 2) Provide public access to this information for prevention, control, and response actions. 3) Educate the public on the damage caused by invasive species and the role they play in prevention. 4) Establish a system to measure results and progress. 5) Improve coordination of all entities working to combat invasive species.

To complete the baseline assessment the council will build a data repository, analyze data for gaps to identify opportunities for prevention and summarize results in a written report. The information clearinghouse's function is to share information by providing easy access to managers and to allow for reporting of invasive species. Additionally, this project will inform

the public of the problem and enlist the help of key groups aimed to effect behavioral changes.

Likely outcomes of project: New and existing invasions will be prevented and better controlled. All entities will have better access to invasive species information and management of invasive species will improve as progress is measured and best practices are shared.

**KEY WORDS:** INVASIVE SPECIES, PUGET SOUND, EDUCATION.

**ALTERNATIVE FUTURES FOR ECOLOGICAL SYSTEMS AT THE EDGE OF COASTAL DEVELOPMENT: AN AUSTRALIAN CASE STUDY.** [David Brunckhorst](#)<sup>1</sup>, Phil Morley<sup>1</sup>, Scott Bassett<sup>2</sup>, and Jamie Trammell<sup>2</sup>. <sup>1</sup>Institute for Rural Futures and UNESCO Centre for Bioregional Resource Management, University of New England, Australia. [www.ruralfutures.une.edu.au](http://www.ruralfutures.une.edu.au). <sup>2</sup>University of Nevada, Reno NV, [sbassett@unr.edu](mailto:sbassett@unr.edu), [jtrammel@unr.edu](mailto:jtrammel@unr.edu).

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Across many regions we are racing down the road towards landscapes consisting of concrete jungles, less productive land, compromised ecosystems and less climate change resilience. Can we change direction? Which future might be more desirable, more resilient and protect viable natural areas?

Rapid large scale change is affecting coastal rural regions of Australia, particularly along the eastern sea board, coastal Victoria and south Western Australia. These areas are facing enormous “*Sea Change*” development, urbanization, urban sprawl and consequent land use and landscape change including loss of agro-ecological systems, natural areas and ecosystems and ecosystem services.

An Alternative Landscape Futures approach was applied to a case study region of the coastal, north-eastern portion of the State of New South Wales (NSW). By capturing the essential elements of a very complex debate about regional development and sustainability, a relatively small number of plausible future land use scenarios were generated. These were assessed in terms of the consequences of each choice in changing the regional landscapes in the medium to long term. The outcomes provide a much clearer picture of future options that communities, planners and policy makers might choose, to optimize protection of natural areas and systems while managing landscape change. Geographically meaningful representations of the consequences of planned futures contribute towards a common understanding, possible resolution, and decisive action towards more ecologically sustainable futures.

**KEY WORDS:** ALTERNATIVE LANDSCAPE FUTURES, DESIGN, LAND USE, LAND COVER CHANGE

**ENVIRONMENTAL IMPACTS OF NON-HERBICIDAL CONTROL OF INVASIVE SPECIES.**

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Although herbicidal control of invasive species has been proven to be effective and environmentally sound, many invasive species control programs feature non-herbicidal control methods. These methods are used because they are claimed to be better for the environment. These include polyethylene sheeting, boiling water, mechanical and manual control, flame weed burners, vinegar, and other organic methods. These non-herbicidal methods are examined for their environmental impact, including total pounds of chemicals used, toxicity of all chemicals used, fuel use, and long term environmental fate of the non-herbicidal chemicals utilized. In addition, the long term safety record of the different methods are compared in terms of worker injuries.

**KEY WORDS:** NON-HERBICIDAL, ENVIRONMENTAL IMPACT, INVASIVE SPECIES, CHEMICALS

**MORO BIG PINE: USING WORKING FOREST CONSERVATION EASEMENTS FOR LANDSCAPE-SCALE PROTECTION OF NATURAL COMMUNITIES AND RARE SPECIES IN ARKANSAS.** Chris Colclasure. Arkansas Natural Heritage Commission.

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Moro Big Pine Natural Area-Wildlife Management Area is a 15,922-acre working forest conservation easement that protects native loblolly-shortleaf pine flatwoods in the South Central Plains Ecoregion of southern Arkansas. The site supports several rare plant communities and species of conservation concern including the federally endangered Red-cockaded Woodpecker. Moro Big Pine is jointly managed by Potlatch Forest Holdings Inc., Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission and The Nature Conservancy. This multi-partner land protection initiative protects species and natural communities of concern and demonstrates the effectiveness of working forest conservation easements in Arkansas.

**KEY WORDS:** WORKING FOREST CONSERVATION EASEMENT, LOBLOLLY SHORTLEAF-PINE FLATWOODS, SOUTH CENTRAL PLAINS, RED-COCKADED WOODPECKER

**PATHWAY RISK ANALYSIS FOR WEED SPREAD WITHIN AUSTRALIA.** Michael Coleman<sup>1</sup>, Brian Sindel<sup>2</sup>, Annemieke Schneider<sup>2</sup>, Ian Reeve<sup>1</sup>. <sup>1</sup>Institute for Rural Futures, University of New England, Australia. [www.ruralfutures.une.edu.au](http://www.ruralfutures.une.edu.au). <sup>2</sup>School of Environmental and Rural Science, University of New England, Australia. [www.une.edu.au/ers/](http://www.une.edu.au/ers/).

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There has been considerable effort to determine the means by which weeds and potential weeds enter Australia, and to assess the risks associated with the importation of plants. However, no comprehensive studies had previously been undertaken to ascertain the ways that weeds spread once present within Australia, or to assess the relative threats or risks (likelihood and potential magnitude) of different weed 'sources' and 'pathways' due to species, quantity of propagules, distance, and sensitivity of the invaded environment.

A review of scientific and other relevant literature, and a survey of over 100 Australian scientific weed experts, was therefore undertaken to identify: how weed propagules spread within Australia; which sources and pathways account for the majority of weed ingress; which sources and pathways currently pose the greatest risks; ways in which these risks are changing (e.g. due to changing climate or patterns of trade); how current and emerging risks can be managed; and gaps in our current understanding of particular sources and pathways.

Twenty-four *sources* (sites or areas of land where weeds are actively growing and from which new invasions may emerge) and 17 *pathways* (the means by which weed propagules are moved) were identified for weed spread in the Australian context.

**KEY WORDS:** INVASIVE PLANT SPECIES, WEED SPREAD, SOURCE, PATHWAY, RISK ANALYSIS.

**FOREST INVENTORY AND MONITORING OF AJLOUN RESERVE, JORDAN.** Thomas E. DeMeo<sup>1</sup>, F. Jack Triepke<sup>2</sup>, E.M. AlSmadi<sup>3</sup>, Yaseen Ananbeh<sup>4</sup>, and Frank Duran<sup>1</sup>. <sup>1</sup>Natural Resources, Pacific Northwest Region, USDA Forest Service. [tdemeo@fs.fed.us](mailto:tdemeo@fs.fed.us). <sup>2</sup>Ecosystem Assessment and Planning, Southwestern Region, USDA Forest Service. [jtriepke@fs.fed.us](mailto:jtriepke@fs.fed.us) <sup>3</sup>The Royal Society for the Conservation of Nature, Amman, Jordan. [reserves@rscn.org.jo](mailto:reserves@rscn.org.jo). <sup>4</sup>Ajloun Forest Reserve, Ajloun, Jordan.

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Management of the nature reserve network in Jordan by the Royal Society for the Conservation of Nature (RSCN) requires information on each reserve's productivity and diversity. Accordingly, we developed a 200-meter grid for the systematic random selection of sample sites within the recently established 12 km<sup>2</sup> Ajloun Reserve, in the evergreen oak zone of northern Jordan. In order to develop a method to compare these ecosystems across broad areas, we used high resolution satellite imagery to make ocular estimates made for

tree volume for all 167 grid points falling within the reserve. A subset of 57 grid points was randomly selected and field sampled for calibration of the ocular estimates. Diameter and species were recorded for all trees on each sample. Stem counts were made by species for all regeneration (<2cm diameter). Following the inventory, a correction coefficient was identified according to the disparity between ocular estimates and volume estimates generated from field data, and then applied to all remaining grid points. Volume averaged 2.5m<sup>3</sup>/ha (12.4% sample error using a 95% confidence interval). Using this method, biomass estimates can be extrapolated across landscapes in order to compare them. The permanent sampling network so established is relatively easy to maintain over time, and also provides a habitat framework for other studies on wildlife and rare plants. Repeat sampling (n=12) in 2008 showed results similar to those of 2007, except for a decrease in the proportion of oaks in the 2.0 to 4.9 cm class.

**KEY WORDS:** FOREST INVENTORY, *QUERCUS COCCIFERA CALLIPRINOS*, VEGETATION SAMPLING, FOREST BIOMASS, MONITORING FRAMEWORK

**THE IMPACT OF MULTIPLE WILDFIRES ON SAGEBRUSH-STEPPE COMMUNITIES: IMPLCATIONS FOR RESTORATION.** [Eva Dettweiler-Robinson](mailto:evadr@u.washington.edu)<sup>1</sup>, G. Matt Davies<sup>1</sup>, Jonathan D. Bakker<sup>1</sup>, Peter W. Dunwiddie<sup>1</sup>, Jim Evans<sup>2</sup>, Sonia A. Hall<sup>3</sup> and Janelle Downs<sup>4</sup>. <sup>1</sup>School of Forest Resources, University of Washington. [evadr@u.washington.edu](mailto:evadr@u.washington.edu); [gmdavies@u.washington.edu](mailto:gmdavies@u.washington.edu); [jbakker@u.washington.edu](mailto:jbakker@u.washington.edu); [pdunwidd@u.washington.edu](mailto:pdunwidd@u.washington.edu). <sup>2</sup>The Nature Conservancy, Seattle, WA. [jevans@TNC.ORG](mailto:jevans@TNC.ORG). <sup>3</sup>The Nature Conservancy, Wenatchee, WA. [shall@tnc.org](mailto:shall@tnc.org). <sup>4</sup>Pacific Northwest National Laboratory, Richland, WA. [jl.downs@pnl.gov](mailto:jl.downs@pnl.gov).

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Large wildfires burnt the Arid Lands Ecology Reserve (ALE) of the Hanford Reach National Monument in 2000 and 2007. Changes to fire regimes, such as increased frequency and severity, pose a threat to the composition, structure and environmental services of sagebrush-steppe communities. Permanent vegetation plots on ALE were sampled in 1996, 2001 through 2004, and 2009. Plots were originally selected to represent vegetation types across a range of elevations and soils types.

Cover of all plant functional groups declined immediately following the 2000 fire. Most groups exhibited some post-fire recovery, but the 2007 burn resulted in further reductions. Shrub cover showed a continual decline from 1996 values. Species richness increased slightly from 1996 through 2009, largely due to increases in perennial native forbs. Pre-fire vegetation was strongly influenced by elevation and soil type. Fire effects were scale-dependent: repeated fires accentuated differences between broad elevational groups, but plots within these groups became more similar to one another. In 2009, low elevation sites were strongly associated with invasive annuals. *Bromus tectorum* occurred in nearly all plots in 2009 but its abundance was lower than prior to the 2007 fire. Plot trajectories of change suggest that successive fires moved plots increasingly far from their state in 1996. Repeated fires have

produced fundamental changes in communities and severely compromised restoration efforts. If ALE is to return to anywhere near its "initial" state further significant intervention will be needed. We will return to ALE in 2010 to continue studying post-fire vegetation dynamics

**KEY WORDS:** *BROMUS TECTORUM*, FIRE ECOLOGY, HANFORD REACH NATIONAL MONUMENT, INVASIVE SPECIES, RESTORATION

**MAPPING EXISTING WETLANDS AND WETLAND RESTORATION POTENTIAL ON THE MISSOURI RIVER FLOODPLAIN.** David D. Diamond, Clayton Blodgett, and Ronnie Lea. Missouri Resource Assessment Partnership (MoRAP), University of Missouri. [diamondd@missouri.edu](mailto:diamondd@missouri.edu); [blodgett@missouri.edu](mailto:blodgett@missouri.edu); [leard@missouri.edu](mailto:leard@missouri.edu).

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Wetland conservation efforts have been hampered by the lack of accurate, up to date maps of existing wetlands and by lack of a way to set priorities for wetland restoration. We worked with Missouri Audubon, the Corps of Engineers, the EPA, the Missouri Department of Natural Resources, and other partners to develop algorithms for mapping existing wetlands and for mapping wetland restoration potential along a reach of the Missouri River floodplain from Atchison, KS, to Kansas City, MO. LANDSAT data were used to identify permanently flooded areas, SPOT data were used to define general community types, and RADARSAT-1 data were used to define vegetation structure, allowing the accurate separation of forested, scrub-shrub, and marsh communities. Mapping of restoration potential was accomplished via the development of fine-resolution DEMs from data provided by the COE and use of SSURGO soils data. Subtle variation in elevation and soil characteristics define which natural communities are appropriate to restore on a given site (e.g. marsh in low areas versus bottomland hardwoods in higher areas). Finally, we developed a landscape context algorithm which took into consideration proximity to urban development, public lands, and existing natural wetlands, and suggest areas close to existing wetlands, away from urban, and close to public lands are most suitable for restoration. Methods are transparent and practical in cost, and partners plan to use these algorithms to identify existing wetlands and wetland restoration potential in across the Midwest, which should significantly aid both proactive and reactive conservation efforts.

**KEY WORDS:** Wetland Conservation, Wetland Mapping, Wetland Restoration, Missouri River Floodplain

**APPLICATION OF NEW TEXAS LANDCOVER DATA FOR CONSERVATION PLANNING.** Lee F. Elliott<sup>1</sup>, David D. Diamond<sup>1</sup>, Dianne True<sup>1</sup>, Clayton Blodgett<sup>1</sup>, Duane German<sup>2</sup>, and Kim Ludeke<sup>2</sup>. <sup>1</sup>Missouri Resource Assessment Partnership (MoRAP), University of Missouri. [elliott@missouri.edu](mailto:elliott@missouri.edu); [diamondd@missouri.edu](mailto:diamondd@missouri.edu); [truecd@missouri.edu](mailto:truecd@missouri.edu);

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We mapped existing vegetation at fine spatial and thematic resolution to facilitate landscape-scale conservation planning in Central Texas. The effort produced a spatial resolution of 10 m (using image objects), and a thematic resolution of 109 mapped types. The mapped vegetation types are based on the Ecological System classification developed by NatureServe. Previously, regional conservation planning has relied on less useful landcover data such as the National Land Cover Data or older vegetation maps of Texas. Examples of the conservation significance of the improved vegetation map include better mapping of endangered Golden-cheeked Warbler habitat, identification of mesic slope habitats that harbor rare species and rare communities in the Edwards Plateau, and identification of deep, sandy woodlands and grasslands in the Crosstimbers. Existing models of potential Golden-cheeked Warbler have relied on landcover data that fails to incorporate the difference between coniferous evergreen and broad-leaved evergreen cover types. While coniferous evergreens (mostly *Juniperus ashei*) play an important role in the life history of the species, broad-leaved evergreens are much less important and were found to represent more than 20% of the forest cover within the range of the warbler. Heretofore, two habitats of conservation interest had not been geospatially identified at a regional scale. We mapped more than 325,000 hectares of slope forest on the Edwards Plateau, with 20% dominated by deciduous hardwoods. We were also able to map more than 25,000 hectares of woodlands occupying deep sands within the Crosstimbers.

**KEY WORDS:** LANDCOVER, GOLDEN-CHEEKED WARBLER, EDWARDS PLATEAU, CROSSTIMBERS

### **ESTABLISHING A SUCCESSFUL COOPERATIVE WEED MANAGEMENT AREA: A LOOK BACK AT THE FIRST THREE YEARS OF THE RIVER TO RIVER CWMA.**

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Cooperative Weed Management Areas (CWMAs) provide a framework for regional coordination to address the threat of invasive species. While CWMAs have a long history in the Western United States, they are a relatively new phenomenon in the East and face a different set of challenges and organizational needs. The River to River CWMA was the first CWMA in Illinois and one of the first in the Eastern United States. Formed in the fall of 2006, the River to River is an established and successful CWMA. Using the experience gained from these first three years, the River to River proposes a three-phase strategy to establishing CWMAs: 1.) Education and awareness, 2.) organization and capacity building

and 3.) implementation of coordinated control efforts. These three phases build upon each other, lay a foundation for long-term success and foster participation between all CWMA members while engaging other stakeholders. The complex landownership patterns, small parcel sizes and varying land uses common in the Eastern United States requires careful planning and an ambitious educational campaign before coordinated control projects are feasible. This talk examines the first three years of the River to River and discusses the methods used to establish a CWMA, particularly what worked and what didn't.

**KEY WORDS:** Invasive Species, Cooperative Weed Management Area, Adaptive Management

**CONSERVATION EASEMENT ADOPTION: MOTIVATIONS, VARIABLES, AND THE DECISION PROCESS.** James R. Farmer<sup>1</sup>, Charles Chancellor<sup>1</sup>, and Burnell Fischer<sup>2</sup>.

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Since 1980, land trusts have grown dramatically as a direct result of the populations' reaction to rapid development (Gustanski & Squires, 2000). Consequently, the comprehension of motivations for the use of conservation easements (CE), one of the leading private land conservation tools, is paramount in protecting more land (Merenlander et al., 2004). The current study attempted to elucidate what, if any relationship may exist between motivations and land ownership type on a state scale.

This study utilized a mixed method design with a quantitative focus (Creswell and Clark, 2007). Phase 1 included informal interviews to construct the questionnaire used in Phase 2. The questionnaire garnered responses using a Likert style scale with prompts concerning the importance of various motivations on one's decision to adopt a CE. Subsequent sections were used to gather land type / use data and demographic data.

Overall, motivations that stem from environmental values dominated the study's participants' rationale for choosing to use a CE. The environmental motivation tested significantly different at the .000 level. Further, the uniqueness of one's property was also significantly different from the rest of the group, with motivations relating to culture, financial incentives, family heritage, and society receiving lower scores, respectively. Additionally, the significance and rank of motivations was found to differ based upon the type of land ownership. This presentation will discuss the significance and details of these findings, results regarding CE adoption process, as well as the implications of this study for the land conservation field.

**KEYWORDS:** CONSERVATION EASEMENTS; PRIVATE LAND CONSERVATION; LAND TRUST

**MITIGATION BANKING: A POTENTIAL TOOL TO RESTORE & SUSTAIN PRIORITY HABITATS.** Dana Field. Oregon Department of State Lands. [Dana.Field@state.or.us](mailto:Dana.Field@state.or.us)

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Oregon now has 20 approved wetland mitigation banks, which may sell wetland credits to satisfy the mitigation obligations of the state and federal wetland regulations. Four of these banks support ESA-listed species. The state is working on a system to quantify wetland credits based on specific functional gains, which could reward strategic selection of optimal conservation locations. Mitigation credit sales can provide a funding mechanism for perpetuity stewardship of regulated resources, via an endowment and stewardship agreement with a land trust. The author will describe key ecological and financial risks and opportunities of mitigation banking as a conservation tool, as well as key elements of regulatory oversight needed to ensure ecological gains.

**KEY WORDS:** WETLAND MITIGATION BANKING, PERPETUITY STEWARDSHIP

## G – K

**CHALLENGES AND STRATEGIES FOR IMPLEMENTING A SUCCESSFUL VOLUNTEER-BASED RARE PLANT MONITORING PROJECT.** Wendy Gibble and Sarah Reichard, PhD. [wjgibble@u.washington.edu](mailto:wjgibble@u.washington.edu); [reichard@u.washington.edu](mailto:reichard@u.washington.edu).

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Numerous examples of successful community monitoring programs exist across the United States. These programs fill a void in government funding for basic ecological monitoring that is vital to long-term conservation of species and ecosystem sustainability. However, relatively few programs focus on monitoring plants because of the unique challenges they present. Plant monitoring requires volunteers be able to identify plants in the wild, have basic navigation skills to locate and map sites, be able to collect population data independently in the field, and to provide clear written reports of their findings. Washington Rare Plant Care and Conservation (Rare Care) initiated a rare plant monitoring program in 2001 in collaboration with the Washington Natural Heritage Program. The goal of the project is to update inventories on occurrences of rare plant species in Washington State, to provide land managers with data they need to track the status of populations on their lands, and to identify immediate threats to rare plant populations.

Since its inception, Rare Care has trained 265 volunteers and over 720 site visits have been made and reported on across the state. The success of the program stems from careful screening and training of volunteer monitors, it's association with a University where it is managed by scientists, the collaboration with the Natural Heritage Program that provides a

structure through which the data are managed and shared, and a well-developed quality assurance program that provides a framework for ensuring quality data are produced and kept confidential.

**KEYWORDS:** RARE PLANT MONITORING, COMMUNITY SCIENCE

**THE USE OF THE HISTORICAL RECORD AND GRAPHICAL INFORMATION SYSTEMS TO GENERATE A SUITABILITY MAP FOR PRAIRIE RESTORATION IN MISSISSIPPI.**

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An exhaustive search of General Land Office records was conducted with a goal of identifying the historic locations of prairies in the Jackson Prairie Belt region of Mississippi. These records include surveys of township and section lines made by government surveyors following tribal land cessions in the early 19<sup>th</sup> century. Over 300 locations of entry and exit points of Jackson Belt prairie patches were found and transcribed. The points were converted to x and y coordinates in ArcMap, and a tool was created which automated this process, which resulted in the generation of a series of vector lines representing areas in which the surveyor was crossing prairie. This map was compared to one created and published by John Barone by digitizing plat maps from the same era. Patches not included in the plat maps are evident. While Barone's shapefiles contain more information about the patch sizes and margins, the lines generated from the transcriptions of survey notes result in more precisely georeferenced locations. Additional datasets, including National Forest Boundaries, distance to primary roads, transmission lines, current land use and 16<sup>th</sup> section land, were added to the GIS and analyzed as variables affecting suitability for restoration. These variables were weighted according to input from stakeholders, including the Nature Conservancy of Mississippi and their partner groups. The weighted raster files were inserted into a map algebra equation in ArcMap resulting in a suitability map. Locations deemed most suitable were confirmed as such through aerial photography and site visits.

**KEYWORDS:** GLO RECORDS, JACKSON BELT, PRAIRIE, SUITABILITY MAPS

**ANTHROPOGENIC DISTURBANCE AND FIRE: FACTORS IN NON-NATIVE PLANT INVASION AT FORT PICKETT, VIRGINIA.**

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U.S. Army training lands play a unique role in conserving native plant diversity. The primary mission of Army lands is to train military personnel, however these lands serve a critical conservation function providing relatively protected habitat for a variety of floral and faunal species. As with non-military natural lands, invasive plant species often impede these conservation goals.

Research conducted at Fort Pickett, Virginia, investigated the role military disturbance and fire regimes play in altering the non-native composition of natural grassland communities. For the military, understanding the relationship between levels and type of disturbance is critical to understanding how non-native invasion threatens sensitive species and habitats.

Relationships between varying levels of anthropogenic disturbance, fire, and several invasive species; including: *Lespedeza cuneata*, *Centaurea maculosa*, and *Schedonorus phoenix*, were analyzed from 10 years of ecological plot data to establish baselines for management strategies to reduce non-native invasion. The relationship between disturbance, fire, and invasion were complex. Physical disturbance favored and high fire frequency reduced invasive species cover. Total cover of invasive species was significantly higher ( $P < 0.05$ ) in plots where physical disturbance was present. The total cover of invasive species was lower in the high fire frequency plots. Native legumes showed a significant reduction in the physical disturbance plots while non-native legumes increased. Fire increased native legumes and decreased non-native legumes.

Results will be adapted to management models for Army land management and be of interest to non-military managers in maintaining natural plant communities on lands that experience minor to heavy anthropogenic disturbances.

**KEY WORDS:** INVASIVE SPECIES, FIRE, ANTHROPOGENIC DISTURBANCE, LAND MANAGEMENT

**GUIDING CONSERVATION ACTIONS IN WASHINGTON WITH THE STATE BIODIVERSITY COUNCIL AND THE CONSERVATION OPPORTUNITY FRAMEWORK.**

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The Conservation Opportunity Framework is a landscape level tool developed by the Washington Biodiversity Council to guide state and regional conservation actions. The Council itself is a public-private partnership chartered by executive order to develop policies and programs to conserve Washington's remarkable biological diversity. Council members include federal, state and local government, conservation organizations, private landowners, tribes, educators, planners and researchers. In late 2007, the Council completed a long-term

conservation strategy, which includes over sixty specific recommendations in four broad focus areas: Science, Education, Incentives and Land Use.

The Strategy also features the Conservation Opportunity Framework, a set of ecoregional maps intended to direct attention towards areas most significant for biodiversity conservation. These maps assess the distribution of important species, plant communities, and ecological systems within each ecoregion, and overlay them with projected human population growth. A central component of the Framework is the notion that each area of the landscape, regardless of where it ranks in terms of biodiversity value or risk, has an important role to play in the conservation picture. In some cases, the highest needs may be restoration, education, or additional study and inventory. In other areas, exploring options for preservation might be the most urgent and critical need. The Conservation Opportunity Framework has been used to rank applications for state land acquisition programs and as a tool to aid local land use planners. The concept has also been replicated in other local biodiversity assessment efforts.

**KEY WORDS:** BIODIVERSITY COUNCIL, CONSERVATION STRATEGY, ECOREGIONAL PRIORITIES.

**CHANGE IN ECOSYSTEM SERVICE OF PHONGSALY NATIONAL BIODIVERSITY CONSERVATION AREAS LAO PDR.** Chanhda Hemmavanh and Somchay Inthavong. Secretary Department, Prime Minister Office Lao PDR. [Chanhda2006@hotmail.com](mailto:Chanhda2006@hotmail.com)

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Land Use Changes were traced during 10 years from 1992 to 2002 in Phongsaly National Biodiversity Conservation Area (NBCA), one of the most important NBCA and rich in biodiversity in Lao PDR, based on satellite image interpretation and field verification in order to identify causes of the changes. The dynamic information of the forest land cover change during 10 years was calculated by the map algebra in ArcGIS 9.2. Based on the theory of ecosystem service function and the service function value of global different ecosystem services values (ESV) provided by Costanza et al, the value of the six forest cover and land use categories in the Study Areas was worked out. Ecological environment effect that the regional land cover change produced in study period was calculated. A principal component analysis (PCA) was used to quantitatively study driving forces of forest land use change. Results showed that forest land cover declined 15463.35 ha about 12.39% from 1992 to 2002, resulted that in a \$31050406.80 net decline in ecosystem services of forest category respectively. The economic and population factors were the principal driving forces of forest cover change in the study area. ESV, PCA were a suitable method for investigating driving forces of forest land cover change and finally policy concerning to biodiversity and sustainable use of the natural resources were developed.

**KEYWORDS:** ECOSYSTEM SERVICES, LAND USE, PHONGSALY, LAO PDR

**BALSAM WOOLLY ADELGID AND LANDSCAPE DISTURBANCE ON THE OLYMPIC PENINSULA, WA.** [Karen Hutten](mailto:karen.hutten@u.washington.edu)<sup>1</sup>, Christian Torgersen<sup>2</sup>, Andrea Woodward<sup>3</sup>, Robert Kennedy<sup>4</sup>, and Justin Braaten<sup>1</sup>. <sup>1</sup>College of Forest Resources, University of Washington. [huttenk@u.washington.edu](mailto:huttenk@u.washington.edu). <sup>2</sup>U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Cascadia Field Station, College of Forest Resources University of Washington. [ctorgersen@usgs.gov](mailto:ctorgersen@usgs.gov). <sup>3</sup>U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Olympic Field Station. [andrea\\_woodward@usgs.gov](mailto:andrea_woodward@usgs.gov). <sup>4</sup>Department of Forest Ecosystems and Society, Oregon State University. [Robert.kennedy@oregonstate.edu](mailto:Robert.kennedy@oregonstate.edu).

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Natural and exotic disturbance agents can act synergistically to create novel ecosystems by altering disturbance regimes and vegetation patterns in forest landscapes. Climate change can further modify ecosystems by facilitating range expansions of exotic species. We are investigating spatial and temporal patterns of severity and extent of balsam woolly adelgid (BWA) infestation in relation to physical geography, climate, and associated disturbance agents on the Olympic Peninsula, WA. BWA is an exotic herbivorous insect first documented on the Peninsula around 1980. It has since spread and caused mortality throughout the range of its true-fir host and is damaging subalpine fir forests on the peninsula. In this research, we use LandTrendr-processed satellite imagery and field verification to determine the distribution of BWA and associated disturbances. Sampling was initiated in 2009 to verify BWA presence and measure mortality rates and affected tree species and age classes. This information will ultimately be applied to determine (1) the potential of BWA to alter forest vegetation and disturbance dynamics, and (2) the effects of climate change on these processes and patterns. We have observed BWA-caused gouting in all age classes of subalpine fir in stands that have experienced vegetation decline for five years or longer. Mortality and vegetation recovery ostensibly depend on the duration of infestation. Preliminary results indicate that patterns of vegetation decline and associated BWA infestation are correlated with annual weather, aspect, and elevation.

**KEY WORDS:** DISTURBANCE, EXOTIC SPECIES, BALSAM WOOLLY ADELGID, SUBALPINE FIR, FOREST VEGETATION

**IS RIVER REHABILITATION INVOLVING ALIEN FISH ERADICATION ABOUT GETTING THE ALIENS OUT OR GETTING THE ANGLERS ON YOUR SIDE? FOUR SOUTH AFRICAN RIVERS AS A CASE HISTORY.** [Dean Impson](mailto:dimpson@capenature.co.za)<sup>1</sup>, Denis Tweddle<sup>2</sup>, Ryan Weaver<sup>3</sup>, and Louise Stafford<sup>4</sup>. <sup>1</sup>CapeNature. [dimpson@capenature.co.za](mailto:dimpson@capenature.co.za). <sup>2</sup>Enviro-Fish Africa. [D.tweddle@ru.ac.za](mailto:D.tweddle@ru.ac.za). <sup>3</sup>University of Stellenbosch. [jflyfish@iafrica.com](mailto:jflyfish@iafrica.com). <sup>4</sup>City of Cape Town. [Louise.Stafford@capetown.gov.za](mailto:Louise.Stafford@capetown.gov.za).

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The Cape Floristic Region of South Africa is internationally renowned for its biological diversity and is a conservation hotspot. Although its indigenous freshwater fish fauna is depauperate for an area this size, it is highly endemic (21 out of 23 taxa). Most endemic fishes are threatened, including 13 that are Critically Endangered or Endangered. The primary threat to these fishes are invasive alien fishes, especially North American basses (*Micropterus*). Through the Cape Action for People and the Environment (CAPE), a pilot project has started that aims to rehabilitate four priority rivers that are invaded by alien fishes. The preferred method of eradication is using the piscicide Rotenone. This chemical has a proven track record in the USA, but some projects have been highly controversial for a variety of reasons. The pilot project is in the final stages of a comprehensive Environmental Impact Assessment. Public and media reaction to the project have been lead by a small but vociferous group of trout anglers who are against the use of Rotenone in a small river with invasive rainbow trout in it. This paper describes the project and public reaction to it, which has varied from support from the bass angling fraternity to a concerted attempt to stop the project by a small group of trout anglers.

**KEY WORDS:** RIVER REHABILITATION, THREATENED FISHES, ALIEN FISHES, ROTENONE

**CULTIVATING PLACE-BASED ECOSYSTEM RESTORATION AND RECOVERY: A PUGET SOUND BASIN CASE STUDY.** Jennifer Knauer, Jones & Jones, Architects + Landscape Architects + Planners. [jknauer@jonesandjones.com](mailto:jknauer@jonesandjones.com) .

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Ecosystem recovery and restoration decisions are often informed by science without a corresponding commitment to understanding how humans interact with the landscape in question. As a result, restored landscapes are often conceived in a vacuum, with respect to how individuals and groups perceive the land, make use of its resources, and more generally interact with the landscape. Place based ecosystem restoration and recovery requires a structured, multi-scaled approach to understanding and accounting for the many ways in which humans interact with their natural environment.

Human dimensions are the behaviors, the institutions, and the inter-relationships between humans and their landscape. A structured approach to understanding these human dimensions throughout the life of a project or initiative, translates to stronger relationships between individual, communities, and their landscape; the strength of these connections serve as a cornerstone of successful restoration and recovery processes. The supposition is that by understanding these social factors, the dynamic tension between humans and functioning natural systems will be lessened over time.

Cultivating a place-based approach to ecosystem restoration and recovery requires a commitment to the following: relationship building with stakeholders; a contextual

understanding of how humans directly interact with the site or area; a contextual understanding of how the site or area contributes vital ecosystem services to individuals and communities; and maximizing the potential for strong human-nature relationships. A Puget Sound case study will be presented to illustrate the theoretical and applied resource management implications of achieving place-based restoration projects and ecosystem recovery initiatives.

**KEY WORDS:** HUMAN DIMENSIONS, SOCIAL FACTORS, PLACE-BASED RESTORATION, PLACE-BASED ECOSYSTEM RECOVERY

## L - Q

**PORTLAND, OREGON—A CASE STUDY IN PROTECTION OF URBAN NATURAL AREAS.** Deborah Lev. Portland Parks & Recreation. [dlev@ci.portland.or.us](mailto:dlev@ci.portland.or.us).

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Portland Parks & Recreation manages over 7,000 acres as natural area within the City of Portland, Oregon with an additional 1,500 acres managed by partner agencies. The 2006 Portland Natural Area Acquisition Strategy outlined the need for additional habitat areas to complete a contiguous system of habitat within the City, connected to a larger regional habitat system. Priorities were based on statewide conservation planning tools and local inventories, protecting species and habitats of concern and connecting existing protected lands. Targeted habitats include interior forest, oak woodlands, grassland, riparian forests, and wetlands. Habitats supporting salmonid and amphibian species are also targeted for protection. Implementation of the acquisition strategy is being accomplished with funding from a regional bond measure, a local development impact fee for parks, and City stormwater fees. Guidance is offered by subsequent plans such as the Oregon Conservation Strategy and the City of Portland's Terrestrial Ecology Enhancement Strategy. Acquisition relies on partnerships with other agencies and organizations, including Metro, Portland's regional government agency, and the Bureau of Environmental Services, the City's stormwater management agency. Protecting natural areas serves diverse City goals such as watershed health, flood management, water quality, public health, carbon reduction, and recreation. Since the plan was adopted in early 2006, over 200 acres of additional natural area acres have received permanent protection.

**KEY WORDS:** ACQUISITION, PROTECTION, HABITAT

**DESPITE CONSTRAINTS: HABITAT CREATION AND MANAGEMENT IN AN URBAN PARK SYSTEM.** Sarah Low, Tom Witmer, and Joan Blaustein. Environment, Stewardship,

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Fairmount Park, Philadelphia's park system, consists of 9200 acres, of which, 5600 acres are forests, wetlands, meadows, and other natural areas. Managing natural areas for wildlife habitat in the context of an urban area often requires addressing a variety of very challenging issues, such as: a lack of staff trained in natural resource management, conflicts between user groups, the spread of invasive plants, an overabundance of deer, and a host of problems related to urban blight (i.e. graffiti, littering, dumping and burning stolen cars, illegal ATV use, and vandalizing and destroying guardrail). In the context of a highly developed region, the park system provides much needed wildlife habitat. Indeed, habitat protection and management in Philadelphia has led to high-quality stop-over areas for migratory songbirds, habitat for pollinating insects, and opportunities for park users to experience and develop an appreciation for nature. The presentation will focus on three meadows and three reforestation projects. These projects include the following elements: removal of invasive plants, enhancement of plant diversity, regeneration of native plants, on-going monitoring, and outreach to user groups, staff, and outside agencies. Collectively, these projects can serve as an illustration of the different challenges facing park staff in an urban setting and the different ways that those challenges have been met. Although the list of constraints to habitat management is significant, Fairmount Park has made progress in habitat creation, restoration, and protection in Philadelphia.

**KEY WORDS:** HABITAT RESTORATION, URBAN PARKS

**NEW DEVELOPMENTS WITH THE CACTUS MOTH (*CACTOBLASTIS CACTORUM* BERG.) DETECTION AND MONITORING NETWORK EFFORTS.** [Victor L. Maddox](#)<sup>1</sup>, Clifton Abbott<sup>1</sup>, John Madsen<sup>1</sup> and Randy Westbrooks<sup>2</sup>. <sup>1</sup>Geosystems Research Institute, Mississippi State University. [vmaddox@gri.msstate.edu](mailto:vmaddox@gri.msstate.edu); [abbott@gri.msstate.edu](mailto:abbott@gri.msstate.edu); [jmadsen@gri.msstate.edu](mailto:jmadsen@gri.msstate.edu). <sup>2</sup>United States Geological Survey, Whiteville, NC. [rwestbrooks@usgs.gov](mailto:rwestbrooks@usgs.gov).

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In 2006, an announcement of the Cactus Moth Detection and Monitoring Network (CMDMN) ([www.gri.msstate.edu/cactus\\_moth](http://www.gri.msstate.edu/cactus_moth)) was presented at the Natural Areas Conference in Flagstaff, AZ. The announcement provided information regarding the accidental introduction of the cactus moth (*Cactoblastis cactorum*) into the Southeastern United States, its potential impacts upon native *Opuntia* species in the southern United States and Mexico, and the collaborative efforts to prevent its spread westward. This exotic pest is expected to have a catastrophic effect on landscapes of Western states and Mexico, if its range expands beyond Louisiana. Previously, the cactus moth was as far west as Alabama, but in 2008 the cactus

moth was detected on Horn and Petit Bois Islands in MS. On the Atlantic coast, the moth has been detected as far north as Cape Romain, South Carolina. Infected host eradication, trap, and sterile insect technique (SIT) efforts are currently underway in coastal MS, AL, and western FL. No larval infestations were observed during pest eradication surveys on Horn and Petit Bois Islands in early 2009, but surveys continue. Currently, there are 2556 positive host population reports recorded in the CMDMN, which include 31 States from Maryland to California and Florida. In addition, there are 3446 negative host reports also in the CMDMN. Negative reports are included for host modeling efforts and to prevent redundant survey efforts. Sixty-nine sentinel sites have been established from the Carolinas to Arizona.

**KEY WORDS:** INVASIVE SPECIES, CACTUS MOTH, DATABASE

**INVASIVE PLANT ATLAS OF THE UNITED STATES.** [Les Mehrhoff](#)<sup>1</sup>, [Jil M. Swearingen](#)<sup>2</sup>, and Charles T. Barger<sup>3</sup>. <sup>1</sup>Invasive Plant Control, Inc. [les.mehrhoff@uconn.edu](mailto:les.mehrhoff@uconn.edu). <sup>2</sup>Center for Urban Ecology, National Park Service. [jil\\_swearingen@nps.edu](mailto:jil_swearingen@nps.edu). <sup>3</sup>Center for Invasive Species and Ecosystem Health, University of Georgia. [cbarger@uga.edu](mailto:cbarger@uga.edu).

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The Invasive Plant Atlas of the U.S., previously known as “WeedUS,” was initiated by the National Park Service in 1997 to address the need for current distribution information on alien invasive plants affecting natural areas in the United States. Data was gathered from state and federal agencies, scientific journals, books, and other publications and a survey of the National Park Service conducted by the author. WeedUS was added to the Plant Conservation Alliance’s Weeds Gone Wild website [www.nps.gov/plants/alien](http://www.nps.gov/plants/alien) in 1998 and was widely used for obtaining state level distribution data for plants invading wild lands. In October 2008, the University of Georgia Center for Invasive Species and Ecosystem Health (CISEH) designed an expanded website for WeedUS that allows users to access lists of invasive plants by habit (aquatic, grass, herb/forb, shrub, tree, and vine). Each species has its own web page featuring a brief descriptive paragraph, native range, images from the Center’s extensive image database, distribution maps, links to information resources on identification, biology and management, and suggestions for native plant alternatives provided by the Lady Bird Johnson Wildflower Center. The atlas will soon provide new features including the ability to make queries for species occurring in particular areas or reported by particular sources and the ability to track management efforts. The Invasive Plant Atlas [www.invasiveplantatlas.org](http://www.invasiveplantatlas.org) currently includes 1,027 invasive plant species. Taxonomic information is automatically updated through coordination with the USDA Plants Database.

**KEY WORDS:** invasive plants, images, distribution mapping, EDRR

**REPORTING THE RESULTS OF LONG-TERM MONITORING: CONTROL CHARTS AND INFORMATION THEORETIC MODELING.** [Lloyd W. Morrison](#)<sup>1</sup>, Hope R. Dodd<sup>2</sup>.

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Resource managers require quality monitoring data to make appropriate management decisions. We take an innovative approach with a suite of analysis tools that can provide critical information in a simple and easy to understand format, and is not subject to many of the problems associated with traditional null hypothesis significance testing procedures. We used control charts to evaluate the health of fish communities occurring in small prairie streams at Tallgrass Prairie National Preserve in Kansas. Fish communities were sampled by seining 5 pools in each of 12 stream segments every year for eight years. To evaluate species richness, diversity, and an overall index of biotic integrity, we used univariate control charts; multivariate control charts were employed to evaluate patterns of relative species abundance. Both control chart methods focus on the magnitude of change in communities over time, and can indicate to managers when communities are changing beyond levels of natural variability. Habitat data were collected for 11 different variables. We used an information-theoretic approach based on Akaike's information criterion (AIC) to determine the best predictors of three response variables (species richness, diversity, and catch per area) in each year. This approach seeks the most parsimonious model (best predictive or explanatory power with the fewest predictor variables). Physical habitat variables associated with pool dimension were generally better predictors than physiochemical variables associated with water chemistry.

**KEY WORDS:** AKAIKE'S INFORMATION CRITERION, CONTROL CHARTS, FISH COMMUNITIES, INFORMATION-THEORETIC APPROACH, RESOURCE MANAGEMENT

**REPEATED AERIAL GPS CENSUS AND MAPPING TO ASSESS PHRAGMITES ABUNDANCE AND EFFECTS OF CONTROL TREATMENTS ON THE VIRGINIA EASTERN SHORE.** [Rick K. Myers](mailto:rick.myers@dcr.virginia.gov), Kevin E. Heffernan, and Paul A. Clarke. Virginia Department of Conservation and Recreation, Division of Natural Heritage. [rick.myers@dcr.virginia.gov](mailto:rick.myers@dcr.virginia.gov); [kevin.heffernan@dcr.virginia.gov](mailto:kevin.heffernan@dcr.virginia.gov).

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The Eastern Shore of Virginia continues to experience rapid invasion by non-native Phragmites (*Phragmites australis*). A 2004 aerial (helicopter) GPS census conducted by the Virginia Department of Conservation and Recreation – Division of Natural Heritage with funding support from NOAA through the Virginia Coastal Zone Management Program documented and mapped 2,024 acres of Phragmites on the Seaside of Virginia's Eastern Shore. This project developed an efficient technique for mapping Phragmites resulting in the collection of useful data for planning and contracting Phragmites control treatments. In 2008, a second aerial census was completed for the same area surveyed in 2004 in order to (1)

measure success of control treatments completed by multiple conservation partners over a four-year period on the Virginia Eastern Shore; 2) quantify the rate at which untreated Phragmites patches have expanded; and (3) assess the number of new invasions established over the four-year census interval. Phragmites distribution data was made available to the public in 2008 via the on-line Virginia Phragmites Mapping Application which provides landowners a tool for assessing the extent of Phragmites on their own property and serves as a benchmark for assessing Phragmites spread. While an intensive effort was made to control Phragmites over the last four years on the Seaside, census results indicate that overall Phragmites abundance remained steady at about 2,000 acres. Increases from untreated patch expansion and new patch colonization have about equaled acreage reductions from herbicide application. And while the number of large patches has decreased, there has been an increase in the number of small, difficult-to-treat patches.

**KEY WORDS:** PHRAGMITES, *PHRAGMITES AUSTRALIS*, AERIAL GPS CENSUS, HELICOPTER MAPPING, RATE-OF-SPREAD

**THE PIKES PEAK ALPINE LAB: FREDERICK CLEMENTS ON THE EDGE OF SUCCESSION (1910-1944).** [Steven Olson](#)<sup>1</sup>, Dina Clark<sup>2</sup>, and Elizabeth Klein<sup>3</sup>. <sup>1</sup>Pike-San Isabel National Forests and Cimarron-Comanche National Grasslands. [solson01@fs.fed.us](mailto:solson01@fs.fed.us). <sup>2</sup>Denver Botanic Gardens. [ClarkD@botanicgardens.org](mailto:ClarkD@botanicgardens.org). <sup>3</sup>2524 N. Weber St. Colorado Springs, CO.

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Although Frederick Clements is well-known for working in the early development of successional theory, less is generally known about where his research was done. Three of his research sites are located at different elevations in the vicinity of Colorado Springs, Colorado. The alpine lab is at 12,000 feet on the tundra slopes of Windy Point on Pikes Peak, and is probably the oldest alpine study area in North America. Much of Clements' original work was funded by the Carnegie Institute with the directive to establish permanent quadrats at each site for classic garden studies. The alpine lab was an active place of scientific study in the early 1900s as the area is ecologically diverse, including tundra, krumholtz and subalpine forest communities. Over 60 years have passed since the last work at the alpine lab by Clements, and degradation has been occurring primarily through natural processes. Despite the thousands of visitors to Pikes Peak via the Pikes Peak Toll Road, the Manitou and Pikes Peak Cog Railway, and hiking trails, few people know of the significance of Windy Point in the history of ecological thought. An ecological study in the late 1990s revealed no surviving non-native plants from the garden studies. The same study rekindled the importance of this site to land managers, and highlighted the potential that the site may have for inclusion on the National Register of Historic Places. A floristic survey of the area this year followed by archaeological surveys in the future will spur on these efforts.

**KEY WORDS:** FREDERICK CLEMENTS, PIKES PEAK ALPINE LAB, ALPINE FLORA

**GEOLOGICAL AND CLIMATIC FACTORS IN CLASSIFICATION OF NATURAL AREAS FOR SUSTAINABLE DEVELOPMENT IN HIMALAYAN LANDSCAPE.** A.K.Pachauri.

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A terrain classification system for selection of natural areas is presented from Himalayas. Himalayas are the youngest mountain chain with very high relief that controls the climate of the highly populated Indian subcontinent. The tectonic and geological factors of the mountain and its variety of landscape make it more interesting to seek a method to classify such a terrain for biodiversity and conservation. Natural disaster inventory has been made using facet based classification of terrain in to uniform and homogeneous land units and an example presented from Higher Himalayas of Garhwal. The Natural area classification is based on hierarchical system of terrain classes leading to identification of terrain types.

Geological rock types and relief categories are the main basis of the terrain because of the geodynamic nature of Himalayas which are constantly undergoing a change due to Indian Plate motion. The degree of erosion is directly related to slope types and facets in the terrain as per rock types and fault bounded rock units. The classification is practical and the workable basic unit is called facets, mapped at 1: 50 000 scale for which base topographic maps are available from Government of India as well Indian satellite sources.

**KEY WORDS:** TERRAIN CLASSIFICATION, FACETS, NATURAL AREAS, HIMALAYA

## R- Z

**AN URBAN PARK'S VEGETATION COMMUNITY: IMPACTS BY DEER AND OTHER GUESTS.** Terry Robison, John Mack, Nidia Arguedas, and Charles Thomas. Cleveland Metroparks. <mailto:tlr@clevelandmetroparks.com>.

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The 16 reservations of Cleveland Metroparks form an inter-connected, mostly forested system along the region's river valleys covering over 8500 hectares in two major physiographic regions: the Lake Erie Coastal Plain and the Allegheny Plateau. Reservations range in size from 24 ha to over 1400 ha with each reservation having its own unique features ranging from classic Olmsted designed city parks to larger blocks of Northern

Hardwood, Beech-Maple, and dry-mesic oak forest with embedded wetlands, rivers, meadows, and recreational facilities.

In 2002, the Park District began a vegetation sampling project to document the effects of deer browsing on plant communities, which had become a concern in the early 1990s. By the end of 2009, over 1200 sampling plots will have been measured in the eight largest reservations.

Even before data was collected, the impacts of deer browsing was easily recognized by high browse lines and depauperate understories. As vegetation data has been acquired and analyzed, additional impacts are evident including the growing distribution of invasive plants and the recent recognition that exotic earthworms have been affecting the Park District's natural resources. A description of the status and changes in vegetation structure as related to deer management will be presented. In addition, preliminary information concerning exotic earthworm distribution and impact will be discussed.

**KEY WORDS:** DEER MANAGEMENT, BROWSING, HERBIVORES, FOREST VEGETATION, EARTHWORMS, INVASIVE PLANTS

**PROACTIVE VEGETATION MANAGEMENT AND RESTORATION EFFORTS OF THE ARKANSAS NATURAL HERITAGE COMMISSION.** Bryan Rupar. Arkansas Natural Heritage Commission. [bryan@arkansasheritage.org](mailto:bryan@arkansasheritage.org)

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Many of the lands acquired by the Arkansas Natural Heritage Commission (ANHC) have had negative anthropogenic disturbances such as past land use, fire suppression, and invasive species. The ANHC has taken an aggressive approach to restore ecosystem functions by employing a variety of management techniques. Highlighted project summaries include: Downs Prairie restoration- the physical removal of an abandoned railroad bed which was fragmenting prairie habitat and contained an array of invasive species. Kudzu eradication at Nacatoch Ravines- the rugged terrain of this natural area makes traditional treatment of invasive species difficult, hence aerial herbicide application is used to treat infestations. Red-cockaded Woodpecker habitat restoration at Pine City and Warren Prairie- machinery are used to modify forest understory to restore habitat structure to historic conditions. Glade restoration at Devil's knob, Terre Noire, and Middle fork Barrens—a combination of staff workdays, commercial vendors, and horse-loggers are used in the removal of woody plants from fire-suppressed glades and prairies across the state.

**KEY WORDS:** ECOLOGICAL RESTORATION, INVASIVE SPECIES, HABITAT RESTORATION, VEGETATION MANAGEMENT.

**EFFECTS OF GRASS-SPECIFIC HERBICIDES ON BUTTERFLIES: EXPERIMENTAL INVESTIGATIONS TO ADVANCE CONSERVATION EFFORTS.** Cheryl B. Schultz, Russell and Caitlin Labar. Washington State University Vancouver

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Herbicides are an important tool in managing invasive species in habitats for at least 16 species of at-risk butterflies in the United States. However, herbicide effects on butterflies are virtually unknown. We conducted lab and field investigations of the effects of two widely used grass-specific herbicides on butterflies. In a lab study, we investigated the effects of two graminicides (fluazifop-p-butyl and sethoxydim) on Puget blue, *Icaricia icarioides blackmorei* and cabbage white, *Pieris rapae*, butterflies. The effects on butterfly larvae were assessed by mimicking recommended timing and mixture rates of field applications. Survival of cabbage whites was reduced by 32% with sethoxydim and 21% with fluazifop-p-butyl. Wing size and pupal weights of cabbage whites were reduced by herbicide treatments. Puget blues experienced a 21% reduction in development time from the date of treatment to eclosure. In a field study, we assessed effects of sethoxydim on habitat and demography using Puget blue as a model species. Habitat use of adult silvery blue (*Glaucopsyche lygdamus*), ochre ringlet (*Coenonympha tullia*), and wood nymph (*Cercyonis pegala*) butterflies was also quantified. The results suggest that sethoxydim had very little to no impact on larval survival, flower species, or Puget blue oviposition, but adult butterflies spent significantly less time in sprayed plots than in controls. Given the necessity to control invasive species in butterfly habitats, we recommend several strategies to minimize herbicide effects on butterflies when managing these natural areas.

**KEY WORDS:** BUTTERFLIES, FUSILADE, GRASSLANDS, POAST, PRAIRIES

**BUILDING STEWARDSHIP AND COMMUNITY: A RECORD OF ACHIEVEMENT.** Gary Smith and Catherine Hovanic. Washington Native Plant Society. [yeesmith@comcast.net](mailto:yeesmith@comcast.net); [wnps@wnps.org](http://wnps@wnps.org).

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Engaging the public in the preservation and care of our natural areas is critical to the long term sustainability of our native flora and fauna. The Washington Native Plant Society has supported a NATIVE PLANT STEWARDSHIP PROGRAM since 1996 to recruit and train volunteers from local communities in King, Pierce and Snohomish counties at the heart of Central Puget Sound Region. The free training is offered to all citizens in exchange for a commitment of 100 volunteer hours to community projects. Currently, 439 stewards have completed the training and have reported over 76,400 volunteer hours to public education (13,300 hours), HABITAT RESTORATION (58,600 hours) and native plant advocacy (4,500 hours). The goal of the program is to establish STEWARDSHIP LEADERS as assets to their communities. The success of the training is due to the exceptional instruction provided by

recognized academic, government and practitioner experts that inspires the stewards to give back to their communities. We will discuss the evaluation of the program from individual projects to the team concept developed with the Green Seattle Partnership in 2007 and to a cooperative partnership with five communities in 2009 and 2010. We will offer a series of vignettes to illustrate the kinds of projects completed and COMMUNITY SUCCESSES achieved in parks, schools and green spaces.

**KEY WORDS:** NATIVE PLANT STEWARDSHIP PROGRAM, HABITAT RESTORATION, STEWARDSHIP LEADERS, COMMUNITY SUCCESSES

**RESTORING DEGRADED PRAIRIES AND OAK SAVANNAS IN THE PACIFIC NORTHWEST: RESULTS OF A 5-YEAR, MULTISITE EXPERIMENT.** [Amanda G. Stanley](#)<sup>1</sup>, Peter W. Dunwiddie<sup>2</sup>, Thomas N. Kaye<sup>1</sup>. <sup>1</sup>Institute for Applied Ecology; [amanda@appliedeco.org](mailto:amanda@appliedeco.org); [tom@appliedeco.org](mailto:tom@appliedeco.org). <sup>2</sup>The Nature Conservancy. [pdunwiddie@tnc.org](mailto:pdunwiddie@tnc.org).

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Invasive plants, especially non-native perennial grasses, are a critical threat to remnant prairies and oak savannas in the Pacific Northwest. We evaluated the effectiveness of restoration treatments designed to 1) reduce target exotic weeds with minimal non-target impacts and 2) increase native species diversity and abundance. This collaborative study involved land managers at 10 sites along a 500-km latitudinal gradient from the Willamette Valley, OR to Vancouver Island, BC. We tested native seed addition crossed with four different combinations of disturbance treatments, which included the following elements: grass-specific herbicide (sethoxydim), broad-spectrum herbicide (glyphosate), fire, and mowing. After 4 years, we found that the combination of sethoxydim, burning, and post-fire glyphosate led to reduced abundance of exotic grasses and forbs without causing a decline in native species. Sethoxydim combined with fall mowing reduced exotic grasses and increased native plant abundance. In all cases, disturbance treatments reduced exotic cover to varying degrees but had no positive impact on native diversity; only seed addition increased native species richness. Seed addition also increased cover of native species. Treatment combinations that included fire favored some seeded species, particularly the annual *Plectritis congesta* and perennial forbs *Eriophyllum lanatum* and *Achillea millefolium*. Our results show that restoration of degraded grasslands is most successful when it employs a variety of strategies applied in combination over several years, and where the type, timing, and number of treatments are carefully chosen based on a thorough understanding of limiting conditions, species biology, and grassland ecology.

**KEY WORDS:** PRAIRIE RESTORATION, INVASIVE WEEDS, HERBICIDE, SEED ADDITION, FIRE

**LESSONS LEARNED AMIDST THE LAVA – WHAT A NATURALLY FRAGMENTED LANDSCAPE CAN TELL US ABOUT HUMAN AND NATURAL INFLUENCES ON FORESTS.**

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This paper reviews research at Lava Cast Forest (LCF), a naturally fragmented and isolated landscape in central Oregon. Situated within Newberry National Volcanic Monument, LCF is characterized by kipukas (forested islands) separated by shallow, mid-Holocene lava flows. These remnants of once continuous forest provide local and regional reference conditions for restoration and management of semi-arid coniferous forests. The absence of active management provides the rare opportunity to investigate both the spatial and temporal aspects of forest succession and disturbance regimes (fire, drought, pathogens) over the past 450 years. Our results show that the contemporary forest structure, composition and disturbance regimes at LCF are influenced not only by natural processes, but also by regional and national management policies such as timber extraction and fire suppression that have far-reaching effects on otherwise isolated communities. Research in a natural area such as LCF also presents a number of challenges. Kipukas represent neither islands in the classical biogeographic sense nor fragments resulting from human activities, and thus are best understood using a combination of methodological approaches. Also, kipuka isolation and area may confound the general application of our findings. Nonetheless, we believe the longevity and ecological responses of kipuka plant communities to disturbance and isolation contribute much toward our understanding of forest ecosystems and our ability to conserve and manage natural areas.

**KEY WORDS:** DISTURBANCE, NEWBERRY NATIONAL VOLCANIC MONUMENT, FRAGMENTATION, LANDSCAPE ECOLOGY

**COOPER MOUNTAIN NATURE PARK: LESSONS LEARNED ON MANAGING NATURAL RESOURCES AT THE URBAN INTERFACE.** Adam Stellmacher. Metro Parks and Environmental Services. [adam.stellmacher@oregonmetro.gov](mailto:adam.stellmacher@oregonmetro.gov)

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In 1995 voters in the greater Portland Metropolitan area approved a bond measure to acquire regionally significant natural areas, parks and other greenspaces from willing sellers. Born from these efforts emerged the purchase of nearly 250 acres of land on Cooper Mountain in Washington County, near Beaverton, Oregon. Cooper Mountain's variety of habitats including conifer forests, oak woodlands and native prairies are unique natural resources to

the region. Once acquired, Metro natural resource land management efforts focused on reforestation, control of invasive plant species, resolving inherited encroachment issues and wildfire fuels reduction at the urban interface. Additionally, efforts continue to be focused on the decommissioning of a web of roads and trails contributing to habitat fragmentation and massive soil erosion. The carefully planned use of prescribed fire is employed to reduce accumulated fuels at the urban interface, enhance stands of Oregon White Oak/Pacific Madrone woodlands and reclaim native upland prairie habitat.

**KEY WORDS:** LAND MANAGEMENT, HABITAT RESTORATION, PRESCRIBED FIRE, URBAN INTERFACE.

**RURAL GROWTH COMMUNITY PLANNING AND STRATEGY: CONSERVING LANDSCAPES, STRENGTHENING RURAL ECONOMIES AND ENGAGING COMMUNITY.**  
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In December 2008, Puget Sound Regional Council released new numbers showing rural growth in Western Washington happening twice as fast as planned. In the same month, Puget Sound Partnership released its Action Agenda which stated that protecting rural lands is critical to maintaining and restoring the health and productivity of Puget Sound.

In light of these recent revelations and policy recommendations concerning rural conservation, Cascade Land Conservancy (CLC) has emerged as a leader in community engagement and stakeholder consensus building in an effort to identify a sustainable path forward in community and conservation planning. One of the strategies which CLC has promoted for rural development is Conservation Villages, which calls for using Transfer of Development Rights to cluster development in highly efficient, green designed, compact communities as an alternative to the current pattern of large lot development in the rural zone. CLC presented this policy idea to stakeholders over the last several years through various tours, meetings and conferences as a potential solution to the rapid pace of development in rural areas and a low impact approach for accommodating expected growth.

Mr. Stonington will provide background on CLC's rural growth strategy, including Conservation Villages and CLC's 2009 King County "Walk the Line Tour." The tour followed King County's Urban Growth Boundaries, traveled through our rural zones and explored the implications of population growth and low-impact development on rural landscapes and economies.

**KEY WORDS:** CONSERVATION, RURAL, GROWTH, SUSTAINABILITY, COMMUNITY

**PRESCRIBED BURNING IN STATE PARK PROPERTIES OF NORTH CAROLINA AND NEARBY COASTAL STATES.** John Taggart<sup>1</sup>, Marshall Ellis<sup>2</sup>, and Doug Sprouse<sup>3</sup>. <sup>1</sup>Dept. of Environmental Studies, University of North Carolina Wilmington. [taggartj@uncw.edu](mailto:taggartj@uncw.edu). <sup>2</sup>North Carolina Division of Parks and Recreation, West District Office. [marshall.ellis@ncmail.net](mailto:marshall.ellis@ncmail.net). <sup>3</sup>North Carolina Division of Parks and Recreation, Yorkshire Center. [doug.sprouse@ncmail.net](mailto:doug.sprouse@ncmail.net).

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Prescribed burning has been used by the North Carolina Division of Parks and Recreation (DPR) since 1974 to reduce hazardous fuel loads, restore/maintain specific habitats, and preserve rare species populations within state parks, recreation areas, and natural areas. System-wide staff training, development of burn prescriptions, and burning procedures were mandated according to agency guidelines. During 2002-2008, prescribed burns within state park properties was far less than adequate to maintain fire-dependent communities. The number of hectares treated per year as a percentage of the number needing treatment decreased yearly. In addition to weather conditions, common obstacles to achieving burning goals included conflicts with other responsibilities, lack of trained staff/dedicated funding, and increasing wildland-urban interfaces. Prescribed burning data and associated information from state parks and natural areas in Virginia, South Carolina, Georgia, and Florida indicated that interagency burning agreements, full-time burning staff, and use of contractors have improved burning results significantly in recent years. Prescribed fire councils have served as advocates for prescribed burning at state-wide levels, while prescribed burning legislation has helped to limit smoke and, in some states, fire damage liability. Suggested enhancements for the DPR prescribed burn program include: use of both internal and external burning organizations, development of cooperative agreements with analogous programs, pursuit of earmarked state funds and outside grants, expansion of staff burn training, active participation in prescribed fire advocacy groups, and development of site-specific public information/education to address local concerns and to promote benefits of prescribed burning.

**KEY WORDS:** PRESCRIBED BURNING, STATE PARKS/NATURAL AREAS, BURN TEAMS, WILDLAND-URBAN INTERFACE

**THE USA NATIONAL PHENOLOGY NETWORK: TRACKING THE PULSE OF NATURAL AREAS.** Kathryn A. Thomas and Jake F. Weltzin. USA-National Phenology Network, National Coordinating Office. [Kathryn\\_a\\_thomas@usgs.gov](mailto:Kathryn_a_thomas@usgs.gov); [jweltzin@usgs.gov](mailto:jweltzin@usgs.gov).

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The USA National Phenology Network (NPN) is an emerging and exciting partnership among organizations, scientists, and the public to promote understanding and application of

phenology information. Phenology, the seasonal life cycles of our biotic resources, is a regulator not only of the growth and behavior of plants and animals but of the functioning of ecological communities and their ecosystem services. The National Coordinating Office (NCO) of the USA-NPN ([www.usanpn.org](http://www.usanpn.org)) is establishing a nation-wide phenology monitoring program using standardized protocols for select plants and animals. They provide the information infrastructure and services to compile, maintain and disseminate phenology monitoring data within a National Phenology Database. The NCO facilitates the efforts of other observation networks, including networks of biological field stations, in phenology monitoring. With full development, the monitoring program will encompass ground-based field observations, ground-based observations integrated with climatic instrumentation, and integrated ground and remote sensing observations. The collective efforts of USA-NPN collaborators is sought to provide a much broader understanding of how plant and animal phenology responds to environmental variability and to climate change. The compiled data, their analysis, and resulting value added products can inform land managers scientists and the public on how phenology collectively effects management of natural areas and natural resources.

**KEY WORDS:** PHENOLOGY, USA-NATIONAL PHENOLOGY NETWORK

**ISSUES IN NATURAL RESOURCE MANAGEMENT IN AN URBAN SETTING: RESTON ASSOCIATION, VIRGINIA.** [Claudia Thompson-Deahl](#) and Patricia Greenberg. Reston Association, Reston, VA. [Claudia@reston.org](mailto:Claudia@reston.org).

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Reston, Virginia has 1,350 acres of natural areas spread throughout this planned community. This land is set aside permanently as natural buffers between developed areas and is home to a great variety of plants and animals. Reston is 11 square miles located 25 miles from Washington, DC. We have a population of 62,000 residents. Reston Association provides and protects quality recreational parks and natural areas for the enjoyment of people and wildlife. Reston Association has many opportunities for both passive and active recreation.

There are many issues that we face in trying to manage this land in an environmentally sound manner. This includes co-existing with wildlife, outreach and wildlife counts. Encroachment into the natural areas is a big part of our job since this leads to a spread of invasive exotics and degraded habitat. Reston residents, in partnership with RA, are responsible for protecting an irreplaceable community asset. We have many volunteer opportunities for residents to assist in managing this parkland. Our Reston Association board recently passed a ban on planting 8 invasive exotic species on the homeowner's property. This ban is a new opportunity for us to educate residents about the problems with invasive exotic plants and to reduce the planting of problem species. There are not that many communities in the country that have a plant ban and we are learning how we can best enforce this new resolution. We have a weed-warrior program that removes invasive exotic species from our natural areas. We are currently in the process of implementing a stream restoration project covering 14

miles of stream. We are using a new program called EDDMapS, available on-line, to track the spread and location of invasive exotic plants.

**KEY WORDS:** RESTORATION, URBAN, INVASIVE EXOTIC SPECIES, ENCROACHMENT, WILDLIFE,

**IMAPINVASIVES: A WEB-BASED APPROACH TO INVASIVE SPECIES DATA AGGREGATION, MAPPING, DECISION-MAKING AND ACTION!** Mandy Tu. The Nature Conservancy's Global Invasive Species Team. [physo.carpus@verizon.net](mailto:physo.carpus@verizon.net).

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A crucial part of invasive species prevention, early detection and management is having good location information. The New York Natural Heritage Program, the Florida Natural Areas Inventory, The Nature Conservancy and NatureServe are working together to develop an online, GIS-based mapping tool to assist on-the-ground land managers and others working on invasive species. This national prototype will allow users to enter quality-controlled data online, search and view data, run analyses, and create maps and reports. Learn how MapInvasives serves the needs of those working on invasive species and how you and your partners can participate at a statewide scale.

**KEY WORDS:** INVASIVE SPECIES, MAPPING, DATABASE

**A NOVEL MOTIVATOR FOR ENGAGING PARK NEIGHBORS IN ECOLOGICAL RESTORATION PROJECTS.** Carin E. Vadala<sup>1</sup>, Robert D. Bixler<sup>1</sup>, and Terry L. Robison<sup>2</sup>.  
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Initiating programs that persuade park neighbors to make decisions about changing their property to benefit the local ecosystem requires an understanding of what approaches homeowners will find engaging and most useful. A special park district in Northeast Ohio faces several ecological issues including flooding, erosion, and invasive species. Residents who own property adjacent or near urban park reserves could play a role in reducing the effects of flooding, erosion and invasive plant species by planting or installing rain gardens and/or barrels. This research project sought to understand attitudes of residents about ecological integrity and how they could contribute to reducing ecologically harmful situations in their neighborhoods. Results indicate differences among resident's attitudes and consequently their willingness to participate in urban park reserve's initiatives. Surprisingly, concern for ecological issues in the urban park reserves was weakly related to willingness to install rain gardens and rain barrels. However one worthwhile result was people who

demonstrated an interest in participating in “hands-on activities and hobbies” were significantly more likely to express a willingness to install rain barrels and rain gardens. Park districts could use this information to initiate partnerships with nurseries and begin holding restoration workshops for interested residents. According to the results, the workshops could potentially attract more people by emphasizing that installation of rain gardens and rain barrels are challenging hands-on projects. Thus, to be most effective at convincing residents to alter their property it is important to recognize that non-ecological reasons may play an important role in motivating participation.

**KEY WORDS:** URBAN PARK RESERVES, ECOLOGICAL ISSUES, ECOLOGICAL RESTORATION

**BACK FROM THE BRINK – THE RETURN OF AN EXTIRPATED PLANT TO BC’S WEST COAST.** [Ross Vennesland](#)<sup>1</sup>, Matt Fairbarns<sup>2</sup>, Louise Blight<sup>3</sup>, Danielle Bellefleur<sup>4</sup>, and Philip Lee<sup>1</sup>. <sup>1</sup>Parks Canada Agency, Vancouver, BC. [Ross.Vennesland@pc.gc.ca](mailto:Ross.Vennesland@pc.gc.ca). <sup>2</sup>Aruncus Consulting, Victoria, BC. <sup>3</sup>University of British Columbia, Centre for Applied Conservation Research, Vancouver, BC. <sup>4</sup>Parks Canada Agency, Ucluelet, BC.

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Pink Sand-verbena (*Abronia umbellata*) is a low-growing annual restricted to coastal sand habitats from California to southern BC. In Canada, the species is known from only three sites on the west coast of Vancouver Island. In the past 50 years it has been observed at only one of these sites (Clo-oose Bay in Pacific Rim National Park Reserve), but the last observation there was in 2001.

*Abronia umbellata breviflora* is listed as Endangered in Canada under the *Species at Risk Act*, and has been assessed by NatureServe globally as critically imperilled (T2). The species’ recovery strategy recommends re-introduction of the species at Clo-oose Bay and two other sites.

Occurring on sand beach and dune habitats, this species exists on a geographical edge, wedged between the Pacific Ocean and the coastal rainforest. It also has an edgy existence in Canada, as a peripheral species with an ephemeral existence.

Re-introduction of extirpated species is often costly and sometimes controversial, particularly when it involves peripheral populations. But a taxon at the edge of its range may be particularly important for conservation (e.g., adaptability to more variable environments). We discuss the results of the first two years of our recovery project in the context of these issues. Results have been promising, with high survivorship through the growing season and natural regeneration in the second year. The re-introduction project has been designed as an experiment, with comparisons between dune and beach habitats, seeds versus transplants and fertilized versus unfertilized plants.

**KEY WORDS:** ENDANGERED SPECIES, BOTANY, REINTRODUCTION, HABITAT RESTORATION

**COOPERATIVE ELK CONSERVATION IN RESTORED PLANT COMMUNITIES IN BUFFALO NATIONAL RIVER.** Gary Vequist and Mark Depoy. Natural Resources Stewardship and Science, Midwest Region, National Park Service. [gary\\_vequist@nps.gov](mailto:gary_vequist@nps.gov); [mark\\_depoy@nps.gov](mailto:mark_depoy@nps.gov).

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The Arkansas Game and Fish Commission (AGFC) in cooperation with Buffalo National River (BNR) reintroduced 112 elk during the early 1980s. The introduced herd has flourished, with an extant population of over 500 animals. Elk reintroduction has been successful due to a cooperative partnership between AGFC, BNR, Rocky Mountain Elk Foundation, National Wild Turkey Federation and Quail Unlimited. Cumulatively, these partners collaborated to restore over 10,000 acres of native prairie, woodland and savanna communities, which provides forage and recruitment habitat for elk and numerous wildlife species that are listed as species of conservation concern. Consequently, a viable free-roaming elk herd currently inhabits approximately 150,000 acres of properly functioning native habitat within the Ozark ecoregion.

This collaborative partnership utilized a suite of restoration techniques to convert degraded and fragmented habitat dominated by a closed canopy forest, invaded by exotic vegetation and incapable of supporting robust biodiversity, to a proper functioning and diverse landscape that supports a healthy elk herd. Botanical community restoration was achieved via utilization of prescribed fire, control of exotic plants and reintroduction of native grass, forbs and cool season legumes in open fields. Repeated prescribed fires opened the forest canopy, facilitating the recruitment of warm season grass and forbs, which substantially enhanced herbaceous diversity, providing exemplary habitat for turkey, quail and large ungulates such as elk and deer. Prescribed fire also facilitated recruitment of oaks, hickory and other mast producing trees that provides a staple fall and winter nut crop, relied upon by wildlife. Open-fields dominated by fescue and Bermuda grass were replaced with native prairie grasses and legumes essential to grassland dependant wildlife populations.

**KEY WORDS:** CONSERVATION, RESTORATION, PLANT, COMMUNITIES, ELK, HABITAT

**CONTROLLING JAPANESE BARBERRY: ALTERNATIVE METHODS AND IMPACT ON TICK POPULATIONS.** Jeffrey S. Ward<sup>1</sup>, Scott C. Williams<sup>1</sup>, and Thomas E. Worthley<sup>2</sup>.

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Japanese barberry (*Berberis thunbergii*) is classified as invasive in 20 states and 4 Canadian provinces. It is also established in another 11 states. In addition to forming dense thickets that can inhibit forest regeneration and native herbaceous plant populations, barberry understories can harbor greatly enhanced levels of blacklegged ticks (*Ixodes scapularis*) which transmit the causal agents of several diseases including Lyme disease. Since 2006, a two-step process to control barberry has been examined at eleven sites. Initial treatments (prescribed burning, mechanical mowing with a drum chopper or with a brush saw, and directed heating with a propane torch) were equally effective in reducing clump size and cover, but varied in cost. Effectiveness of follow-up treatments in mid-summer that treated new sprouts (foliar application of triclopyr or glyphosate, and directed heating) varied by initial size of clumps. While more expensive, directed heating was as effective as herbicides for clumps smaller than 120 cm, but less effective for larger clumps. Follow-up treatments of both directed heating and herbicides reduced barberry cover by 94%. Propane torches provide an alternative to herbicides in parks, nature preserves, or forests where herbicide use is restricted. Relative to dense barberry infestations, plots where barberry was controlled had fewer blacklegged ticks, and fewer ticks were infected with the spirochete *Borrelia burgdorferi*, the causal agent of Lyme disease in humans. Thus, controlling Japanese barberry can improve public health by reducing both the number of blacklegged ticks and *B. burgdorferi* infection prevalence of ticks that commonly feed on humans.

**KEY WORDS:** INVASIVE, PROPANE TORCH, HERBICIDE, LYME DISEASE

# Poster Presentation Abstracts

Alphabetical by Presenter's Last Name

## A-K

**VEGETATION OF ANKENBRAND FOREST, WABASH COUNTY, ILLINOIS.** Wade Bloemer<sup>1</sup>, Dane Goble<sup>1</sup>, Mark Alessi<sup>2</sup>, Bob Edgin<sup>3</sup>. <sup>1</sup>Plant Biology, Southern Illinois University. [wblum@siu.edu](mailto:wblum@siu.edu); [mgoble@siu.edu](mailto:mgoble@siu.edu). <sup>2</sup>University of Illinois. [mark.alessi@illinois.gov](mailto:mark.alessi@illinois.gov). <sup>3</sup>Illinois Nature Preserve Commission. [bob.edgin@illinois.gov](mailto:bob.edgin@illinois.gov).

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Ankenbrand forest is a 13-ha (32-acre) forest located along Bonpas Creek in Wabash County, Illinois (N38° 25' 55"; W87° 57' 00"). The overstory (trees  $\geq$  10.0 cm dbh), woody understory ( $\geq$  1 m tall; < 10.0 m dbh) and groundlayer (herbaceous species and woody species < 1.0 m tall) were sampled in July 2009 using nested plots that were randomly located on alternating sides of four transect lines. A total of 27 tree species, including nine *Quercus* (oaks), were encountered in the overstory sampling. Overstory tree density averaged 328 trees/ha with a basal area of 32.477 m<sup>2</sup>/ha. *Carya ovata* (shagbark hickory) had the highest importance value at (28.4 out of 100.0), followed by *Quercus alba* (white oak) (9.6), *Carya tomentosa* (mockernut hickory) (9.4) and *Quercus palustris* (pin oak) (6.2). Eighteen trees or shrubs averaging 1,885 stems/ha were encountered in the understory sampling. *Asimina triloba* (pawpaw) was the most abundant averaging 1,040 stems/ha followed by *Celtis occidentalis* (hackberry) (305 stems/ha) and *Virburnum prunifolium* (black haw) (305 stems/ha). A total of 51 species were encountered in the groundlayer sampling. *Toxicodendron radicans* (poison ivy) had the highest importance value (18.6 out of 100.0) followed by *Lysimachia nummularia* (moneywort) (16.7), *Aster lateriflorus* (side-flowered aster) (8.6) and *Viola pubescens* (smooth yellow violet) (7.0). *Lysimachia nummularia* was the non-native species observed during the study.

**KEY WORDS:** FOREST, WABASH, FLOODPLAIN

**WETLAND PHALARIS ARUNDINACEA ABUNDANCE AS A FUNCTION OF WATERSHED SOIL AND LAND COVER ATTRIBUTES.** Nina Borchowiec and Amanda Little. Biology Department, University of Wisconsin-Stout. [borchowiecn@uwstout.edu](mailto:borchowiecn@uwstout.edu); [littlea@uwstout.edu](mailto:littlea@uwstout.edu).

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*P. arundinacea* is a weed that grows invasively across North America. It suppresses native vegetation, ultimately reducing ecological diversity. Knowing how *P. arundinacea* responds to landscape attributes will help determine how to monitor and manage it. We related *P. arundinacea* abundance from a statewide data layer created by the Wisconsin Department of Natural Resources. ArcGIS 9.2 was used to calculate the proportions of different soil surface textures, drainage classes, and land-cover types in each watershed to determine NRCS 12-digit watershed characteristics that influenced the abundance of *P. arundinacea* in wetlands of the Lower Chippewa River Watershed, Wisconsin, USA.

To reduce the number of covarying attributes, we used non-metric multidimensional scaling to create composite variables. We used multiple linear regression to relate these variables to wetland *P. arundinacea* abundance, as a percentage of wetland land cover dominated by *P. arundinacea*.

One surface texture and one drainage class variable predicted *P. arundinacea* abundance ( $\log(y) = 1.23 + 0.467\text{drainvar1} - 0.166\text{surftexvar2}$ ,  $R^2 = 29.5\%$ ,  $P < 0.001$ ). Synthetic land cover variables were not significant predictors. Relationships between individual predictors and synthetic variables indicate that *P. arundinacea* is more abundant in wetland watersheds with more wetland-type muck soils and less abundant with substantial open water. These findings indicate that agriculture may not be a strong driver of *P. arundinacea* abundance at the watershed level. *P. arundinacea* is not found in watersheds with somewhat excessively drained fine sandy loam, although it's uncertain whether this is a function of the soil properties or associated topographic constraints.

**KEYWORDS:** PHALARIS ARUNDINACEA, WATERSHED, SOIL, LAND COVER

**ASSESSING PRAIRIE MANAGEMENT FOR GEORGE WASHINGTON CARVER NATIONAL MONUMENT: CONTROL OF INVASIVE SPECIES AND INDICATOR SPECIES ON RESTORED PRAIRIE UNITS** [Michael P. Burfield](mailto:michael.p.burfield@mizzou.edu) and Charles H. Nilon. Department of Fisheries and Wildlife, University of Missouri. <mailto:mbrkb@mizzou.edu>; <mailto:nilonc@missouri.edu>.

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In 1981, the administrators at the George Washington Carver National Monument in Diamond, Missouri implemented a Prairie Restoration Action plan designed to restore, protect, and maintain historic native prairie in the park. Since then, multiple restoration plans have been developed. The goal of this project is to develop and evaluate prairie management recommendations for the Monument, develop land management guidelines for GWCNM rangers and maintenance staff, and assist the park in implementing its stewardship and conservation goals that are highlighted in the park's Centennial Strategy. In addition, we intend to create a streamlined approach to management by combining effective aspects of

five previous plans and to present prairie management and monitoring methods that can be carried out efficiently by the non-natural resources personnel at the park. Finally, habitat suitability models and occupancy data for Henslow's sparrows (*Ammodramus henslowii*), ornate box turtles (*Terrapine ornata ornata*), northern bobwhite quail (*Colinus virginianus*), and prairie voles (*Microtus ochrogaster*) will be used to evaluate habitat quality in the restoration process. The project is expected to be completed in fall 2010.

**KEY WORDS:** PRAIRIE RESTORATION, HABITAT SUITABILITY, INDICATOR SPECIES, INVASIVE SPECIES, GEORGE WASHINGTON CARVER NATIONAL MONUMENT

**OUT WITH THE OLD, IN WITH THE NEW: GAINING ACCURATE POPULATION ASSESSMENTS FOR A COLORADO ENDEMIC, *Penstemon harringtonii*** Penland, [Carol Dawson](#), Peter Gordon, and Carla DeYoung. Bureau of Land Management, Colorado. [Carol\\_Dawson@blm.gov](#); [Peter\\_Gordon@blm.gov](#); [Carla\\_DeYoung@blm.gov](#).

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*Penstemon harringtonii* is endemic to the sagebrush steppe of western Colorado. Its range spans 82 by 48 miles and includes 74 occurrences. Outside of data presented here, no robust quantification of *P. harringtonii* populations exist & previous management decisions relied upon small-scale counts and qualitative data. The aim of this project is to use statistically sound techniques giving a better understanding of the status of this species. Since 2006, the Bureau of Land Management has investigated *P. harringtonii* numbers through simple random sampling using a grid-cell method. To date, ten occurrences have been visited with significant results being found at each. The Meyer Gulch population (approximately 400 acres) previously estimated at 4,144-5,144 individuals was found to have 4,166 individuals in one 40x60m plot. Similarly, a 40x60m plot at Sheep Creek Mesa was found to have 3000 individuals. This number was previously estimated for the entire population covering 160-200 acres. These results suggest that population sizes have been grossly underestimated by techniques used in the past. Management decisions based on the threat level to this species are valid, but it is also crucial to take accurate population size assessments into consideration. Without this data true population trends will remain unknown. Further investigation using robust population measurement techniques implemented by the BLM may continue to show that this species is more abundant than previously thought. This information is vital to land managers working within *P. harringtonii*'s range and also to those charged with deciding the appropriate protection status for this species.

**KEY WORDS:** *PENSTEMON HARRINGTONII*, HARRINGTON'S BEARDTONGUE, MONITORING TECHNIQUES, POPULATION ASSESSMENT

**GERMINATION STUDIES TO EXAMINE THE SEED ECOLOGY OF *LUPINUS LEPIDUS* VAR. *LEPIDUS*, *LUPINUS POLYPHYLLUS* AND *LUPINUS ALBICAULIS* (FABACEAE).**

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Long range plans for the conservation and restoration of south Puget Sound Prairies, Washington, USA have highlighted the need to test the germination requirements of native taxa by methods that simulate natural conditions in order to create baseline data for long term re-introduction of native plants. Our study set out to examine the importance climate, seasonal weather conditions and anthropogenic fire events as possible germination cues for three native Lupinus species of prairie and oak savannah plant communities. A full-factorial design was used to measure germination rate response to temperature changes during the summer seed dormancy period, to temperature fluctuations leading to germination in fall or spring and the interaction of these factors.

Fresh seed of each species exhibited physical dormancy. For Lupinus polyphyllus and Lupinus albicaulis, data confirm the findings of previous studies with temperate legumes that suggest the sequence of chilling below 5° C for six weeks followed by cool diurnally alternating temperatures is an important environmental cue to promote germination of physically dormant seeds during favorable early spring conditions. However; the data also suggest high interspecific variation in germination response within Lupinus. The seed of Lupinus species may be influenced a number of naturally variable environmental conditions in both the developmental phase of physical dormancy and in promoting germination during favorable conditions. Approaches that recognize this variation may more effectively harvest, store and germinate these species which are important for the restoration of Pacific Northwest prairies.

**KEYWORDS:** LUPINUS ALBICAULIS, LUPINUS LEPIDUS, LUPINUS POLYPHYLLUS, PHYSICAL DORMANCY, SOUTH PUGET SOUND PRAIRIE

**A MICROHABITAT ANALYSIS OF JAPANESE HOPS (*HUMULUS JAPONICUS*) AND JAPANESE STILTGRASS (*MICROSTEGIUM VIMENIUM*) IN A RIPARIAN ECOSYSTEM**

**ALONG HUTCHINS CREEK IN UNION COUNTY, ILLINOIS.** [Derek Evans](mailto:daevans@siu.edu)<sup>1</sup> and Mame Redwood<sup>2</sup>. <sup>1</sup>Department of Forestry, Southern Illinois University, Carbondale, IL 62901. [daevans@siu.edu](mailto:daevans@siu.edu); <sup>2</sup>Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901. [redwood@siu.edu](mailto:redwood@siu.edu).

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The goal of this study was to analyze microhabitats of Japanese hops (*Humulus japonicus*) and Japanese stiltgrass (*Microstegium vimineum*) in a riparian ecosystem to determine if their presence could be related to any landscape variables. Japanese hops and Japanese

stiltgrass are both invasive species that are spread by water and native to eastern Asia. Independent variables, such as slope, aspect, and canopy cover, were compared to percent cover of the target species within 86 1m<sup>2</sup> plots along Hutchins Creek in Trail of Tears State Forest located in Union County, IL. There was no correlation between slope and percent cover of both species. Furthermore, aspect among the three sites had little variability. Most aspects were southern facing. The percent cover of Japanese stiltgrass showed a significant positive relationship with percent canopy cover ( $r=0.214$ ,  $p=0.048$ ) demonstrating that Japanese stiltgrass may be tolerable to shade. Japanese stiltgrass cover was also highest 3 to 6 meters from the stream. This could be due to seed dispersal via flooding into shaded areas along the stream. The percent cover of Japanese hops showed a highly significant negative relationship with percent canopy cover ( $r=-0.435$ ,  $p<0.0001$ ) indicating that Japanese hops may be relatively intolerable to shade. Japanese hops cover also decreased with increased distance from the stream, which is likely due to its mode of dispersal via overbank flow.

**KEYWORDS:** JAPANESE HOPS, *HUMULUS JAPONICAS*, JAPANESE STILT GRASS, *MICROSTEGIUM VIMENIUM*, RIPARIAN

**LONG TERM TREATMENT EFFECTS OF MECHANICAL AND PRESCRIBED FIRE TREATMENTS FOLLOWING CLEARCUTTING OF JACK PINE (*PINUS BANKSIANA*) ON HERBACEOUS PLANTS AND REGENERATION.** [Michelle Latsch Freeman](#)<sup>1</sup>, Andrew J. Storer<sup>1</sup>, and Ryan DeSantis<sup>2</sup>. <sup>1</sup>School of Forest Resources and Environmental Science, Michigan Technological University. [mfreeman@mtu.edu](mailto:mfreeman@mtu.edu); [storer@mtu.edu](mailto:storer@mtu.edu). <sup>2</sup>Department of Natural Resource Ecology and Management, Oklahoma State University. [ryan.desantis@okstate.edu](mailto:ryan.desantis@okstate.edu).

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Jack pine (*Pinus banksiana*) regeneration is optimized when the serotinous cones are opened by heat to release seeds, and bare mineral soil is available for seedling development. Fire is the optimal way to achieve this, but fire has been suppressed for over 100 years in the Great Lakes region. As a result, jack pine populations have decreased in the region. This study utilized prescribed burning and scarification techniques as treatments for regenerating jack pine after a harvest. After 4 years post-treatment, we found an herbaceous layer community shift and a lack of jack pine regeneration within the treatment areas. We have been able to follow the shifting of species from 2004 to present and postulate reasons for the shift. Preliminary results indicate greatest success of regeneration in control and scarification areas while vegetation was significantly impacted throughout all the treatment areas.

**KEY WORDS:** JACK PINE, REGENERATION, PRESCRIBED BURNING

**PLANT COMMUNITY SHIFTS IN ACTIVE DUNE AREAS INVADED BY SPOTTED KNAPWEED (*CENTAUREA MACULOSA*) IN PICTURED ROCKS NATIONAL LAKESHORE.** Michelle Latsch Freeman and Andrew J. Storer. School of Forest Resources and Environmental Science, Michigan Technological University. [mfreeman@mtu.edu](mailto:mfreeman@mtu.edu); [storer@mtu.edu](mailto:storer@mtu.edu).

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Active lacustrine sand dunes are a rare ecosystem and stabilizing agents such as invasive plants threaten their existence. This study compares vegetation areas of no, low, and high infestations of spotted knapweed (*Centaurea maculosa*) in active dune areas of Pictured Rocks National Lakeshore in the Upper Peninsula of Michigan. We found a transition in vegetation that suggests a plant community shift to stabilizing plants, which will eventually cause the active dunes to become stable dunes, thus endangering the active dune ecosystem itself. Preliminary results show populations of native dune species decrease as spotted knapweed establishes populations in an active dune area.

**KEY WORDS:** DUNES, INVASIVE SPECIES, NATIVE PLANT SHIFT

**CHALLENGE COST SHARE FUNDS PROVIDE PARTNERS, PROSPERITY AND PUNCH TO THE NATIONAL NATURAL LANDMARKS PROGRAM.** Stephen T. Gibbons and Allen McCoy. National Park Service. [steve\\_gibbons@nps.gov](mailto:steve_gibbons@nps.gov); [allen\\_mccoy@nps.gov](mailto:allen_mccoy@nps.gov).

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The Challenge Cost Share Program (CCSP) was established in 1992 to support increased participation by neighboring communities and qualified partners in the preservation and improvement of National Park Service natural, cultural, and recreational resources. Not only is the program geared toward the potential benefit of park resources but just as importantly, the Challenge Cost Share Program includes all other authorized National Park Service programs and activities, both inside or outside park lands. As such, the Challenge Cost Share Program has provided a natural bridge or entrée if you will for supporting public and private (e.g. non-Federal) stewardship activities within National Natural Landmarks (NNLs) throughout the United States and even our U.S. Territories. This uncanny marriage between a fund source and a nationally recognized program has resulted in a renewed sense of identity and a source of inspiration for National Natural Landmark owners and managers but especially for the American public.

**KEY WORDS:** NNL, LANDMARKS, CHALLENGE, PARTNERS, PUBLIC

## **THE USE OF THE HISTORICAL RECORD AND GRAPHICAL INFORMATION SYSTEMS TO GENERATE A SUITABILITY MAP FOR PRAIRIE RESTORATION IN MISSISSIPPI.**

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An exhaustive search of General Land Office records was conducted with a goal of identifying the historic locations of prairies in the Jackson Prairie Belt region of Mississippi. These records include surveys of township and section lines made by government surveyors following tribal land cessions in the early 19<sup>th</sup> century. Over 200 precise locations of entry and exit points of Jackson Belt prairie patches were found and transcribed into a spreadsheet. The points were converted to x and y coordinates in ArcMap, and a tool was created which automated this process. The final product in GIS is a series of lines representing land along section lines where the surveyor was walking through prairie. This map was compared to one created and published by John Barone by digitizing plat maps from the same era. Patches not included in the plat maps are evident. Adding layers generated from data provided by the Mississippi Natural Heritage Foundation and the United States Forest Service has resulted in the most comprehensive GIS map of Jackson Belt Prairie ever created. Converting the vector files to raster grids will enable us to conduct statistical operations in order to generate suitability maps for prairie restoration in the Jackson Belt. The proposed presentation will cover this methodology and the results of the statistical analysis.

**KEYWORDS:** GLO RECORDS, JACKSON BELT, PRAIRIE, SUITABILITY MAPS

**EIGHT PROHIBITED INVASIVE EXOTIC PLANTS IN RESTON, VA.** Patricia Greenberg, Claudia Thompson-Deahl. Reston Association. [Patricia@reston.org](mailto:Patricia@reston.org); [Claudia@reston.org](mailto:Claudia@reston.org).

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In May of 2008 the Reston Association (RA) approved a resolution banning 8 invasive exotic plants from being planted on homeowner property. The Reston Association is the governing body of Reston, VA. Reston is a large planned community of 62,000 residents and encompasses 11 square miles, located 25 miles from Washington, DC. The Environmental Advisory Committee advises the Reston Association Board of Directors. This committee worked with the RA staff to develop a list of 8 of the most common landscape yard escapees that overwhelm the natural areas. Our natural areas are spread throughout Reston, in fact the motto of Reston is: "Living in Reston is like living in a Park."

The 8 species are:

- Flowering Pears, *Pyrus calleryana* cultivars

- Exotic Bamboos, Bambusa species
- Winged Burning Bush, Euonymus alata
- Oriental Bittersweet Celastrus orbiculatus
- Chinese and Japanese Wisteria, Wisteria sinensis/Wisteria floribunda
- Bush Honeysuckles, Non-native Lonicera species
- Japanese Barberry, Berberis thunbergii
- English Ivy, Hedera helix

We have chosen these species because they decrease biodiversity and harm the wildlife that depend on native plants for food and shelter. They were chosen because they are commonly sold in the nurseries and spread from neighboring property. Many invasive exotics overtake native shrubs and trees that are a signature of the Reston community.

Due to this ban, when a homeowner tried to have one of these plants installed, the landscape company informed them that they were not allowed to use the banned plant in the landscape. We have also seen an increase in the availability of native varieties in local nurseries. This is a recent ban and we have had limited experience in the enforcement of this resolution. Enforcement will be a challenge.

**KEY WORDS:** INVASIVE EXOTIC SPECIES, NATURAL AREAS, BIODIVERSITY, 8 BANNED PLANTS, HOMEOWNERS ASSOCIATION

**WETLAND CREATION IN THE NORTHERN INDIAN RIVER LAGOON: A RESPONSE TO SEA LEVEL RISE ASSOCIATED WITH GLOBAL CLIMATE CHANGE.** Todd Jones, Jonathan Linder, and Jacqueline Vaughn. Department of Marine and Environmental Systems Florida Institute of Technology. [jones2008@fit.edu](mailto:jones2008@fit.edu), [jlinder2008@fit.edu](mailto:jlinder2008@fit.edu), [jvaughn2008@fit.edu](mailto:jvaughn2008@fit.edu)

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According to the Intergovernmental Panel on Climate Change, global temperature will increase by as much as 6.4 C by the year 2100. This change in temperature will result in up to 1.4 meters of sea level rise, impacting coastal wetlands around the world. One such area is 400 acres of salt marsh along the Indian River Lagoon in Florida, between Big Flounder Creek and the Brevard-Volusia County line. The area land use is currently designated agricultural and protected lands which are ideal for future mitigation. In addition to the protected lands, 405 additional acres would be purchased to create a buffer between the current wetlands and the future land/water interface zone. Not only will this prevent future human development in the region, but taking early action will also provide the opportunity for natural recruitment of the species that inhabit this ecosystem. The land along the creeks and ditches will be cleared and graded to provide flora and fauna the opportunity of colonizing the

new lands prior to sea level rise. This inland creation of wetlands will help support natural migration and mitigate future sea level rise impacts to the area.

**KEY WORDS:** CLIMATE CHANGE, SEA LEVEL RISE, COASTAL WETLANDS, MITIGATION

## L-Z

**A METHOD FOR ASSESSING THE ECOLOGICAL CONDITION OF ARMY LANDS USING A FLORISTIC QUALITY INDEX.** Bruce MacAllister<sup>1</sup>, Sarah Nemeth<sup>1</sup>, Alan B. Anderson<sup>1</sup>, Heidi Howard<sup>1</sup>, and Malcolm McLeod<sup>2</sup>. <sup>1</sup>US Army Engineer Research and Development Center Construction Engineering Research Laboratory. [bruce.a.macallister@usace.army.mil](mailto:bruce.a.macallister@usace.army.mil); [sarah.b.nemeth@usace.army.mil](mailto:sarah.b.nemeth@usace.army.mil); [alan.b.anderson@usace.army.mil](mailto:alan.b.anderson@usace.army.mil); [heidi.r.howard@usace.army.mil](mailto:heidi.r.howard@usace.army.mil). <sup>2</sup>Headquarters, US Army Corps of Engineers, Washington DC. [malcolm.e.mcleod@usace.army.mil](mailto:malcolm.e.mcleod@usace.army.mil).

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A floristic quality assessment, based on species conservatism, is a relatively easy and quick tool one can use to determine the ecological condition of a site. Species conservatism is the extent to which an individual species is likely found in areas relatively unchanged from pre-European settlement conditions. As such, the floristic quality assessment measures the level of “naturalness” of an area. The identifying characteristic of a highly conservative site is, therefore, dependent on the number of species that reflect the characteristics found in pre-European settlement conditions, thus distinguishing between the concepts of conservatism and rarity.

Floristic quality assessments have several useful applications. They can be used to: 1) determine the degree of “naturalness” of a site, 2) evaluate protective measures undertaken for a particular site, 3) evaluate restoration activities of a particular site, and 4) make comparisons among various sites.

Floristic Quality Assessments can be conducted easily by a competent botanist without the need for elaborate sampling equipment or, alternatively, can be calculated with existing data sets. For our purposes, the Land Condition Trend Analysis (LCTA) data sets from Fort Riley, KS were used. Results of the assessment are outlined in the presentation.

**KEY WORDS:** FLORISTIC QUALITY INDEX, RELATIVE NATURALNESS, ASSESSMENT TOOL, SPECIES CONSERVATISM, C VALUES.

**IMPROVING SCIENCE LITERACY THROUGH VISUAL COMMUNICATIONS.** Mary McFadzen and Melissa Brown. Center for Invasive Plant Management, Montana State University. [mmcfadzen@montana.edu](mailto:mmcfadzen@montana.edu); [melissab@montana.edu](mailto:melissab@montana.edu).

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Communicating science effectively to diverse audiences has broad implications for implementing science-based solutions to environmental problems such as those associated with non-native species invasions. If audiences are able to understand and assess scientific information, they are more likely to make decisions based on facts rather than on hearsay or speculation. Frequently, popular press articles on invasive species are designed to promote fear-based responses. Published works in peer-reviewed journals oppose using fear to motivate behavioral change. One author suggests that the use of militaristic and combative language as metaphors often leads to an inaccurate perception of invasive species and loss of scientific credibility, which can be counterproductive to achieving conservation and management goals. Researchers and practitioners should strive to present science-based information in a way that helps improve the science literacy of their audiences. This poster presents examples of how visual design strategies and learning theory can be used to engage audiences and communicate science effectively.

**KEY WORDS:** SCIENCE LITERACY, INVASIVE SPECIES, COMMUNICATIONS

**EVALUATION OF MIST BLOWER APPLICATION OF GLYPHOSATE IN THE TREATMENT OF *LONICERA SPP.* IN A NON-SENSITIVE NATURAL AREA.** Radonna McKinney<sup>1</sup>, Kimberly Elsenbroek<sup>2</sup>, Loretta Battaglia<sup>2</sup>, Sara Baer<sup>2</sup>, Roger Jansen<sup>3</sup>.

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The objective of this study was to eradicate *Lonicera spp* (bush honeysuckle) in a black locust tree planting in Illinois. The study area was located at Hidden Springs State Forest in Shelby County. The area was deemed non-sensitive because the understory primarily consisted of exotic plant species. We used a randomized complete block design to evaluate the effectiveness of different concentrations of glyphosate on percent kill of bush honeysuckle. In each block, glyphosate was applied at 1%, 2% and 4% active ingredient and no glyphosate was applied to areas assigned as untreated controls. Glyphosate was applied using an ATV mounted mist blower driven at ~2 mph. Six weeks following treatment, the numbers of dead versus live stems of the focal species were recorded at six meters into each

plot. Preliminary results indicate that higher concentrations of glyphosate were more effective at controlling *Lonicera spp.* than lower concentrations. The 1% and 2% solutions had a kill rate of 2.4% and 6.6% respectively, while the 4% solution killed *Lonicera spp.* at a rate of 17.9%. The 4% solution of glyphosate was 2.7 times more effective than the reduced solution of 2% and 7.4 times more effective than the 1% solution. We suggest that use of a mist blower is a time saving way to treat large infestations of this invasive woody species in non-sensitive natural areas.

**KEY WORDS:** MIST BLOWER, INVASIVE SPECIES, BUSH HONEYSUCKLE, GLYPHOSATE, NATURAL AREAS

**EFFECTS OF MOWING, CHOPPING, AND FIRE ON RESTORATION OF OVERGROWN FLORIDA SCRUB VEGETATION.** Eric S. Menges<sup>1</sup>, Carl W. Weekley<sup>1</sup>, Marcia A. Rickey<sup>2</sup>, Gretel L. Clarke<sup>3</sup>, and Stacy A. Smith<sup>1</sup>. <sup>1</sup>Archbold Biological Station. [emenges@archbold-station.org](mailto:emenges@archbold-station.org); [cweekley@archbold-station.org](mailto:cweekley@archbold-station.org); [ssmith@archbold-station.org](mailto:ssmith@archbold-station.org). <sup>2</sup>Boulder County Parks and Open Space. [rickeymarcia@hotmail.com](mailto:rickeymarcia@hotmail.com). <sup>3</sup>Dept. of Biology, University of Vermont. [gretelclarke@gmail.com](mailto:gretelclarke@gmail.com).

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Due to the challenges of prescribed burning (e.g. escapes, smoke), mechanical pre-treatments or substitutes for fire are often used in management and restoration, but with little study of ecological effects. In Florida scrub, an ecosystem rich in endangered species, we evaluated two five year, large-scale field experiments: mowing with a Brown tree-cutter (Mow & Burn), and chopping with a GyroTrac (Chop & Burn), each with and without subsequent fire. The goals included reducing woody cover, increasing bare sand and rare plant abundances, and decreasing litter.

In the Mow & Burn experiment, burning was more effective and persistent than mowing alone in reducing woody cover, increasing bare sand and decreasing litter depth and cover. The burn-only treatment was most successful in increasing rare species abundances.

In the Chop & Burn experiment, burning (with or without prior chopping) was more effective than chopping alone in achieving conservation goals. While all three non-control treatments reduced woody cover, only the burn treatments increased bare sand and reduced litter cover, outcomes favorable for rare herb recruitment. Rare plant responses to treatments, however, were variable.

In these experiments, burning alone accomplished key conservation objectives, while mechanical treatments alone failed to do so. Thus, fire without mechanical pre-treatment is the recommended restoration method for Florida scrub. If a mechanical treatment is used, it should be a pre-treatment, not a surrogate, for fire. Managers need to monitor treatments and responses vigilantly, with a particular eye towards impacts on rare plants and exotic species invasions.

**KEY WORDS:** FIRE MANAGEMENT, MECHANICAL TREATMENTS, RESTORATION METHODS, RARE PLANT MANAGEMENT, FLORIDA SCRUB

**ESTABLISHING A SHOREBIRD CONSERVATION WORKING GROUP IN THE TENNESSEE RIVER VALLEY: A PROJECT EVALUATION.** Jason M. Mitchell. Land and Water Stewardship, Tennessee Valley Authority. [jmmitchell@tva.gov](mailto:jmmitchell@tva.gov).

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Shorebird populations have declined significantly in the U.S. Shorebirds depend on inland stopover sites to meet the energetic demands of migration. Mudflats exposed by seasonal drawdowns of TVA reservoirs provide important habitat for thousands of migratory shorebirds. In 2004, TVA altered the drawdown schedule on several reservoirs to maximize public recreation benefits. Concern regarding potential impacts to shorebird populations led TVA to establish a five-year working group comprised of federal and state agencies, non-governmental organizations, and volunteers to learn more about shorebird resources in the Tennessee River Valley (TRV).

In 2009, the working group was evaluated to determine the project's effectiveness and to identify improvements for similar future initiatives. Project accomplishments include over 2000 hours of shorebird monitoring (3639 surveys at 127 sites), resulting in the largest shorebird monitoring effort ever undertaken in the TRV. TVA leveraged 94K in associated cost sharing projects and 47K from in-kind and volunteer support. Additionally, several associated research projects were completed. In an online questionnaire, all working group members indicated that they were satisfied with the results of this initiative and all felt that the group should continue beyond its original five-year mission. Establishment of an interagency working group provides an example of how agencies can successfully collaborate to answer ecological questions for policy decisions and achieve collective goals, and how similar initiatives could strengthen interagency and public interaction.

**KEY WORDS:** SHOREBIRDS, WORKING GROUP, COLLABORATION

**RNA INVENTORY AND ECOLOGICAL REPRESENTATIVENESS: THE SOUTHWESTERN REGION PROCESS FOR DETERMINING NEED FOR ADDITIONAL RNAS.** Rosemary Pendleton<sup>2</sup>, Richard Periman<sup>1</sup>, Charlie McDonald<sup>1</sup>, Todd Mowrer<sup>2</sup>, Paula Cote<sup>3</sup>, Jennifer Kevil<sup>4</sup>, Roxanne Turley<sup>5</sup>, Kathleen Hawkos<sup>1</sup>, Amy Unthank<sup>1</sup>, and Jack Triepke<sup>1</sup>. <sup>1</sup>US Forest Service, Region 3 Regional Office. [rperiman@fs.fed.us](mailto:rperiman@fs.fed.us); [cbmcdonald@fs.fed.us](mailto:cbmcdonald@fs.fed.us); [khawkos@fs.fed.us](mailto:khawkos@fs.fed.us); [aunthank@fs.fed.us](mailto:aunthank@fs.fed.us); [jtriepke@fs.fed.us](mailto:jtriepke@fs.fed.us). <sup>2</sup>US Forest Service, Rocky Mountain Research Station. [tmowrer@fs.fed.us](mailto:tmowrer@fs.fed.us); [rpandleton@fs.fed.us](mailto:rpandleton@fs.fed.us). <sup>3</sup>US Forest Service, Carson National Forest. [pcote@fs.fed.us](mailto:pcote@fs.fed.us). <sup>4</sup>US

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All of the forests in the Southwestern Region of the U.S. Forest Service are conducting resource management plan revisions. To support the identification of new RNAs to include in revised plans, we conducted a region-wide coarse-filter assessment of RNA ecological representation to identify ecosystems and vegetation types that are underrepresented among the Region's currently established RNAs. We first examined existing Forest Plans, RNA GIS files, and RNA establishment records. Records were reviewed and organized by Forest. Following the inventory, the distribution of existing RNAs and other protected lands, inside and outside the agency, were compared with the distribution of PNVT classes (general ecosystem types), ecological sections, and Terrestrial Ecological Unit Inventory (TEUI) climate gradients (Winthers et al. 2005). The objective of this effort was to support an effective ecological distribution of RNAs across major climate gradients, biophysical settings (PNVTs), and to some extent, across important vegetation types within life zones. A simultaneous effort was made to consider the geographic distribution of RNAs across ecological sections and subsections of the region. In the process, we considered the distribution of biophysical settings across other reserve designations (e.g., wilderness) to help prioritize the establishment of additional RNAs. This prioritization process provides a model that may be useful for other agencies or Forest Service Regions in determining vegetation types that are currently underrepresented in their respective Natural Areas programs.

**KEYWORDS:** RESEARCH NATURAL AREAS, VEGETATION TYPES, REPRESENTATION, FOREST SERVICE, ASSESSMENT

**MYCORRHIZAL COMMUNITY STRUCTURE: IMPLICATIONS FOR RESTORATION AND INVASION.** Wendy S. Phillips<sup>1</sup>, Eric W. Seabloom<sup>1</sup> and Deborah L. Clark<sup>2</sup>. <sup>1</sup>Department of Zoology, Oregon State University. [phillipw@science.oregonstate.edu](mailto:phillipw@science.oregonstate.edu); [seabloom@oregonstate.edu](mailto:seabloom@oregonstate.edu). <sup>2</sup>Department of Botany and Plant Pathology, Oregon State University. [deborah.clark@oregonstate.edu](mailto:deborah.clark@oregonstate.edu).

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Effective conservation of our natural areas requires an understanding of how native and exotic species interact directly (e.g. competition for resources or space) and indirectly (through shared enemies and mutualists). Indirect interactions mediated by mutualistic arbuscular mycorrhizal fungi (AMF) could play a large role in the ability of an invading exotic or restored native species to spread through the system. The nature of AMF's role will depend on the degree to which AMF are host specialists or generalists. Although both the plant and AMF partners have long been considered generalists, recent research casts doubt on this axiom. We amplified and sequenced the AMF community in 8 common prairie plant

species at a remnant bunchgrass prairie, Kingston Prairie Preserve, in Oregon. Phylogenetic analysis revealed at least 30 AMF, twice as many as has been found in previous studies of grassland systems. The greater richness is likely due to our sampling of a larger number of plant species than in previous studies. BLAST searches indicate that the majority of our sequences, though falling soundly within the AMF group, are too dissimilar to the approximately 200 described AMF species to be considered one of those species. Furthermore, multivariate analysis showed strong evidence for non-random association between host plant species and root AMF communities. Effective use of AMF as a conservation tool will require greater knowledge of the diversity of AMF in natural ecosystems and the generality with which they associate with host plants.

**KEY WORDS:** ARBUSCULAR MYCORRHIZAL FUNGI, SPECIFICITY, COMMUNITY STRUCTURE, PRAIRIE

**A STUDY OF *ELAEAGANS UMBELLATA* DISPERSAL BASED ON THE AGES AND RELATIVE LOCATIONS OF INDIVIDUALS IN A STAND.** Mame Redwood<sup>1</sup>, Derek Evans<sup>2</sup>, Chris Evans<sup>3</sup>, David J. Gibson<sup>1</sup>. <sup>1</sup>Department of Plant Biology, Center for Ecology, Southern Illinois University. [redwood@siu.edu](mailto:redwood@siu.edu); [daevans@siu.edu](mailto:daevans@siu.edu). <sup>2</sup>Department of Forestry Southern Illinois University. <sup>3</sup> River to River Cooperative Weed Management Area. [rivertoriver@gmail.com](mailto:rivertoriver@gmail.com).

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This study examines the spread of the invasive species *Elaeagans umbellata* (Autumn Olive) based on the ages and relative locations of 76 individuals in a 2.95 hectare stand. All individuals of *E. umbellata* in the stand were mapped using GPS in a 20 meter grid with locations subsequently mapped using ESRI ArcGIS. The locations of younger individuals were compared to locations of older individuals to examine dispersal routes and test the null hypotheses that age was homogenous across the stand. The age and diameter of each individual was recorded to allow investigation of the age-to-diameter ratio. Analysis of the ages and diameters showed no consistent age: diameter ratio. Analysis of the relative ages of nearest neighbors indicated a non-random age-class structure ( $\chi_{df=9}^2 = 56.38, p < 0.0001$ ). Individuals aged 1-4 years most often had 5-9 year old neighbors. Individuals aged 5-9 most often had neighbors of the same age. Individuals aged 10-14 most often had neighbors aged 15+, and individuals aged 15+ most often had neighbors aged 9-14. A map presenting the ages and relative locations of individuals showed a cluster of older individuals which appear to be the founder plants during colonization of the stand.

**THE USE OF PARASITES AS INDICATORS OF BIODIVERSITY IN SELECTED LAKES OF THE INLAND NORTHWEST.** John Shea, Gordon Kersten, Chris Puccia, Andy Stanton, Suzi Stiso, Erika Helgeson and Emily Back. Biology Department, Gonzaga University. [shea@gonzaga.edu](mailto:shea@gonzaga.edu).

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Some parasites have complicated life cycles, requiring multiple hosts. If these parasites are present in an ecosystem, then one can infer that their respective hosts must also be present. Thus, parasites may serve as reliable indicators of ecosystem health. To test this, Gonzaga University students sampled parasites from three lakes in Idaho that varied in heavy metal pollution as well as three lakes in Washington that varied in agricultural use. If parasites do serve as reliable indicators of ecosystem health, then parasite diversity should be higher at the least polluted sites. Results were consistent with this hypothesis as the diversity indices of both parasites and snails were lowest at the Idaho site with the highest levels of heavy metals. Interestingly, this site experienced the highest insect diversity. In Washington, the parasite diversity index was highest at the lake inside the Turnbull National refuge (1.63, Shannon) when compared to the two lakes immediately outside the refuge (0.54 and 0, Shannon). Chemical tests failed to detect the presence of NO<sub>2</sub> or NO<sub>3</sub> at any of the six sites. We conclude that parasite diversity indices may be more preferable than insect diversity indices in instances of heavy metal pollution.

**KEY WORDS:** TREMATODES, ENVIRONMENTAL PARASITOLOGY, POLLUTION

**A PLANT PHENOLOGY MONITORING MAP: A JOURNEY THROUGH THE USA-NATIONAL PHENOLOGY DATABASE.** [Kathryn Thomas](#) and Jake Weltzin. USA-National Phenology Network, National Coordinating Office. [Kathryn\\_a\\_thomas@usgs.gov](mailto:Kathryn_a_thomas@usgs.gov); [jweltzin@usgs.gov](mailto:jweltzin@usgs.gov).

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The USA National Phenology Database represents the compiled phenology monitoring observations of the USA-National Phenology Network (NPN) partners. On March 2<sup>nd</sup>, 2009, the USA-NPN National Coordinating office offered on-line a list of over 210 recommended plants for monitoring in the 2009 season. Plant species include 20 widespread calibration species recommended for everyone making observations and nearly 200 regional species that are important in certain locales for their contribution to ecological processes, biological diversity, conservation, economics, and/or human culture. The USA-NPN web site ([www.usanpn.org](http://www.usanpn.org)) represents each species with a species profile page that identifies the different phenophases to be monitored for that plant and describes how to make the observations. The phenophase instructions, while tailored for each plant, also represent groupings of plants based on their flower type and leaf seasonality, for example broadleaf evergreen, needle-leaved evergreen, deciduous, etc. As well as presenting listings of the recommended species and examples of phenophase monitoring instructions, this poster illustrates the process of how an observer chooses a plant, registers as an observer, and submits their data. We present the results of the first year of USA-NPN data collection as well as plans for the 2010 phenology monitoring season.

**KEY WORDS:** PHENOLOGY, MONITORING, USA-NATIONAL PHENOLOGY NETWORK

**LANDSCAPE SCALE CONSERVATION IN WASHINGTON, LAND ACQUISITION AND CONSERVATION UNDER THE ESA.** Theodore B. Thomas and Joanne Stellini. Division of Listing and Recovery, U.S. Fish and Wildlife Service. [ted\\_thomas@fws.gov](mailto:ted_thomas@fws.gov); [joanne\\_stellini@fws.gov](mailto:joanne_stellini@fws.gov).

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The U.S. Fish and Wildlife Service, in coordination with state conservation partners, nongovernmental organizations and local governments have dedicated more than \$100 million towards land acquisition to benefit species and improve habitat. Under section 6 of the Endangered Species Act, we cooperate with states to develop programs and implement conservation actions to conserve Federally threatened and endangered species, and trust species considered at-risk by the Washington Departments of Natural Resources, and Fish and Wildlife. Typically, upon acquiring a land parcel the State agencies hold conservation easements on the property and the partnering NGO holds fee title and carries out the management actions. Species that benefit from these land acquisitions are found in diverse ecosystems throughout Washington State. Species that have benefitted include the northern spotted owl, marbled murrelet, lynx, wolf, grizzly bear, Columbian white-tailed deer, pygmy rabbit, bull trout and salmon, golden paintbrush, streaked horned lark, mardon skipper and Taylor's checkerspot butterflies and Oregon spotted frog, to name a few. The objective of these land acquisition actions is to buffer existing reserves and block up lands to provide continuity and connectivity of ecosystem values in perpetuity. Management plans are developed to guide actions through active, and in some cases, passive management. Management actions have been as varied as silvicultural prescriptions in young forests; to reintroductions of threatened plants; captive breeding and translocation programs for rare butterflies on grasslands; and endangered pygmy rabbits on shrub-steppe habitat. We look forward to new acquisitions to protect species and conserve natural areas in Washington.

**KEY WORDS:** CONSERVATION, LAND ACQUISITION, SECTION 6, ENDANGERED SPECIES ACT

**LEARNING ON THE EDGE: INVOLVING RESEARCHERS IN SHARING RESEARCH CONDUCTED IN NATURAL AREAS.** Lucy Tyrrell. Denali National Park and Preserve. [Lucy\\_Tyrrell@nps.gov](mailto:Lucy_Tyrrell@nps.gov) .

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Researchers are accustomed to sharing results in specialized journals or as technical posters and talks. I have collaborated with researchers after their research experiences in Denali to create fact sheets for a general audience, including visitors, educators, and park managers.

The researcher provides text and figures to illustrate the key points about methods and results, and I edit the text, create a two-page color layout, and email a draft fact sheet (as pdf) to the researcher along with questions and comments. The researcher(s) and I work back and forth, until we are satisfied that the messages are clear and scientifically accurate. The outcomes are (1) a printed fact sheet about the research process and results, and (2) an increased ability by the researcher to share data in a straightforward, simplified manner. In addition to fact sheets, researchers also share information via material for websites, public lectures and field seminars, and podcasts. When researchers working in national parks or other natural areas are able to clearly communicate their research results, they connect people with the landscapes and ecosystems, build support for additional research in natural areas, and provide information for science-based management of these protected areas.

**KEY WORDS:** EDUCATION, RESEARCH(ERS), COMMUNICATION, SCIENCE

**AN OCCUPANCY AND ACID PRECIPITATION IMPACT STUDY OF SOME ENDEMIC PLANTS OF ATHABASCA SAND DUNES PROVINCIAL PARK, SASKATCHEWAN, CANADA.** [Robert A. Wright](mailto:rob.wright@gov.sk.ca)<sup>1</sup>, Eric Lamb<sup>2</sup>, and Darcy Henderson<sup>3</sup>. <sup>1</sup>Saskatchewan Parks Service. [rob.wright@gov.sk.ca](mailto:rob.wright@gov.sk.ca). <sup>2</sup>Department of Plant Sciences, University of Saskatchewan. [eric.lamb@usask.ca](mailto:eric.lamb@usask.ca). <sup>3</sup>Canadian Wildlife Service. [darcy.henderson@EC.GC.CA](mailto:darcy.henderson@EC.GC.CA).

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The Athabasca sand dunes support the only endemic plant species found in Saskatchewan. Because these species are found nowhere else on earth, and are listed in the Canadian federal Species at Risk Act (SARA), the Saskatchewan Parks Service and the Canadian Wildlife Service have a duty to ensure that they are well protected and conserved in ASDPP. These plants grow on poorly buffered and easily acidified sands and are potentially threatened by the acid precipitation being created at upwind tar sands developments. The work includes 1) a growth chamber experiment on the effect of acid precipitation and NOx fertilization on the growth of several endemics and several potential competitive exotic invasive weed species and, 2) field studies to accurately estimate the area occupied, and the variety of habitats occupied, by the endemics in the dunes. The results of the occupancy field work and acid precipitation growth chamber experiment will enable an improved estimate of the degree of imperilment faced by the species due to the deposition of acid precipitation generated by huge tar sands projects only 300 km upwind of the dunes. These results will be useful in assessing the need for a re-classification of the taxa to higher categories of imperilment, under federal legislation, and may contribute to a strengthened argument for improved mitigation of the pollution effects generated by tar sands development in the Canadian northwest.

**KEY WORDS:** OCCUPANCY, ACID PRECIPITATION, SAND DUNES, ENDEMIC, TAR SANDS