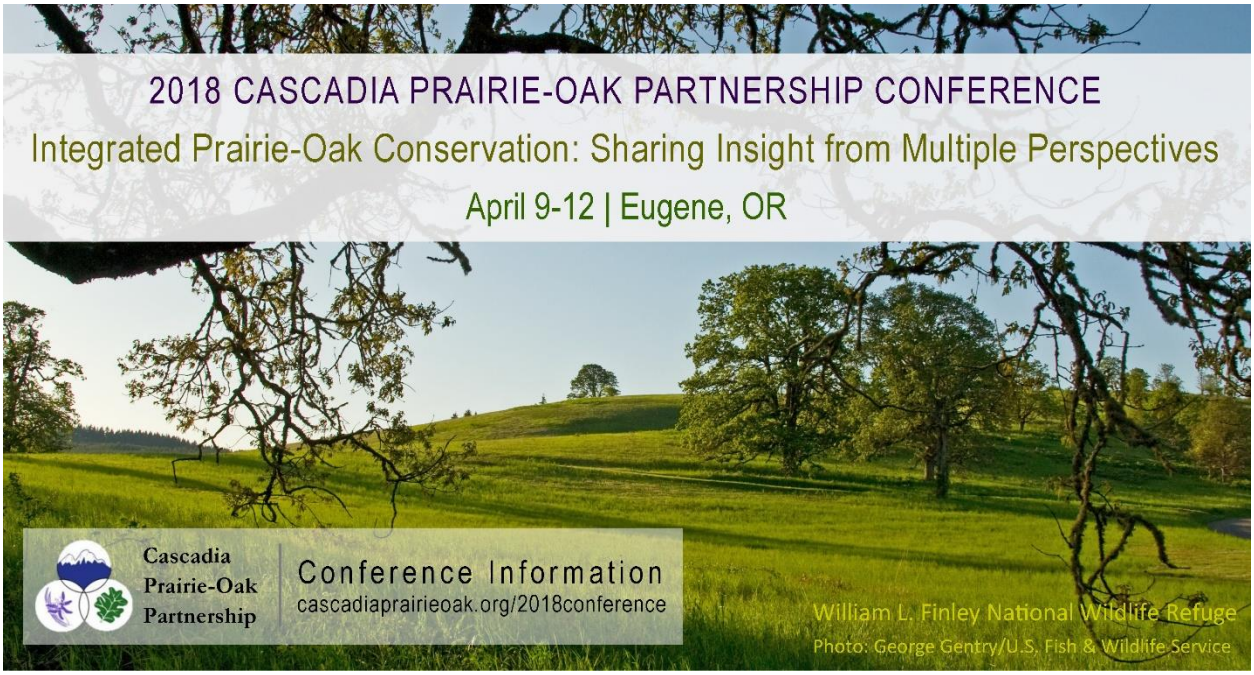

CONFERENCE ABSTRACTS

LINKS TO PRESENTATION & POSTER PDF'S INCLUDED

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Abstracts are arranged in alphabetical order by presenter author's last name.
Oral and poster abstracts included, and the title links to a PDF when available.

ABSTRACTS

POSTER

NOT JUST A RESOURCE, BUT AN HEIRLOOM: RESTORATION OF OAK SAVANNA IN THE COLUMBIA RIVER FLOODPLAIN. **Karen Adams** and Kelley Jorgensen, Wapato Valley Mitigation and Conservation Bank, 33415 NW Lancaster Road, Ridgefield, WA, 98642. kadams@pnfarm.com

Oregon White Oak (*Quercus garryana*) habitats are well documented in the Willamette Valley/Puget Trough ecoregion, however they are generally associated with upland sites. Less attention has been given to culturally important oak savanna and associated wet prairie habitats found in the tidally influenced floodplain of the Lower Columbia River (LCR). Remnants of low elevation Oregon white oak habitat are scattered across the floodplain from Vancouver, WA to the Cowlitz River. Disturbance regimes driven by flood, fire, and Native American land use no longer shape the landscape. Oak savanna habitats in the floodplain that have not been converted to agriculture are shifting to woodland, and are only identifiable by savanna form oaks surrounded by forest species. Wapato Valley Mitigation and Conservation Bank (Wapato Valley) is being developed as a mechanism to protect the legacy of environmental stewardship for future family generations. The objective of this research was to understand ecological drivers of oak distribution across tidally influenced floodplains to increase the success of oak savanna restoration at Wapato Valley. Biologists collected data on the elevation, location, hydrologic regime, stand structure and plant community, and conducted a thorough literature review. Results show that elevation, soil depth and past land management practices dictate the location and extent of relic oak habitats in the floodplain. Restoring these culturally and ecologically important resources contributes to the continuity of a disappearing habitat, and supports biodiversity at a time when the impacts of climate change and globalization threaten to homogenize the landscape.

ORAL

CLACKANOMAH OAK CONSERVATION IMPLEMENTATION STRATEGY: CONSERVING OREGON WHITE OAK ON WORKING LANDS. **Nicole Ahr** and Jenne Reische, Clackamas Soil and Water Conservation District, 221 Molalla Ave, Suite 102, Oregon City, OR 97045; and Kammy Kern-Korot, West Multnomah Soil and Water Conservation District, 2701 NW Vaughn St # 450, Portland, OR 97210. nahr@conservationdistrict.org

Working cooperatively with private landowners is critical to the protection and restoration of oak habitat. This is particularly important because of a lack of regulatory protection for these habitats, the lack of technical expertise on the part of the landowners and the fact that the majority of remnant oak habitat is on private lands. Clackamas and West Multnomah Soil and Water Conservation Districts collaborated with other natural resources agencies in the spring of 2017 to secure funding from the Natural Resources Conservation Service to implement a Conservation Implementation Strategy (CIS) in oak prominent areas of Clackamas and West

Multnomah counties. The resulting Clackanomah Oak CIS was awarded three years of funding. Targeted outreach efforts began in the fall of 2017 using the recently produced oak mapping data from the local collaborative Oak Working Group covering the greater Portland-Metro Regional Conservation Strategy area. Site visits with interested landowners have revealed a variety of properties where oak have persisted with working lands. Many of the oak trees are being maintained with grazing animals, exist along fence lines or in riparian areas and remain on soils poorly suited to agricultural uses. Proposed oak habitat restoration practices on these properties range from oak release and weed control to planting of oak and associated species in both woodlands and savannas and prescribed grazing practices. Oak habitat projects for this CIS are likely to address multiple natural resource concerns due to the locations of the remaining oak trees and the common occurrence of livestock on oak properties.

ORAL

GRASSLAND BIRDS IN THE PACIFIC NORTHWEST: CAN WE SAVE THEM? **Bob Altman**, Avifauna Northwest, 311 NE Mistletoe, Corvallis, OR, 97330. baltman@peak.org

Several species of grassland birds are extirpated from ecoregions or parts of ecoregions, and are at risk of extirpation across the entire Pacific Northwest west of the Cascade Mountains. These include Oregon Vesper Sparrow, Streaked Horned Lark, and Western Meadowlark. There are variable, species-specific, and often significant ecological challenges to address their conservation needs. It is essential to understand those challenges to strategize and prioritize conservation actions. I will describe several of these challenges by species and by ecoregion including population size and trends, area requirements, site fidelity, adaptability to types of agriculture, compatibility with working lands, and other species-specific ecological requirements, to postulate on the likelihood and the caveats of their future as part of the avifauna of the Pacific Northwest.

ORAL

INTEGRATING PRAIRIE AND OAK HABITAT MANAGEMENT OBJECTIVES INTO AN ACTIVELY USED COMMUNITY PARK. **Ed Alverson**, Lane County Parks Division, 3050 N. Delta Hwy, Eugene, OR 97408. Edward.alverson@co.lane.or.us

Zumwalt Park is a Lane County Park, about 60 acres/25 ha in size, located on the shores of Fern Ridge Reservoir, in the southern Willamette Valley about 10 miles/16 km west of Eugene. Lack of funding and an out-of-the-way location precluded conversion of the park to ornamental landscaping when funding for park development was available during the 1960's and 1970's. Subsequent closure of the park, and reopening with limited maintenance and volunteer support from the local community, has created a park with a unique personality and, inadvertently, perhaps, a public space that supports a unique mixture of park uses and natural features. Features within the park interpret a wide span of human and natural history(s). The park is the site of an historic pioneer homestead, and nearby archaeological sites testify to many millennia of prior Native American settlement. A state designated Heritage Tree Grove includes a 300-year old Oregon white oak, and "prairie lawns" within the park are managed with a mowing schedule that encourages the growth of naturally occurring native prairie wildflowers. In July, after the "prairie

lawns" are mowed, the park is temporarily transformed in to a large temporary campground during the Oregon Country Fair. These diverse uses of the park are not mutually exclusive, but rather enhance and amplify complementary uses, and help to affirm that nature is, indeed, everywhere.

ORAL

SPATIALLY EXPLICIT HABITAT MODEL FOR THE SLENDER-BILLED NUTHATCH IN THE WILLAMETTE VALLEY USING FOREST STRUCTURE METRICS DERIVED FROM LIDAR. **Ramiro Aragon Perez**, Oregon State University, 2244 Jefferson St, Eugene, OR 97405; Joan C. Hagar and Patti Haggerty, USGS Forest & Rangeland Ecosystems Science Center, 3200 SW Jefferson Wy, Corvallis, OR 97331. aragon.nw@gmail.com, joan_hagar@usgs.gov, phaggerty@usgs.gov

The slender-billed nuthatch (*Sitta carolinensis aculeate*; SBNU) is a species of conservation concern that is highly associated with oak woodlands in the Willamette Valley, Oregon. A map of habitat availability would aid conservation planning efforts for the SBNU. According to previous studies, large-diameter, open grown oaks provide the most suitable nesting habitat for the SNBU. Therefore, an accurate estimate of available nesting habitat would need to incorporate measures of woodland structure rather than being simply based on the total area of oak vegetation types. To address this need, we used Light Detection and Ranging (LiDAR) to identify structural features of the oak woodlands associated with SBNU nest sites in the Willamette Valley. We developed a predictive model of nesting habitat using LiDAR-derived metrics that quantified canopy height and canopy cover in two height strata at a set of nest trees locations and a set of "pseudo-absence" sites. The preliminary final model included LiDAR metrics quantifying cover in both canopy height strata. The performance of this preliminary model was evaluated as "good" according to multiple performance measurements. We applied the model to map predicted distribution of SBNU nesting habitat based on structural characteristics of oak woodlands across the study area.

POSTER

CONTROLLING EXOTIC GRASSES WHILE MAINTAINING NATIVE PLANT COMMUNITIES IN FIRE-MAINTAINED WET PRAIRIES. **Matt A. Bahm**, Denise Giles-Johnson, Erin Gray and Thomas N. Kaye, Institute for Applied Ecology, Conservation Research Program, 563 SW Jefferson Ave, Corvallis, OR 97333. mattab@appliedeco.org

Wetland prairies in the Willamette Valley are among the most endangered ecosystems in North America, and support many imperiled species. The Fern Ridge Research Natural Area (RNA) contains substantial remnant wetland prairies, and is dedicated to serve as a research site and reference community for the Willamette Valley wet prairie system. It consists of three main units; Rose Prairie, Royal Amazon, and Fisher Butte, all of which support rare and endangered plant species including *Lomatium bradshawii* and *Erigeron decumbens*. Wet prairie habitats at Fern Ridge RNA are currently managed using prescribed fire, which benefits the plant community by decreasing thatch and promoting germination by native species. There is a need for alternative management strategies to reduce the abundance of invasive grasses, particularly *A.*

odoratum, without causing harm to native plants. The ultimate goals of this project are to improve the diversity (both evenness and richness) of native species and decrease the cover of exotic species. We tested habitat management treatments at two sites, including a control (fire only), Fire + glyphosate (1 week after), Fire + glyphosate (1 week after) + glyphosate (Feb.), Fire + fusilade (1 week after), Fire + fusilade (1 week after) + fusillade (Feb.), and Fire + surfactant (NuFilm) only. Initial results indicate that the Fire + glyphosate (1 week after) + glyphosate (Feb.) reduced *Anthoxanthum* cover, as well as the overall ratio of native species to invasive species cover.

POSTER

EVALUATION OF COMMERCIAL POLLINATOR SEED MIXES FOR WESTERN OREGON. **Amy Bartow** and Annie Young-Mathews, USDA NRCS Corvallis Plant Materials Center, 3415 NE Granger Ave, Corvallis OR 97330. Amy.bartow@or.usda.gov

There are many pollinator seed mixes available on the commercial market, but not all are likely to establish and perform well in our region, or provide high quality pollinator habitat. The purpose of this study was to evaluate a number of commercially available pollinator mixes for use in western Oregon. This 3-year study, started in the fall of 2014 at the Corvallis Plant Materials Center (PMC), includes small plots of seven different commercial pollinator mixes seeded at a standardized rate of 60 seeds/ft^2. Plots were monitored every two to four weeks throughout the 2015, 2016, and 2017 bloom seasons (late February through September) for plant canopy cover, bloom period, flower abundance, and pollinator visitation. Results from the first three years of the study showed that most mixes had at least three species in bloom in early, mid and late season for their first year of establishment, but diversity tended to drop the second year, with many plots dominated by just a few species the second year (lupines in particular). The "standard" Xerces Society (comprised almost exclusively of Willamette Valley native species) mix appeared to attract the most native bees, while some of the other seed mixes (containing non-native species) attracted more European honey bees.

POSTER

OAK PRAIRIE PRESERVATION: A SEED IN TIME SAVES NINE. **Adrienne Basey** and Marsha Holt Kingsley, Metro Regional Government, 600 NE Grand Ave, Portland OR 97232. adrienne.basey@oregonmetro.gov

With over 450 ha of oak and prairie habitat under management, Metro is a leader in oak-prairie conservation in the lower Willamette Valley and prioritizes stewardship of this threatened habitat. Site conservation balances both active habitat restoration and preservation of rare plant populations. This project targets conservation of uncommon forbs through four actions: determination of target species, locating and documenting populations, gathering herbarium vouchers, and collecting seed for banking. We compiled a master list of species known to occur within Metro oak habitats and subsequently ranked them based on fidelity to oak-prairie habitat, state and local rarity, and expressed concern from regional ecologists. This process designated 72 target species. Our goal over three years is to locate, voucher, and collect seed from at least 80% of the 257 known occurrences on Metro properties. After one field season, we have collected

37% and 22% of our targets for vouchers and seed, respectively. For each accession, data were gathered including location and extent, population estimate, percent of plants flowering, and phenology. Voucher specimens are stored at the Portland State University Herbarium. Seed accessions will be housed at the Rae Selling Berry Seed Bank in Portland, Oregon. This project demonstrates an effort designed to maintain and preserve representative samples of local plant material and is integrated with the greater conservation strategy of Metro Parks and Nature. By partnering with regional institutions, we aim to expand scientific understanding of this threatened habitat and inform further conservation efforts.

POSTER

BUILDING A RESILIENT NATIVE CONSERVATION NURSERY: UTILIZING REGIONAL AND LOCAL PARTNERSHIPS, INNOVATION, AND COMMUNITY. **Jessika Blackport** and Sierra Smith, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501. jblackport@cnlm.org

CNLM has built a nursery program that delivers seed and plants to restore hundreds of acres of prairie each year. Our coalition of partners includes state and federal agencies, universities, municipalities, non-profit organizations, and private landowners. The collaborative approach involves regional ecologists and agency representatives at all levels of the program, ensuring that expert opinion guides nursery decisions. Those who use the plant material decide what is grown, therefore matching production to demand. Through regional cooperation, the reach of CNLM'S conservation nursery now extends beyond the South Puget Sound into 7 ecoregions in Western Washington and Oregon. Beyond our traditional partnerships, new relationships provide opportunities for contract growing, contract seed cleaning and direct sales of custom seed mixes, lending greater resiliency and variety to what a non-profit seed farm can offer. Our infrastructure and technical knowledge equip us to perform all stages of the seed increase process- from wild seed collection, to agricultural trials, to delivering genetically diverse, clean seed for the restoration of our most endangered habitats.

POSTER

WILLAMETTE VALLEY OAK-PRAIRIE COOPERATIVE: LOCAL OAK-PRAIRIE EFFORTS AND ANCHOR SITES. **Alejandro Brambila** – University of Oregon, 907 West 11th Ave #1, Eugene, OR 97402. abrambil@uoregon.edu

Working with the Willamette Valley Oak-Prairie Cooperative, whose mission is to "establish a regionally- focused, collaborative, and sustainable program to conserve and maintain" prairie and oak habitats, I will perform a preliminary assessment of habitat anchor sites within the Willamette Valley. As a first step I will review existing plans, studies and reports put together by different local groups for the conservation of oak-prairie habitats. From these documents, and interviews of key partners, I will identify areas of high-quality habitat across different land use types in the valley. This synthesis will present us with a picture of where habitat is already conserved and where there are opportunities to work with agencies or local landowners to preserve and enhance habitat values. Looking across different land use types will allow us to consider different conservation strategies to maintain ecosystem function for different managed

landscapes. Results will be a gap-analysis synthesis of local oak and prairie conservation plans, and an identified list of anchor habitats and the landscape matrix in which they are located. I will also produce a table based off the literature of land use versus ecosystem function and service to understand what functions can be realized across residential, working, and natural landscapes.

ORAL

STREAKED HORNED LARK CONSERVATION ON WORKING LANDS. **Niles Brinton,** Pacific Birds**,** 650 Hawthorne Ave, Salem, OR 97301. niles_brinton@pacificbirds.org

Habitat conservation on working lands requires extensive outreach, community engagement, and input from a wide variety of stakeholders. In the Willamette Valley, the Streaked Horned Lark can be found nesting, breeding, and foraging in a wide variety of actively managed agricultural fields. After numerous site visits and interviews with agricultural producers, conservationists, and Lark experts, a suite of conservation practices was developed to allow farms to provide Lark habitat with minimal interference with agricultural operations. Subsequent outreach activities include production of marketing materials, written pieces in agricultural and birding publications, presentations to groups of landowners, farmers, and conservationists, and face-to-face meetings with members of the local agricultural industry. Details will be shared regarding our first pilot project being implemented in 2018 in Benton County, Oregon.

ORAL

USE OF CANINES TO DETECT EARLY LIFE HISTORY STAGES OF A THREATENED BUTTERFLY. **Cody T. Burkhart and Richard W. Van Buskirk**, Pacific University, Environmental Studies, Forest Grove, OR; Heath Smith, Conservation Canines, Center for Conservation Biology, University of Washington, Seattle, WA; and Deanna Williams, USDA Forest Service, Corvallis, OR. vanbuskirk@pacificu.edu

Despite decades of work by researchers to define key habitat requirements for the federally threatened Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*), fundamental questions persist about the habitat characteristics required to support viable populations. As a result, populations remain in decline and recovery goals unmet. These challenges stem from the cryptic nature of the species' larval stages, during which factors affecting survivorship are unknown. We applied a novel approach to locating late-instar larvae and pupa in the wild in order to identify habitat regions where individuals are surviving beyond early life history stages. This method involves the use of scent-trained canines to detect larvae and pupae that otherwise would be nearly impossible to locate. Olfactory searches for larvae/pupae were conducted in partnership with Conservation Canines, a group that uses rescue dogs to locate species-specific scents for conservation projects worldwide. Here we present the results of a pilot study to explore the use of detection dogs for locating pupae in the wild. Locating early life stages of *S. z. hippolyta* with the assistance of detection dogs would allow us to delineate patches of high and low occupancy within coastal meadows occupied by the butterfly. Success with this approach will lead to a better definition of optimal butterfly habitat that can serve as a target for management and restoration efforts.

ORAL

A REVIEW OF THE LITERATURE ON BUTTERFLIES AND CATTLE GRAZING.
Samantha Bussan, Washington State University Vancouver; and Cheryl Schultz, Washington State University Vancouver, 14204 NE Salmon Creek Ave, Vancouver, WA 98686. samantha.bussan@wsu.edu

Worldwide, agricultural intensification, fire suppression, urbanization, and biological invasions threaten many endemic grassland plant and animal species. Since much of the area that was formerly grassland has been converted to livestock pasture, it is critical to understand how to support native flora and fauna in an agroecosystem while still supporting the livelihoods of farmers and ranchers. Lepidopterans, especially butterflies, can serve as useful indicator species of ecosystem health due to their unique habitat requirements. I conducted a review of the literature on butterflies and cattle grazing using the search engine *Web of Science* and found 105 relevant papers. Many studies show potentially positive effects of certain grazing practices on the ecosystem as well as butterfly populations and communities. However, most studies took place in Europe and there is a relative paucity of information on cattle grazing effects on North American butterflies. In addition, European studies focus more on for-profit beef and dairy farms, while North American studies focus on restoration and conservation-oriented grazing. There is a strong need for more research on how cattle grazing affects butterflies in North America, particularly on for-profit farms and ranches. With less than three percent of the original extent of Western Washington prairies remaining, this area is an ideal location to study this interaction. Improving sustainable agriculture in this agroecosystem is critical to preventing species extirpation or extinction.

ORAL

PLANNING CONSIDERATIONS FOR IMPLEMENTING LIVESTOCK GRAZING SYSTEMS FOR MANAGEMENT OF GRASSLAND HABITATS.
Marty Chaney, USDA Natural Resources Conservation Service, 1835 Black Lake Blvd SW, Suite D, Olympia, WA 98512. marty.chaney@wa.usda.gov

Developing livestock grazing systems for manipulation of grassland habitats involves similar core requirements, whether the habitat is upland or wetland. The grazing system must benefit both the grassland manager and the livestock manager in order to make the partnership profitable and sustainable for both parties. An initial critical question: Are there easement or management plan restrictions that limit livestock grazing options? The following factors need to be addressed: Infrastructure – are there boundary and cross fences and are they in good repair? Is livestock water available? Is the site secure – can it be monitored and do gates lock? If infrastructure is lacking or needs repair, who is responsible for installation or repair – the landowner or the livestock producer? How much forage is available and when is it available? Are grazing deferment periods required, and are other areas available for livestock grazing during that time? How many months of grazing are available? How many years might the agreement persist? A several-year lease can give the producer additional economic stability. Is it worth the producer's time and cost to transport livestock and settle them in a new pasture, especially if just a short grazing period is available, or if livestock need to be trucked to and from the site multiple times?

How far away is the property from the producer's farm? Are there poisonous plants on the property? All these questions must be answered to the satisfaction of both parties in order for a successful grazing partnership to be developed. This presentation will provide examples of how to achieve this partnership.

ORAL

CHARACTERIZING A REFERENCE SITE FOR THE ENDANGERED WILLAMETTE DAISY (*ERIGERON DECUMBENS*). **Rhiannon Cochrane,** US Army Corps of Engineers, 26275 Clear Lake Rd, Junction City, OR, 97448. Rhiannon.C.Cochrane@usace.army.mil

Willamette daisy (*Erigeron decumbens*) exists only in a few remnant Willamette Valley prairies, and has been listed as endangered by the US Fish and Wildlife Service since 2000. The largest known population occurs within a designated Research Natural Area near Eugene, OR, on land owned and managed by the US Army Corps of Engineers. This site serves as both a seed source and reference site for restoration efforts in the Eugene West recovery zone. In 2015, I established 24 $1m^2$ demographic monitoring plots by haphazardly selecting meters along established monitoring transects that contained daisies. I tracked the fate of individual plants in these plots for three years, and in 2016 I measured the plant community (cover of all plant species) in the same plots and in 24 randomly located plots throughout the site. Daisy is known from both upland and wetland prairies, and at this site, occurs in the dryer microsites with less tufted hairgrass (*Deschampsia cespitosa*), common camas (*Camassia quamash*), and pennyroyal (*Mentha pulegium*), and more Hairy cat's ear (*Hypochaeris radicata*) and blue-eyed grass (*Sisyrinchium* sp.). These pilot data years confirm that individual Willamette daisy plants are difficult to distinguish and occasionally remain below ground for a growing season, making accurate relocation tricky. Despite these challenges, understanding the daisy's life history traits and plant community characteristics at this site will inform restoration site selection and indicate whether restored populations grow and reproduce like natural populations.

ORAL

FIRE-DEPENDENT ECOSYSTEM RESTORATION ON THE NORTHWEST OREGON DISTRICT OF THE BLM. **John DeLuca,** Wildlife Biologist, Northwest Oregon District, Bureau of Land Management, 3106 Pierce Pkwy E, Springfield, OR 97477. jdeluca@blm.gov

The Northwest Oregon District of the Bureau of Land Management is preparing an Environmental Assessment to authorize the restoration and maintenance of prairies and oak/pine savannas and woodlands throughout the Willamette Valley and its foothills. The BLM will present an outline of the draft purpose, need, and proposed activities for the project. The purpose of and need for the Fire-Dependent Ecosystem Restoration (FDER) project is to promote restoration and maintenance of fire-dependent ecosystems on BLM-administered lands and provide assistance in restoration and hazardous fuels reduction on Tribal, state, county, municipal, and private lands. The project aims to achieve the management direction for multiple resources and land use allocations on BLM-administered lands, as outlined in the Northwestern and Coastal Oregon (NCO) Resource Management Plan (RMP) and the West Eugene Wetlands (WEW) RMP. In addition to meeting said management direction, the FDER project aims

authorize assistance to current and potential partners, as authorized under Public Law 104-208 (commonly referred to as the "Wyden Amendment"). Pine and oak woodlands, savannas, prairies, and other fire-dependent ecosystems occur in a fragmented patchwork of mixed ownerships across the greater Willamette Valley. To maximize operational efficiencies and ecological effectiveness, the BLM aims to collaborate in landscape-scale management of fire-dependent ecosystems. The BLM seeks to work with the local Tribes; federal, state, and municipal agencies; non-profit organizations; private landowners; and other stakeholders in the greater Willamette Valley who are engaged in the management of fire-dependent ecosystems and the reduction of hazardous fuels.

POSTER

CILOS: COMMUNITY INVOLVEMENT & LONGTERM OWNERSHIP STRATEGY. **Kris Elsbree**, Walama Restoration Project, Eugene OR 97440. Kris@walamarestoration.org

The objective is to provide a poster highlighting CILOS prairie restoration undertaken by Walama Restoration Project in the Whilamut Passage of Alton Baker Park. CILOS goal: Through involving students and community members to install and maintain native habitat, we hope to build a community that is more knowledgeable, engaged and invested in stewardship for the long-term while simultaneously preserving the biodiversity of critically imperiled Willamette Valley ecosystems. Methods include non-chemical control of exotic plant species and installation of native grasses, forbs, rushes and sedges. Conclusions from the project include the pros and cons of using geotextile fabric to shade out exotic species and results of the first annual bee survey conducted during the first growing season at the CILOS site.

POSTER

PRAIRIE, OAKS, AND PEOPLE – A CONSERVATION BUSINESS PLAN TO REVITALIZE THE PRAIRIE-OAK HABITATS OF THE PACIFIC NORTHWEST. **Sara Evans-Peters**, Pacific Birds Habitat Joint Venture; **Bob Altman**, American Bird Conservancy; **Elspeth Hilton Kim**, Center for Lands Management; **Nicole Maness**, Willamette Partnership; **Jaime Stephens**, Klamath Bird Observatory; and **Bruce Taylor**, Pacific Birds Habitat Joint Venture. ekim@cnlm.org, bruce_taylor@pacificbirds.org

Prairie, Oaks and People - A Conservation Business Plan to Revitalize the Prairie-Oak Habitats of the Pacific Northwest outlines the case for long-term investments that will restore a signature feature of the region's historic landscape. Populations are declining, ranges are contracting, and many species are gone from their historic ranges. Over 41 species are listed Threatened or Endangered at the Federal, State, or Provincial levels. We estimate the cost of recovery and restoration to be $83 million over the next 10 to 15 years. With a shared vision and an overarching framework, the business plan presents clear strategies, outlines the resources necessary to meet conservation goals, and creates accountability by defining measurable outcomes. Major strategies include protect prairie-oak species, restore and maintain prairie-oak habitats, support recovery of imperiled prairie-oak species, strengthen conservation infrastructure, inform conservation efforts through monitoring and research, and expand political, and financial support. In concert with priority actions nested within each strategy,

complementary cross-cutting strategies were developed to amplify the effectiveness of conservation efforts through more multi-species approaches, working landscapes, workforce training, ecocultural and traditional subsistence, community engagement, partner engagement, and adaptive management. By bringing together people with common goals that transcend geographic and organizational boundaries, we can align and unite our efforts to achieve larger conservation gains across the region. This business plan seeks to create the economic, social, and political climate to fund and support the interventions necessary to preserve and enhance prairie-oak habitat and the species that rely on it throughout the Pacific Northwest.

ORAL

SPECIES AT RISK RECOVERY EFFORTS IN COASTAL BC. **Nathan Fisk**, Resource Management Officer, Parks Canada, Fort Rodd Hill & Fisgard Lighthouse National Historic Sites, 603 Fort Rodd Hill Rd, Victoria, BC, V9C 2W8. nathan.fisk@pc.gc.ca

Since 2012, Parks Canada staff based out of Fort Rodd Hill have been engaged in the recovery of federally and provincially endangered vascular plants. While efforts have been primarily focused on Garry Oak ecosystems, we are now expanding to include species at risk within the locally rare coastal sand ecosystems. To facilitate this work, a small native plant nursery was built and has been ever evolving to meet expanding project demands. We are engaging our colleagues at Gulf Islands National Park Reserve, supporting efforts in the City of Victoria and most recently the City of Delta, all while seeking guidance from local First Nation communities. Species of note include: Deltoid Balsamroot (*Balsamorhiza deltoidea*), Contorted-pod Evening-primrose (*Camissonia contorta*), Macoun's Meadowfoam (*Limnanthes macounii*) and Slender Popcornflower (*Plagibothrys tenellus*).

POSTER

PHENOLOGICAL RESPONSES OF PACIFIC NORTHWEST GRASSES AND FORBS TO CLIMATE CHANGE. **Kylea Garces**, Augustine Beard, Emily Roque, Samantha Hoffman, Alena Hartmann, and Adrienne Bowles, University of Oregon, 1585 E 13th Ave, Eugene, OR 97403. kyleag@uoregon.edu

Pacific Northwest prairies are biodiversity hotspots with a high number of endemic, endangered, and rare plant species, but have been depleted to as little as 2% their geographic extent circa 1850. Climate change may threaten to further diminish biodiversity and ecosystem function in these prairies. Confronted with a changing climate, range restricted species have three options: migrate, adapt, or go extinct. While numerous studies have examined the capacity of plants to adapt to climate change, fewer have sought to understand adaptations across a regional scale and to a variety of climate change scenarios. In this study, we contribute to ongoing work to analyze the phenological responses of 12 native forbs and grasses to manipulated climate treatments in three site locations along a latitudinal gradient. Primarily, we are collecting and analyzing phenological data and green vegetation density of different species under different treatment conditions. The climate treatments include drought (a 40% reduction in annual precipitation), warming (+2.5 °C), warming with increased precipitation, and control. Our results indicated that the heated treatments experienced earlier flowering with a lower abundance than the control or

drought treatments. Further, the heated plots had both an earlier peak and decline more rapidly than the control or drought treatments. This study contributes to our understanding of the capacity of plants to acclimatize or migrate under climate change and inform restoration projects of Pacific Northwest prairies.

POSTER

PROPAGATION AND OUTPLANTING OF KINCAIDS LUPINE FROM DOUGLAS COUNTY, INITIAL STEPS TOWARDS AUGMENTING EXISTING POPULATIONS. **Denise Giles**, Matt Bahm, and Tom Kaye, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis OR, 97333; and Susan Carter and Aaron Roe, Roseburg District Bureau of Land Management, 777 NW Garden Valley Blvd, Roseburg, OR 97471. denise@appliedeco.org

Kincaid's lupine (*Lupinus oreganus*) is listed by the Oregon Department of Agriculture and the U.S. Fish and Wildlife Service as a threatened species. In order to meet delisting criteria established by the USFWS in Douglas County, a total of least 5,000 m^2 of lupine in at least two meta-populations need to be stable or increasing for at least 10 years on lands that are protected. The Institute for Applied Ecology, in partnership with the Bureau of Land Management and USFWS, have been working towards these recovery criteria in Douglas County through monitoring and augmentation efforts. As part of IAE's efforts, seeds of Kincaid's lupine were collected in 2005, 2011 and 2016 from four BLM sites and stored in paper envelopes at room temperature. In the winter of 2016, seeds were scarified and subsequently stratified in 5°C for 12 weeks. Germination of seeds varied by site and year (range 45%-95%). Seeds collected in 2005 had the lowest germination, (45-72%), while seed from 2016, had germination rates of 82-94%. Seeds from China Ditch and Dickerson Heights consistently had the highest germination independent of year. Of those potted, 70% survived to be outplanted in April 2017 (~3,700 plants). Initial survivorship, (8 weeks post-planting) of a representative sub-sample was over 90%. Results of these augmentation efforts not only contribute to increasing cover of this species at these sites, but also inform plant materials needs for future augmentation or reintroduction efforts of Kincaid's lupine in the southern portion of its range.

ORAL

OAKBIRDPOP: AN ONLINE INTERACTIVE DECISION SUPPORT TOOL FOR ASSESSING BIRD POPULATION CHANGES FROM MANAGEMENT AND RESTORATION OF OAK HABITAT IN THE PACIFIC NORTHWEST. **Caitlyn Gillespie** and Jaime Stephens, Klamath Bird Observatory, Ashland, OR; and Bob Altman, American Bird Conservancy, Corvallis, OR. crg@klamathbird.org

Decision Support Tools benefit researchers by bridging the gap between science and management, and benefit practitioners by streamlining the process by which research can be used for more effective management. Interactive Decision Support Tools present an opportunity to reach a variety of audiences and make relevant ecological information available for restoration planning. The Land Manager's Guide to Bird Habitat and Populations in Oak Ecosystems of the Pacific Northwest provides an introduction to how bird species-habitat relationships can guide restoration planning and monitoring in oak habitats. We built on the successful framework of the

land manager's guide to create OakBirdPop, an interactive tool designed to facilitate restoration and management planning by providing scenarios of projected bird population changes at management-relevant scales. OakBirdPop uses region-specific bird density data for current and future-projected oak habitat types and conditions to display the population response of different bird species and compare it to regional bird population objectives. We will present OakBirdPop and provide a brief tutorial demonstrating how to use the components of the tool. We will examine several case studies of how an interactive Decision Support Tool may be applied in oak habitat restoration planning and discuss advantages and limitations of this approach.

POSTER

STRONG RELATIONSHIPS: NOT JUST FOR LANDOWNERS. **John Goetz,** Clean Water Services, 2550 SW Hillsboro Hwy, Hillsboro, OR 97123. GoetzJ@cleanwaterservices.org

Natural resource managers can dramatically improve the quality, efficiency and effectiveness of their projects and avoid common mistakes by fostering stronger relationships with the contractors that implement plans and projects on thousands of acres throughout the Willamette Valley. Based on personal experiences, and hours of interviewing contractors with decades of on-the-ground experience implementing habitat improvement projects, the authors offer advice, answers and lists of key questions by project stage that, if effectively dealt with, will prove to enhance the teamwork between client and contractor. Key items to consider with every project include things to ask yourself before project initiation, factors to consider during implementation and things to remember to do after implementation. Additionally, through an exploration of what land managers can do better when working with contractors and understanding what must be completed behind the scenes by the contractor for each work day, the reader will find valuable information that, if incorporated into project planning will enhance project management decisions, create more effective teams and lead to the associated natural resource benefits.

POSTER

HYDROLOGIC MONITORING OF RESTORED WETLAND PRAIRIE WITH AN UNMANNED AERIAL VEHICLE (DRONE). **Paul Gordon**, City of Eugene Parks and Open Space, 1820 Roosevelt Blvd, Eugene, OR 97402. paul.gordon@ci.eugene.or.us

The City of Eugene Parks and Open Space used an Unmanned Aerial Vehicle (UAV or drone) to conduct photo monitoring and generate georeferenced images for the purpose of evaluating and reporting on performance standards for a restored wetland prairie in the south Willamette Valley. Specifically, I was documenting the response of the site to modifications that had been implemented to restore typical historic hydrologic patterns. Currently available technology – UAV, mobile device and applications, as well as desktop applications - was deployed to produce repeatable aerial photo points and georeferenced mapping from imagery captured with an UAV. Images were post-processed to 1) document completed actions, 2) reveal flow patterns of surface hydrology that had been modified by constructed features, and 3) report on the progress and success of restoration actions. These products have multiple purposes including meeting regulatory reporting requirements, documenting success of restoration projects, and identifying potential need for adaptive management on site.

ORAL

LONG-TERM ADAPTIVE MANAGEMENT IMPACTS ON PLANT COMMUNITIES IN UPLAND PRAIRIES. **Erin C. Gray** and Matt A. Bahm, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97330; and Wes Messinger, United States Army Corps of Engineers, 26275 Clear Lake Rd, Junction City, OR 97448. erin@appliedeco.org

Upland prairies in the Willamette Valley are among the most endangered ecosystems in North America, and support many imperiled species including Kincaid's lupine and Fender's blue butterfly. Approximately 100 acres of occupied or potential habitat for these species is under management by the U.S. Army Corps of Engineers at Fern Ridge Reservoir. Adaptive management of these sites began in 2008 with goal of restoring a matrix of native prairie grasses with moderate native forb diversity. The Institute for Applied Ecology has been monitoring these sites and has amassed a long-term dataset of detailed plant community data. To examine the effectiveness of the treatments and trajectory of the plant communities, we used multivariate analysis to tease apart trends in the plant community in relation to management treatments. We found that site trajectory depended greatly on plant community composition at the beginning of treatments. Changes in the plant community in response to adaptive management were not linear and varied depending on the year and the treatment type. Treatments using a combination of glyphosate, seeding, and burning tended to be most closely associated with native grasses, whereas introduced forbs were most closely associated with mowing or no treatment. Multiple years of treatment have led to different plant communities at the sites, and have not shown a predictable pattern. These results give insight into the effects of management treatments on upland prairie communities and offer a unique way to assess the impact of these actions.

ORAL

ELK ROCK CLIFF: A NOVEL METHOD FOR CONDUCTING VEGETATION SURVEYS ON A VERTICAL CLIFF FACE. **Laura Guderyahn**, Portland Parks and Recreation, 6437 SE Division St, Portland, OR 97206; **Mary Bushman**, Portland Bureau of Environmental Services, 6437 SE Division St, Portland, OR 97206. Laura.guderyahn@portlandoregon.gov, Mary.bushman@portlandoregon.gov

At river mile 19 of the Willamette River, Portland Parks and Recreation (PPR) manages a 3.3 acre (1.3 ha), 300ft tall basalt cliff, dominated by native Oregon white oak (*Quercus garryana*) and madrone (*Arbutus menziesii*) woodland. Of the 106 plant taxa reported historically from Elk Rock Cliff, 29 are (locally) rare, 3 species (*Delphinium leucophaeum, Bolandra oregana, Sullivantia oregana)* have state and federal status, and 18 taxa have no recent records from our area. In 2017, PPR, in partnership with the Bureau of Environmental Services, developed a method of using high resolution photography and GIS technology to undertake a comprehensive botanical survey of Elk Rock Cliff. A series of 122 individual photographs were taken of the cliff in March and again in May to capture both leaf off and peak bloom times of rare plant species. Analyzing individual photographs and comparing them to real time examination of the cliff face allowed ecologists to identify dozens of species of invasive and native plants across the cliff. GIS technology was used to resolve the fact that the cliff face varies in all three dimensions to determine canopy cover for each species. The results of this survey will allow the City to prioritize, identify funding for, and implement restoration tasks to preserve and protect the rare species that still exist on Elk Rock Cliff.

ORAL

BUILDING RECIPROCAL BENEFITS AND TRANSDISCIPLINARY PARTNERSHIPS BY INCORPORATING INDIGENOUS KNOWLEDGE INTO THE MANAGEMENT AND RESTORATION OF CAMAS PRAIRIE CULTURAL ECOSYSTEMS. **Sarah T. Hamman**, 120 Union Ave #215, Olympia, WA 98502; and Joyce Lecompte-Mastenbrook, 6841 40th Ave NE, Seattle, WA 98115. shamman@cnlm.org

Restoration of degraded cultural ecosystems worldwide has typically lacked input and insight from Indigenous groups that have created and maintained these areas for millennia. The camas prairies of the Pacific Northwest have a long history of Native American cultivation of native plants for food and fiber. Native American harvest and management was severely disrupted in most open prairies of the region over 200 years ago, as Euro-American diseases and colonization dramatically altered the land practices of Indigenous communities across the landscape. The newly formed Camas Prairie Cultural Conservation Education and Research Program (CCERP), initially funded through the University of Washington's Center for Creative Conservation, has gathered over 20 partners to work across real and perceived boundaries to share and honor Indigenous knowledge and practices for the greater goal of ecological and cultural conservation of camas prairies. Through transdisciplinary partnerships between Tribes, federal agencies, universities and non-profits, the CCERP is developing a tribally-driven teaching and research program focused on the South Puget Sound prairies of Washington State. We hope to encourage increased access to camas harvesting using traditional harvesting methods, and evaluate effects of this practice on the prairie ecological community using western scientific monitoring design. Additionally, we're developing a K-12 curriculum that raises awareness of, and appreciation for, Indigenous histories of camas prairie cultural ecosystems, and the importance of camas harvesting to tribal communities today.

ORAL

RESTORING NATIVE DIVERSITY TO WORKING LANDS: OPPORTUNITIES TO EXPAND THE CONSERVATION PORTFOLIO. **Sarah T. Hamman**, 120 Union Ave SE #215, Olympia, WA 98501. shamman@cnlm.org

Working lands have the potential to play an important role in conservation by supporting and connecting diverse communities within fragmented landscapes. The capacity of these landscapes to provide rare species habitat, while maintaining productive fields for cattle is currently unknown. We investigated the effects of grazing (with spring deferment) on native plant establishment and the impact of native seeding on forage grass production at a western Washington ranch. We established grazing exclosures within six paddocks and set up three paired plots within each grazed/ungrazed replicate. We seeded a mix of 22 native prairie species into the eastern half of each plot in 2013 and the southern half in 2014, creating four separate seeding treatments (unseeded control, seeded 2013, seeded 2014, seeded both years). For three years post-seeding, we tracked richness and abundance of seeded and forage species. We found no significant impact of grazing on seeded species richness. However, seeding treatment was significant, with areas seeded in 2014 showing the greatest native species richness. Seeded species were grouped by their response to grazing: 1) no establishment, 2) established more in

ungrazed than in grazed, 3) established more in grazed than ungrazed, and 4) established equally across treatments. There was no treatment effect on forage species richness or cover in grazed areas, with an average of 5 forage species in each plot, comprising 30% cover. These results suggest that high intensity rotational grazing with a spring rest period can maintain forage grasses and support a select mix of native prairie species.

ORAL

REFINING A STREAKED HORNED LARK HABITAT SUITABILITY MODEL IN THE LOWER COLUMBIA RIVER. **James R. Hatten**, U.S. Geological Survey, Western Fisheries Research Center, Columbia River Research Laboratory, 5501-A Cook-Underwood Rd, Cook, WA 98605; Matt Stevenson, CoreGIS, 355 NW 47th St, Seattle, WA 98107; and Gary Slater and Jerrmaine Treadwell, Center for Natural Land Management, 120 Union Ave SE #215, Olympia, WA 98502. jhatten@usgs.gov

In the lower Columbia River, the federally-threatened streaked horned lark (*Eremophila alpestris strigata*) occurs on dredged deposition sites used by the U.S. Army Corp of Engineers (USACE). However, habitat suitability for larks varies with deposition timing and vegetation succession, with the assumption that suitability is highest between 2 to 3 and 7 to 8 years after deposition. Tracking habitat suitability is an important component of the USACE's long-term dredge management plan and Biological Opinion with the U.S. Fish and Wildlife Service. An initial model built by USACE using high resolution imagery and habitat characteristics, primarily percent sand, was a significant first step in identifying lark breeding habitat, but the model had several weaknesses. We initiated a project to refine and improve the habitat suitability model by increasing the number of predictor variables, developing a probability-based model rather than a rule-based model, and incorporating validation. Exploratory analysis found a grain size of 5 - 10 m, a niche of 100 m, and a landscape of 400 m, produced the best predictive model of lark habitat. Location within the river channel was the most powerful predictor of lark habitat, followed in descending order of importance by vegetation greenness (5 to 10-m grain), heterogeneity of greenness (100-m neighborhood), terrain ruggedness (400-m neighborhood), and deposition age. Sentinel-2 satellite imagery used in our analysis is free and available every 8 days, making dynamic updates and change detection possible over short time frames. Finally, we discuss the value of this suitability model for other regions.

ORAL

ABUNDANCE AND VEGETATION RELATIONSHIPS OF THE PRAIRIE BIRD COMMUNITY AT JOINT BASE LEWIS-MCCHORD MILITARY BASE, WA. **Christine Henderson** and Gary Slater, Center for Natural Lands Management, 120 Union Ave, SE #215, Olympia, WA 98501; and Jim Lynch, Joint Base Lewis McChord Military Base, Fish and Wildlife Program, Fort Lewis, WA 98433. gslater@cnlm.org

Since Euro-American settlement, prairie habitats in the Puget Lowlands have been substantially degraded and lost due to human development and altered ecosystem processes, such as fire. Prairies support a unique avian community, and in response to these changes many prairie birds have experienced range contractions and population declines, including the streaked horned lark (*Eremophila alpestris strigata*), a federally-threatened species, and the Oregon vesper sparrow

(*Pooecetes gramineus affinis*, OVSP), a species recently petitioned for federal listing. Estimating abundance and determining relationships between vegetation and bird species' abundance can help obtain information on population size of rare species and steer management to promote vegetation structure beneficial to declining populations. To investigate prairie bird abundance and their relationships with prairie vegetation, we collected data on birds, vegetation, and fire history from 2015-2017 on Joint Base Lewis-McChord, a military base that supports some of the most extensive prairie habitats in the region. We established 110, 250 m line transects across three major prairie complexes (91st Division [AIA], 13th Division, and Weir and Johnson prairies [RTA]). Transects were surveyed three times each breeding season, and we recorded the distance to all detections of bird species. We estimated bird abundance for a suite of rare and common prairie birds using Program Distance and investigated habitat relationships and the effect of fire using generalized linear models. Results will contribute to a better understanding of the population size of rare birds, such as OVSP, and help develop management strategies for this suite of unique birds.

ORAL

MAPPING OREGON WHITE OAK TREES IN NORTHERN OREGON AND SOUTHWEST WASHINGTON TO FACILITATE CONSERVATION. **Lori Hennings** and Jonathan Soll, Metro Parks & Nature Department, 600 NE Grand Ave, Portland, OR 97232; and Ted Labbe, Urban Greenspaces Institute, 3011 NE Hoyt St, Portland, OR 97232. Lori.hennings@oregonmetro.gov

In June 2018, the Portland-Vancouver region's Oak Prairie Work Group will complete a spatially explicit native oak map to help improve conservation outcomes and support collaborative habitat protection, stewardship and education. The study area includes >2,800 square miles. We will describe the technical and financial aspects of the mapping process and show the results. In 2012 we collected field samples of oak habitat to help develop a potential remote sensing model approach. From 2013-2015, Metro used thousands of oak tree locations collected by >180 field-based community scientists, plus points collected via aerial photographs to refine model iterations. Despite our best efforts, all models substantially overestimated the amount of oak, possibly due to the hundreds of tree species present in the urban area including several non-native oaks. We needed more accurate information. Two of us became skilled at identifying oak trees by checking every oak point collected by community scientists. In 2015 we determined that the best approach was to hand-map oak trees using aerial photos. We will describe the positive aspects and limitations of this approach. The results show clear spatial patterns in oak distribution, including large patches and potential wildlife connectivity pathways. Many of these areas fall outside "high value habitat" areas as modeled in the 2012 Portland-Vancouver Regional Conservation Strategy (RCS), which lacked such data at the time. The results will be used to update RCS maps, identify key connectivity areas, and prioritize important conservation areas. We will freely share the data and are currently developing data viewing tools.

ORAL

FIRE AS A RESTORATION TOOL IN A WARMING CLIMATE. **Kathryn Hill**, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA, 98501. khill@cnlm.org

Fire has been an integral part of Puget Trough prairies for thousands of years. Prior to European settlement, burns occurred via lightning and anthropogenic ignitions. Over the past decade practitioners have reintroduced fire, primarily during mid-summer when weather is warm and dry and prairie fuels are well-cured. However, as climate change produces warmer summers and longer droughts, implementing restoration burns while avoiding detrimental effects of higher severity (e.g., native plant death or seed bank sterilization) needs greater attention. At Joint Base Lewis-McChord, we have measured soil temperature and severity within 36 burns over the last three years and then examined second-order effects on vegetation in ninety-one 625-m^2 plots. Our research has two objectives: 1) determine which weather and fuel conditions (temperature, relative humidity, wind speed, solar illuminance, thatch depth, soil moisture, time since rain) are most influential on soil heating and severity; and 2) assess how burning in different conditions impacts the success of our restoration goals (e.g., invasive removal, native seeding, structural heterogeneity). In 2017, our burn program experienced its longest period without a wetting rain (3 months) combined with its hottest August. Time since rain appears to be the best predictor of soil heating; some factors, such as higher relative humidity, may help mitigate the negative effects of burning this parched soil. However, burning in summers that are increasingly warmer and drier may require extra steps, such as pre-burn irrigation, opportunistic flexibility in taking advantage of summer rain events, and strategic selection of burn units during drought periods.

ORAL

WORKING WITH NON-TRADITIONAL HIGH SCHOOLS IN AN ACTIVE WET PRAIRIE RESTORATION SETTING. **Chad Hoffman**, Lane County Waste Management Division, 3100 East 17th Ave, Eugene, OR 97403. chad.hoffman@co.lane.or.us

Quamash Prairie is a 265-acre parcel purchased by Lane County for wetland mitigation needs associated with expansion of the county-owned Short Mountain Landfill. The site is located approximately 5 miles south of Eugene/Springfield metropolitan area, near the confluence of Camas Swale Creek and the Coast Fork Willamette River. Lane County is currently managing four separate mitigation developments totaling 86 acres, and has plans to develop over 120 acres of future wetland areas. Since 2009, over 4000 student visits to Quamash Prairie have contributed to wetland habitat improvements. Through completion of service learning projects and hands-on outdoor classroom activities, students learn important job skills and earn school credit applied towards a diploma. This presentation will discuss the lessons learned and benefits of these valuable community partnerships with regional non-traditional high schools.

ORAL

THE ROLE OF ENVIRONMENTAL EDUCATION IN PRESERVING PRAIRIE-OAK HABITATS. **August Jackson**, Mount Pisgah Arboretum, 34901 Frank Parrish Rd, Eugene, OR 97405. interpretation@mountpisgaharboretum.org

Instilling awareness and appreciation of the Willamette Valley's prairie and oak habitats is an important first step in forging new human relationships with these landscapes and building a community committed to their conservation. Mount Pisgah Arboretum is located within Lane County Parks' 2200-acre Howard Buford Recreation Area (one of the most visited parks in the

state), and is a short drive from the Eugene-Springfield urban core. Beginning in the early 1980's, the Arboretum has developed a field trip program that annually introduces thousands of K-5 students to Willamette Valley ecology. In recent years, the Arboretum has seen an opportunity and a need to make environmental education more accessible for the hundreds of thousands of visitors of all ages who are not part of structured education programs. As part of a new interpretive plan, the Arboretum is installing eight interactive, outdoor exhibits, each situated in the heart of a specific habitat, including an oak savanna exhibit, an oak woodlands exhibit, and a prairie exhibit. With these installations, the Arboretum intends to more thoroughly introduce visitors to the fascinating ecology of the region, and explore the role that humans have played, and must continue to play, in the conservation of these habitats. Building awareness in the community will leverage and reinforce the conservation work of other organizations in the Eugene-Springfield area and the broader Willamette Valley eco-region.

ORAL

RESCUING REMNANTS V. EXTREME MAKEOVER: RESTORING OAK ECOSYSTEMS ACROSS THEIR RANGE OF HISTORICAL VARIABILITY. **Bart R. Johnson**, Nathan D. Ulrich, Scott D. Bridgham, and Adrienne Moll, University of Oregon, 5234 University of Oregon, Eugene, OR 97403. bartj@uoregon.edu

A fundamental principle of ecosystem management is to conserve ecosystems across their full range of historical variability. Willamette Valley oak savanna was distributed across a range of soils and topography, from highly productive valley floor to rocky, exposed slopes. Conservation planning and restoration have focused on high-quality remnants, particularly those with large, legacy oaks. However, most such sites occur on the low-productivity end of the former savanna spectrum, and even moderate successional infill leads to irrecoverable crown loss to open-grown oaks. Little attention has been paid to restoration on productive sites that have succeeded to conifer forest, and which may have had substantially different savanna species composition and habitat values. Sites that have converted to conifer forest have three key restoration benefits: 1) new oaks should grow rapidly and obtain large open-grown canopies relatively quickly; 2) complete conversion to a forest ground layer may make it easier to restore a high-quality ground layer by "starting from scratch", and; 3) marketable logs and chips can help pay for restoration, and potentially generate revenue for longer-term management. We present evidence for this proposal from a variety of sources: valley-wide GIS and statistical analysis, field data from seven sites, best management practices and cost assessments from practitioners, and simulation modeling data. Protecting and restoring sites with legacy oaks must remain a high priority. However, targeting a conservation portfolio toward the full range of historical variability is ecologically sound, may contribute resilience to oak ecosystems under climate change, and may be cost-effective.

ORAL

RESTORENET: IMPROVING PRAIRIE RESTORATION OUTCOMES THROUGH A REGIONAL NETWORK OF REPLICATED EXPERIMENTS. **Thomas N. Kaye** and Matt Bahm, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97333. tom@appliedeco.org

Restoration of grasslands to improve habitat quality for plants and wildlife is a frequent practice in the Pacific Northwest. The success of these restorations varies widely, with encouraging examples in which native species become dominant and pollinators and wildlife respond positively, but also frequent failures marked by poor native plant establishment and high abundance of invasive weeds. But why do some restorations work and others fail? We hypothesize that native plant establishment in restorations is a function of 1) restoration techniques, 2) site specific factors, and 3) traits of the species used in restoration, all of which may interact. For example, the optimal restoration method at a given location may depend on site conditions such as soil nutrient concentrations, soil texture, the seed bank of invasive plants, land use history, the weather during the year of seeding, etc. Restoration tools such as broad or narrow-spectrum herbicides, soil amendment with nutrients or mycorrhizae, early or late seeding, broadcasting or drilling seeds, etc., may vary in effectiveness due to site conditions or species selected. Here we propose RestoreNet, a regional experiment that includes a standard set of restoration techniques and seed mixes that can be replicated at multiple sites to develop a robust data set with which to test this hypothesis. We invite practitioners to join this network and incorporate an experimental block in ongoing restorations. The expected outcome is a predictive framework to identify the best restoration techniques and native species for a given site, based on easily measured site variables.

POSTER

EFFECTS OF SOIL NITRATE AND PHOSPHATE ON GROWTH OF TRANSPLANTED PRAIRIE FORBS. **Brandon Kennedy** and Briana Lindh, Biology Department, Willamette University, Salem, OR 97301. bkennedy@willamette.edu, blindh@willamette.edu

This project explored the relationship between soil nutrients and native plant growth in 95 plots spread across two restoration units totaling 35 acres at Willamette University's Zena upland prairie restoration site. Specifically, we focused on how nitrate and phosphate levels in the soil affected the growth of native plants and their interactions with invasive plants. We developed a protocol to measure nitrogen and phosphorus in aqueous soil extracts using an ion chromatograph (IC). Using the data on sizes of transplanted plugs of *Achillea millefolium*, we found suggestive evidence that nitrate had a positive effect on *Achillea* size when grown alone ($p=0.17$) and a negative effect when grown with exotic competitors ($p=0.11$), while phosphate had no effect. These results suggest that invasive plants may use nitrate more efficiently than *Achillea,* leading exotics to outcompete natives in high nutrient plots. We also sampled nutrient levels in a nitrogen-phosphate-sugar addition experiment at Zena, and found that although we saw little vegetation response to the addition of individual nutrients, our addition treatments raised soil nutrient levels significantly. Sugar, although it created bare zones almost free of vegetation, caused only tiny reductions in nutrient levels two months after addition.

POSTER

EFFECTS OF SEED SOWING SEASON AND YEAR ON ESTABLISHMENT OF NATIVE PRAIRIE SPECIES. **Sarah Krock**, Joint Base Lewis-McChord Fish and Wildlife, 1210 Mann Ave, Joint Base Lewis-McChord, WA 98433. Sarah.l.krock2.ctr@mail.mil

The restoration of south Puget Sound prairie ecosystems requires considerable input of time and resources. This project aims to identify if sowing seeds in different seasons, and/or sowing in different years could increase the first year establishment rates of a suite of native prairie species. The species mix consisted of 23 different species including annual forbs, perennial forbs, and perennial grasses. A field study with a full-factorial randomized block design was used to test the success of direct seed sowing efforts in early fall, late fall, and winter of in 2014, 2015, and 2016. Vegetation monitoring occurred each spring following the seeding treatments. Some preliminary results suggest that sowing in early fall may result in higher establishment of certain species, in at least one of the years tested. Overall, establishment rates were very low, but additional analysis will help clarify the seasonal and annual effects of sowing time on native prairie plants.

ORAL

DYNAMIC REFERENCE CONCEPT AND RESEARCH-BASED RESTORATION ON SOUTH SOUND PRAIRIES. **Bill Kronland,** Center for Natural Lands Management, 120 Union Ave SE, Olympia, WA 98501. bkronland@cnlm.org

Natural landscapes are not static, but rather in a state of constant flux in response to biotic and abiotic interactions that are present in any given system. Animal populations are also responding to impacts these changes inevitably have on animal habitats. Restoring landscapes to some previous condition for improving habitat therefore becomes much more difficult and even inappropriate, given that previous state may no longer exist on even the most pristine areas. A Dynamic Reference Concept was recently proposed (Heirs et al. 2012. *Ecological Restoration, vol. 30*) as a means of identifying restoration targets and assessing success in moving long-leaf pine landscapes of the American Southeast toward a more 'natural' condition that can aid in the recovery of federally-listed species. This concept selects a Dynamic Reference Site (DRS) that represents some broad set of restoration targets in its present-day condition. Restoration areas are then compared against the DRS to determine if observed change is a result of restoration actions, or in response to some larger biological trigger. We adapted the Dynamic Reference Concept to South Puget Sound Prairies on Joint Base Lewis-McChord (JBLM), beginning in 2015. We recognized through intensive habitat monitoring that South Sound Prairies are very diverse, and require multiple DRS that are often unique to individual prairies. We use a case study presented in context of larger prairie-restoration activities on JBLM to demonstrate how we are adapting the Dynamic Reference concept and research-based restoration to enhance or create habitat for federally-endangered Taylors checkerspot butterfly (*Euphydryas editha taylori*).

ORAL

MAZAMA POCKET GOPHER RESPONSE TO PRESCRIBED FIRE ON JOINT BASE LEWIS McCHORD. **Bill Kronland,** Center for Natural Lands Management, 120 Union Ave SE, Olympia, WA 98501. bkronland@cnlm.org

Fire is an integral tool for managing prairie landscapes in the south Puget Sound region. More than 650 prescribed fires have been implemented since 2008, with an average of more than 1800 acres burned annually. Most of these burns have occurred on Joint Base Lewis-McChord

(JBLM), where relatively relaxed federal-burn regulations have permitted prescribed fires during summer months when much of Washington State has been under mandatory burn-bans. JBLM also encompasses landscapes that support robust populations of two sub-species of federally-threatened Mazama pocket gopher (*Thomomys mazama yelmensii, T. m. glacialis*). Long-term impacts of fire are believed to be beneficial to pocket gopher, while short-term impacts have been largely unstudied, though it is reasonable to suspect that dramatic change in landscape structure would have some negative effect. Moreover, duration of positive post-fire impacts on pocket gopher has been largely unstudied. There is a need to determine interval length between prescribed burns, and quantify negative short-term burn impacts to better apply prescribed fire for Mazama pocket gopher. We began in 2015 to seasonally-monitor pocket gopher occupancy on 25m x 25m plots (n = 720) on 4 JBLM prairies following Percent Area Occupancy methods developed by McKenzie et al. (2006). We found gopher populations fluctuate among seasons, with a general decline during autumn months that can be exacerbated by fire under certain conditions. Gopher occupancy has rebounded or exceeded pre-burn states by the following summer in all instances. We did not detect occupancy declines on unburned sites, suggesting burn intervals could be extended.

POSTER

LANDSCAPING WITH OREGON WHITE OAK: PLANTING PLANS FOR URBAN SETTINGS. **Theodore Labbe**, Urban Greenspace Institute, Portland, OR 97202.

In the spring through fall of 2016, a Landscaping with Oregon white oaks workshop series was presented to residential landowners in oak rich areas of northern Clackamas County Oregon identified in an ongoing Oregon oak tree mapping project - Oak Quest. Four planting plan templates were developed for workshop participants and were included in a 2017 follow-up stewardship guide (of workshop instructional materials) titled: Conserving Oregon white oak in urban and suburban landscapes. Each planting plan is a model for establishing and maintaining a small urban prairie oak habitat project; the four individual plans are titled: young oak savannah, oak shrubland, old oak savannah, and oak woodland. Planting plans were designed after analyzing native vegetation survey data from northern Willamette Valley prairie and oak remnants provided by local ecologists, landscape architects, and native plant horticulturists. Scaled for backyard habitat settings, the plans reflect characteristics and habitat gradients commonly observed in the larger prairie oak landscapes of the northern Willamette Valley such as openings of prairie grasses and wildflowers grading to dense woodlands of oaks, understory trees, and shrubs. The Landscaping with Oregon white oaks project trained oak stewards and increases public awareness and support for ongoing work to improve connections between urban oaks and regional prairie oak habitats in the Portland metro area. The guide and plans are available online.

ORAL

TEND, GATHER, GROW: TRANSFORMING RELATIONSHIPS WITH PLACE, CULTURE, AND COMMUNITY. **Joyce Lecompte-Mastenbrook**, PhD, Westland Gardens Consulting; Marian Harvey, Yakama Nation and Native Youth Leadership Alliance; and Elise Krohn, MA, Garden Raised Urban Bounty. Corresponding author: Elise Krohn wild@goodgrub.org

Educating younger generations on the gifts of the land has always been a cornerstone of Indigenous teachings to strengthen mind, body, and spirit. Yet on average, children in America can recognize over 1,000 corporate logos, but less than 10 native plants. They spend over seven hours a day staring at screens, but only 15-30 minutes playing outside. This has led to what many people call "nature deficit disorder." As adult mentors, how can we empower youth to develop deep and meaningful relationships with the land? The Tend, Gather and Grow Curriculum is a plants focused, hands-on, place-based curriculum rooted in Northwest Native culture. We will share information about two Garry Oak Ecosystem related modules: an overview of camas prairie cultural ecosystems, and a camas prairie walk. In sharing these modules, we will also highlight education strategies for empowering youth including team building, games, storytelling, multi-sensory learning, and mentoring.

ORAL

TAYLOR'S CHECKERSPOT REINTRODUCTION: SETTING THE BAR FOR SUCCESS.
Mary Linders, Washington Department of Fish and Wildlife, 600 Capitol Wy N, Olympia, WA 98501. mary.linders@dfw.wa.gov

Taylor's checkerspot (*Euphydryas editha taylori*) is a grassland-dependent butterfly persisting on relict sites west of the Cascade Mountains from British Columbia, Canada to northwestern Oregon, USA. Efforts to re-establish this federally endangered butterfly at remote historic sites in Washington's Puget lowlands was initiated in 2004, and relies on 1) extensive habitat restoration, 2) annual collections from a single remnant population, 3) propagation of larvae at two captive rearing facilities, and 4) multiple years of release and monitoring. Invertebrate conservation is uniquely challenging due to the inability to mark/track individuals, high mortality, multiple life stages with varying habitat requirements, and extended periods when animals are undetectable. Distance sampling is used to monitor the adult population. A reintroduced population is deemed "established" when peak single day abundance estimates (PSDAE) exceed 250 adults for five consecutive years solely through natural reproduction, and adults are widely dispersed across a 20-ha site. One successfully established population had a PSDAE of 3391 adults in 2016 (95% CI: 2143-5366), with a second showing a strong positive trend (PSDAE: 1463 adults, 95% CI: 692-2458) that is expected to meet establishment criteria by 2021. The project is increasing the number of occupied sites by addressing the combined threats of habitat loss and degradation, population isolation, and small population size. Dispersers from these populations are being monitored for indications of colonization at nearby sites.

ORAL

RESPONSE OF URBAN PLANT PHENOLOGY TO ANTHROPOGENIC CLIMATE CHANGE AND NATURAL CLIMATE OSCILLATION.
Briana Lindh, Willamette University, 900 State St, Salem, OR 97301; and Kees McGahan, University of Utah. blindh@willamette.edu

In western Oregon, winter and spring temperatures vary with the Pacific Decadal Oscillation, making effects of anthropogenic warming difficult to detect. The current study focuses on a

legacy plant phenology dataset collected from 1959-2016 in downtown Salem, Oregon by Wilbur Bluhm. The survey included Bush Pasture Park, which supports a 17-ha acre *Quercus garryana* woodland remnant. In addition to many ornamentals, the dataset included 52 native species, of which 33 are associated with prairie and oak habitats. Our analysis of the overall data set, including ornamentals, identified a strong trend toward earlier spring phenology in more recent years, as well as a separate trend of earlier appearance of fall color in recent years with more severe summer drought. There was an average advance in spring phenology across all species of 2.5 days per decade from 1959-2016. Of native species for which there was fairly complete long-term data, *Ribes sanguineum* leafed out earlier over time and *Mahonia aquifolium* flowered earlier, but *Quercus garryana* did not show changes over time. While more data was collected from 1996-2016, most events for most species did not show significant changes over this "short" time period. A 20-year dataset does allow estimation of the relationship between temperature and phenology. Native species with high and medium affinity for prairie oak habitats showed almost uniform negative relationships with spring temperature over this period, flowering or leafing out 5-7 days earlier per 1ºC of warming, which was similar to the average for all species in the dataset.

ORAL

PACIFIC NORTHWEST TRIBAL CLIMATE CHANGE INITIATIVE. **Kathy Lynn**, Pacific Northwest Tribal Climate Change Project, University of Oregon Environmental Studies Program, Eugene, OR 97403. kathy@uoregon.edu

Indigenous communities in the United States are leaders in addressing climate change. Many American Indian and Alaska Native communities are actively engaging climate change policy development, developing vulnerability assessments and adaptation plans, and taking actions to address the impacts of climate change on their communities. Indigenous approaches to climate change adaptation often bridge western scientific assessments with traditional knowledges and are embedded within indigenous efforts to protect and strengthen tribal sovereignty and cultural resources. Pacific Northwest tribes have been at the forefront of many of these efforts through direct action on tribal lands as well as through government-to-government actions to address the impacts of climate change on off-reservation cultural and natural resources. The Tribal Climate Change Project began as a collaborative project between the University of Oregon Environmental Studies Program and the USDA Forest Service Pacific Northwest Research Station. The Project is now funded by diverse partners, including the Bureau of Indian Affairs, the Affiliated Tribes of Northwest Indians, the North Pacific Landscape Conservation Cooperative and the USDA Forest Service Pacific Northwest Research Station. The project focuses on understanding needs and opportunities for tribes in addressing climate change, examining the government-to-government relationship in a climate context and exploring the role of traditional knowledge in climate change studies, assessments and plans.

ORAL

THE QUESTION OF CAMAS PRODUCTION & EXCHANGE BY ANCIENT STS'AILES ON THE HARRISON RIVER OF BRITISH COLUMBIA. **Natasha Lyons**, Ursus Heritage Consulting, Simon Fraser University, Coldstream, BC, Canada; and Morgan Ritchie, Sts'ailes, University of British Columbia, Vancouver, BC, Canada.

Edible root resources were widely cultivated and consumed by First Peoples throughout North America from the early to mid-Holocene to historic times. In recent decades, archaeobotanists, ethnobotanists, archaeologists, and traditional knowledge-holders have explored and clarified many aspects of root food ecology, production, and exchange. This paper focuses on camas, considered a cultural keystone species across much of western North America because of its high cultural value and influence in defining the cultural identities and land use of resident communities. While historic camas use by First Peoples has been widely documented throughout the Pacific Northwest, the archaeology of camas is little known at coastal sites. This paper presents evidence for a concentration of camas bulbs (*Camassia* spp.) found in an earth oven complex within an ancient Sts'ailes (Chehalis) village in the Upper Fraser Valley of southwestern British Columbia, Canada. We explore the abundant ethnobotanical and ethnohistoric camas literature in order to create a picture of the ancient production and exchange of camas amongst coastal communities of the Northwest Coast, and consider the ecological question of how this resource came to be found 150 km outside of its historical growing range. Food Sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

ORAL

THE WILLAMETTE VALLEY OAK ACCORD: CATALYZING STEWARDSHIP INTO PRIVATE LAND CONSERVATION. **Nicole Maness**, Willamette Partnership, 4640 SW Macadam Ave, Portland, OR 97239. maness@willamettepartnership.org

The Oak Accord is a land-owner led voluntary conservation agreement designed to reverse the precipitous loss of oak habitat across the Willamette Valley. The Accord is inspired by local landowners' vision that management of vineyards and forestland takes place in harmony with healthy, sustainable, resilient oak habitat. It creates a mechanism to introduce new Willamette Valley landowners to the need for and importance of oak conservation and creates a community-designed stewardship standard for existing land managers and owners. Signatories to the Accord commit to generating a net increase in quality of oak habitat on their properties through protection, enhancement, and restoration. These private lands, distributed throughout the Willamette, provide a network of managed native woodlands and savanna that increases resiliency of oak in the face of changing climate, expanded urban development, and rapidly increasing conversion to vineyards and other agricultural production. As of March 31, 2018, 46 landowners have signed the Accord, representing over 1500 acres of oak under conservation management. This talk will describe the motivating forces behind the formation of the Accord, identify the challenges and opportunities for tracking the cumulative benefit of restoration activities at the landscape scale, and suggest how we can better connect private landowner restoration to regional conservation initiatives.

ORAL

RE-EVALUATING NURSERY GROWN PLUGS FOR RESTORATION. **R. Adam Martin**, Bill J. Kronland, and Kathryn C. Hill, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501; and Peter W. Dunwiddie, Department of Biology, University of Washington, 24 Kincaid Hall, Seattle, WA 98105. amartin@cnlm.org

Many efforts to recover and reintroduce plants of conservation concern frequently involve using nursery-grown plugs to establish new populations. These species often have limited high-value seed, making out-planting of plugs more common than direct seeding. Our experience restoring three species of conservation concern; golden paintbrush (*Castilleja levisecta*), harsh paintbrush (*Castilleja hispida*), and Puget balsamroot (*Balsamorhiza deltoidea*), has led us to question the effectiveness of out-planting plugs as a restoration strategy. A retrospective analysis of 68 reintroduction attempts of golden paintbrush across 15 years found only two plantings created more individuals than originally introduced. Similarly, demographic studies of 4,403 harsh paintbrush and 5,580 Puget balsamroot across multiple sites have found minimal success from out-planted plugs. With these two species, plug condition and nursery-lot origin exhibited widely differing survival outcomes and these non-habitat factors had a stronger effect on survival than plant community, site placement, and topography. Also, small scale factors drove survival rates more than larger scale factors like site. Further, plugs of long-lived and slow maturing species like Puget balsamroot may need to be outplanted at prohibitively higher densities to create self-sustaining populations. In contrast, direct seeding has created new populations of thousands of individuals of both harsh and golden paintbrush. We conclude seeding should replace using nursery-grown plugs because it distributes greater numbers of propagules across larger areas and more suitable microsites, thereby increasing the likelihood of establishing populations. Thus, a more efficient allocation of resources may be towards increasing available seed for direct sowing instead of producing plugs.

ORAL

HABITATS AND COMMUNITY AT CERRO GORDO. **Robin Meacher**, McKenzie River Trust, 1245 Pearl St., Eugene, OR 97401; and **Eric Alan**, Cerro Gordo Land Conservancy. robin@mckenzieriver.org

In 1974 a visionary group of people led by the late Chris Canfield purchased more than 1000 acres of forests and meadows above Dorena Reservoir, in the foothills east of Cottage Grove, Oregon, with the goal of creating a village in harmony with nature. The property has extensive remnants of native prairie and oak habitats, and a diverse native flora, including more than 120 species of native prairie and oak associated grasses and forbs. While the original village plan never fully materialized, a dedicated core remained committed to conserving the land and its habitats, and has formalized their role as Cerro Gordo Land Conservancy. In 2012 a USDA Healthy Forests Reserve Program easement was secured on 447 acres of Cerro Gordo forest land. Then in 2017 a 531-acre conservation easement, covering the prairie and oak habitats, was established through the Willamette Wildlife Mitigation program in partnership with the McKenzie River Trust. In this presentation we will tell the story of the conservation easement process, as well as stories of community members' time on the land, all of which involve the interweaving of many strands of experience, time, and place.

ORAL

USING CATTLE GRAZING TO AID RESTORATION OF OAK SAVANNA AND NATIVE PRAIRIE HABITAT. **James P. Merzenich**, 35200 Northernwood Dr, Brownsville, OR 97327. jim@oakbasin.com

Oak Basin tree farm consists of 956 acres in the Coburg hills south of Brownsville Oregon. South and west aspects, which occupy half of the total acreage, generally support oak and oak savanna. North and east aspects support Douglas-fir, grand fir, and big leaf maple. Moist and dry meadows are dispersed throughout the property. Oak Basin contains some of the largest intact parcels of oak savanna and prairie habitat remaining in the southern Willamette valley and is home to the endangered Fender's Blue butterfly (*Icaricia icarioides fenderi*) and other rare plant and vertebrate species associated with oak woodlands and savanna. In coordination with the US Fish and Wildlife Service, Natural Resource Conservation Service, and other entities we are actively restoring these areas by removing competing vegetation, prescribed burning, and reestablishing native grasses and forbs. Since 2010 we have maintained a small herd of Scottish Highlander Cattle to aid in this restoration. This heritage breed is smaller, slower to develop to a marketable age, and has a more varied diet than traditional breeds. This presentation will discuss some of the benefits, limitations, and lessons learned from using cattle to aid in restoration while producing a saleable product. Our tree farm's primary objective is to demonstrate that a sustainable flow of harvestable timber, cattle, and non-traditional products can be economically produced from a property that is managed for native species protection.

POSTER

FENDER'S BLUE BUTTERFLY MANAGEMENT AT FERN RIDGE LAKE. **Wes Messinger,** Corps of Engineers, Willamette Valley Project, 26275 Clear Lake Rd, Junction City OR, 97448. wes.messinger@usace.army.mil

Sustained ecologically appropriate management may be needed to increase remnant populations of rare species on small, isolated sites. Fender's blue butterfly, listed Endangered in 2000, requires specific larval hosts, high quality adult nectar resources, and low-statured vegetation, all of which were limiting at time of listing. At Fern Ridge Lake, twenty years of Corps of Engineers effort to increase larval host and nectar abundance, reduce tall exotic vegetation, improve native plant communities, and increase connectivity are associated with an increase in butterfly numbers from a low of 12 animals to about 9,000. During this period, the number of occupied sites increased from 2 to 11 as a result of increased inventory, restoration, and establishment of stepping stone habitat. In part due to intensive management, 80 acres supported about a third of all Fender's blue butterflies as of 2016.

POSTER

FERN RIDGE RESEARCH NATURAL AREA. **Wes Messinger,** Corps of Engineers, Willamette Valley Project, 26275 Clear Lake Rd, Junction City, OR, 97448. wes.messinger@usace.army.mil

Public land provides benefits including species conservation, ecological function, and scientific knowledge. Authorized by Congress in 1939, the Corps of Engineers' Fern Ridge Project (Oregon, Lane County) includes nearly 5500 acres of marsh, wet and upland prairie, and deciduous forest: a significant quantity of publicly held habitat on the heavily utilized Willamette Valley floor. Following Heritage Program surveys in the 1980s, the Corps designated 250 acres of wet prairie as the Fern Ridge Research Natural Area. These sites comprise the only Corps of

Engineers RNA, and one of two on the floor of the Willamette Valley. Other land use designations on these parcels include the Oregon Department of Fish and Wildlife Fern Ridge Wildlife Area and Critical Habitat for *Erigeron decumbens* and Fender's blue butterfly. The RNA supports 10 plant species of conservation concern including *Lupinus oreganus*, *Sericocarpus rigidus*, *Horkelia congesta*, the largest remnant population of *Erigeron decumbens*, and large numbers of *Lomatium bradshawii*. It is the type locality of *Amanita pruittii*, described in 2014. It supports nesting territories of Western Meadowlarks and Grasshopper Sparrows. Corps management is intended to sustain ecological processes including fire and to reduce the influence of exotic species. Two dozen studies on the RNA include seminal work on prescribed fire and *Lomatium bradshawii* demography. Current studies address prairie fungi communities, plant demographics, and exotic grass control against a background of prescribed fire.

POSTER

FROM ACORNS TO LEGACY OAKS: THE KLAMATH-SISKIYOU OAK NETWORK – KSON. **Ellen Michaels-Goheen**, USDA Forest Service, Forest Health Protection, Plant Pathologist, 2606 Old Stage Rd, Central Point, OR 97502. egoheen@fs.fed.us

The Klamath-Siskiyou Oak Network (KSON) is a successful working group that recently formed to address oak restoration needs and challenges in the Klamath Siskiyou Bioregion. Our mission is to conserve oak habitats on private and public lands in southern Oregon and northern California. This area supports high biodiversity, a range of wildlife habitats, rare fauna and flora, and a rich history of traditional cultures. A mosaic of oak ecosystems including woodland, chaparral, and mixed oak/conifer provide fire resilience across the landscape. Most of the oak habitat occurs on private lands and oak restoration is challenging and costly. Through our partnership we are implementing on-the-ground conservation and restoration activities, gaining an understanding of our oak ecosystems through multi-party research and monitoring, promoting social eco-cultural values, encouraging community engagement, developing and promoting best management practices, and finding and maintaining effective partnerships. Examples include assessing and mapping Rogue Basin oaks and their climate resiliency, implementing restoration activities and monitoring on the Table Rocks, publishing a landowner field guide, organizing landowner field days, and holding an oak science day. In October 2017, we were granted OWEB funding to identify and prioritize future oak restoration activities in the region. Our ultimate goals are to increase acres treated across the Klamath Siskiyou landscape, expand our understanding of oak ecosystems, create additional tools to disseminate our collective expertise, and understand and meet emerging threats. We believe our collaborative "all lands" approach is a model for the creation of other work groups in the natural resources.

ORAL

PROTECTING AND RESTORING HABITAT IN AN URBAN COMMUNITY PARK: A RECENT PROJECT IN SKINNER BUTTE PARK, EUGENE, OREGON. **Shelly A. Miller** and Lauri J. Holts, Eugene Parks and Open Space, 1820 Roosevelt Blvd, Eugene OR 97402. shelly.a.miller@ci.eugene.or.us

Prior to European settlement, the south, east, and west flanks of Skinner Butte were open prairies and oak savanna, a landscape maintained in part by fire. Since then, without regular disturbance, a large number of various types of trees have come in on their own or been planted, converting this part of the Butte into a more dense woodland. In addition, many invasive shrubs and trees such as blackberry, wild cherry, English elm, and English hawthorn colonized extensive areas and dominated the lower growing vegetation. In the late summer of 2017, Eugene Parks and Open Space undertook a project to enhance habitat and reduce wildfire risk over approximately 6.5 acres on the part of the butte formerly consisting of prairie and savanna. Crews using primarily hand tools removed dense thickets of non-native undergrowth, removed many larger invasive tree species, and reduced the density of other native tree species. Conducting this work in the heart of Eugene in a heavily used park necessitated extensive planning, outreach and oversight. The resulting character of Skinner Butte provides opportunity for additional desired passive recreation and environmental education and outreach.

ORAL

GRASSHOPPERS AND CRICKETS OF THE NORTHWESTERN OAK-PRAIRIE LANDSCAPES. **James Miskelly**, Research Associate, Royal British Columbia Museum, P.O. Box 174, Brentwood Bay, BC V8M1R3. james.miskelly@gmail.com

Like most insect groups in oak-prairie landscapes, the grasshoppers and crickets have been poorly sampled. This is despite their large body size, ease of observation, and importance to both food webs and human economies. In the oak-prairie landscapes of the Willamette Valley Puget Trough Georgia Basin ecoregion, the grasshoppers and crickets comprise about 35 species. Included are widespread species and species with typically more southern or east-side ranges. There are also several ecoregional endemics or near-endemics. Some of these species may be rare or at-risk. More basic inventory work is needed to better understand the distribution and diversity of this insect group. The relative ease with which these insects can be observed, photographed, and identified makes them well-suited to study by naturalists and citizen scientists.

ORAL

RESTORATION AND EDUCATION AT AN URBAN FARM ON VANCOUVER ISLAND. **Kristen Miskelly** and James Miskelly, Saanich Native Plants, 741 Haliburton Rd, Victoria, BC, V8Y 1H7. kristen.miskelly@gmail.com

The earliest written accounts of southern Vancouver Island describe “prairies” and “plains” that once blanketed the area. Though colonization, urbanization, invasive species, and other threats continue to degrade these ancient prairies, community groups are showing that significant conservation gains can be made on small parcels of land. Haliburton Community Organic Farm is a small farm near Victoria that recognizes that to sustain ecosystems we must restore and build connections between people and nature. It is home to a blend of operations that includes organic vegetable farming, a native plant and seed nursery, and a volunteer-driven restoration and biodiversity project. The Biodiversity Project works towards restoration of meadow and wetland habitat at the farm and provides education to the public about native habitats, wildlife,

Indigenous history, and restoration techniques. Saanich Native Plants opened at Haliburton Farm in 2013 and now provides one of the largest selections of native plants to the Victoria area, as well as the only source of field-grown native seed. Through workshops, courses, tours, and outreach, the nursery aims to assist others in conserving and enhancing the unique habitats of the Victoria area.

ORAL

PLANTS FOR PEOPLE: IMPROVING ACCESS TO CULTURALLY IMPORTANT PLANT SPECIES. **Peter Moore**, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97333; and Jeremy Ojua, Natural Resources Department, Confederated Tribes of Grand Ronde, 47010 SW Hebo Rd, Grand Ronde, OR 97347. peter@appliedeco.org

The Plants for People project aims to help incorporate traditional ecological knowledge and culturally important plant species into restoration of prairie and oak savanna habitat in the Willamette Valley. During Phase I of the project, seed of three species was collected and put into production. Large camas, Gairdner's yampah, and other species were grown in raised in beds, and shrubs were planted in cutting beds, at a new nursery at Confederated Tribes of Grande Ronde. Tribal elders were invited to Herbert Farm & Natural Area and Champoeg State Park to share their knowledge in order to gain insights for restoration and future harvest opportunities. The project culminated in a Tribal Native Plant Materials Development Plan which will help guide plant production. The second phase of the project is partially funding a nursery manager and expanding the production of culturally significant species. As well as contributing to restoration projects at five sites, we will work with partners to develop a plan for traditional gathering and harvest by tribal members at Champoeg State Park. The Plants for People Project and Tribal Native Plants Materials Program has presented the tribe and the community with new opportunities by providing employment, cultural education, and access to culturally significant plants to use in restoration efforts on lands managed by the tribe and elsewhere. It is also establishing sites that tribal members will one day be able to practice traditional gathering of plants for food and other cultural uses.

ORAL

MIGHT YOU HAVE YOUR CAKE AND EAT IT, TOO? COMPARING REGULATORY STRATEGIES TO SAVE OAK AND UPLAND PRAIRIE SPECIES IN THE WILLAMETTE VALLEY. **Adam Novick**, University of Oregon, 3715 Donald St, Eugene, OR 97405. anovick@uoregon.edu

Dependence on active management and private ownership pose challenges to saving the Willamette Valley's oak and upland prairie species through uncompensated land-use regulation based on the presence of species. Regulatory risk can discourage active management, and landowners can in theory lawfully evade such regulation through passive destruction. Attempted regulatory approaches have included (1) imposing strict land-use restrictions, (2) imposing liability for mitigation (the current dominant approach), and to a limited extent, (3) openly refraining from both of these strategies. Comparing various types of costs and benefits of these approaches, while distinguishing between private and public ownership and between

maintenance-dependent species and other species, I argue that for these oak and prairie species, (1) imposing strict species-based land-use restrictions offers ecological and political costs and limited ecological benefits; (2) imposing liability for mitigation offers similar ecological and political costs, few new land-use restrictions, and relatively little funding in addition to public funding typically available for administration, acquisition, and maintenance; and (3) while likewise offering few new land-use restrictions, openly refraining from both such strategies might offer largely the same funding, avoid their ecological and political costs, and give everyone the freedom to conserve or maintain populations of these species without incurring harm from regulation intended to save them. This analysis suggests that regulators might have opportunities to improve the survival of these species through policy efficiencies, by considering a wider range of regulatory strategies and a more refined understanding of the factors involved.

ORAL

THE BURNING OF MOSES PRAIRIE ON THE QUINAULT INDIAN RESERVATION.
Cavin Park, 1214 Aalis Drive, P.O. Box 189, Taholah, WA 98587. Cavin.Park@quinault.org

In 2016 a group of people came together to complete a prescribed burn for the Moses Prairie, located three miles south of the Village of Queets and one mile from the Pacific Ocean. The Quinault prairies are peat-based wetlands that are home a diverse array of plants, including numerous edible, medicinal and textile plants and species that support herds of elk and other wildlife. The Moses Prairie was selected due to complete Quinault ownership and accessibility by roads. Approximately 14 of the 200 acres were burned as a pilot project, representing the return of traditional tribal management strategies for the first time since the late 1800s. The burn area contained sixteen permanent vegetation-monitoring plots, used to generate a plant list from multiple surveys. A paleoecology study was conducted to use modern science as a complimentary tool to Traditional Ecological Knowledge through radiocarbon dating of charcoal samples. Invasive species were removed from the surrounding area to prevent the re-introduction of undesirable species following the fire activity. This talk will cover the historical importance of the controlled burns that the Indigenous people of the Pacific North West, specifically the Quinault and Queets people, applied to the prairies to facilitate an abundance of staple foods. It will also cover our lead up and preparation to this contemporary burn, the training, pre-burn safeguarding, and ecological monitoring before and after the burn, including discussion of fire effects on camas, sedges and shrubs.

POSTER

ENHANCING GRASSLAND HABITAT IN THE MIDDLE OF THE COLUMBIA RIVER.
Matt Paroulek, Carrie Butler, Maureen Minister, and Sarah Wilson, Port of Portland, 7200 NE Airport Wy, Portland, OR 97218. Matthew.Paroulek@portofportland.com, Carrie.Butler@portofportland.com, Maureen.Minister@portofportland.com, Sarah.Wilson@portofportland.com

The Port of Portland (Port) initiated a 50-acre grassland enhancement project on Government Island in 2012 to mitigate for future impacts to lands at the Portland International Airport. The primary goal for the project is to create a site that provides the habitat structure and function

necessary to support grassland associated wildlife, particularly grassland birds and pollinators. Prior to implementation, the site was highly degraded and dominated by pasture grass and invasive broadleaf species. The Port began preparing the site in 2012 which included herbicide applications and mowing to achieve a site suitable for seeding. In the fall of 2015 the site was seeded with 7 species of native grasses and 26 species of native forbs including 2,000 hand planted native camas bulbs. Since 2010, Port staff have conducted regular bird and vegetation surveys and have partnered with the Xerces Society to conduct pre-and post-implementation pollinator surveys. This site presents unique logistical challenges and opportunities due to its island location. An extensive weed seed bank, surrounding degraded habitat, anthropogenic pressures, and extensive flooding have increased the complexity of this already dynamic system. The project is being approached as a field trial, utilizing principles of adaptive management, to determine the most practical and effective methods for enhancing grassland habitat on Government Island, and to determine which habitat targets are achievable and sustainable. Results from this project will inform management strategies for up to 250 additional acres of grassland mitigation on the island.

ORAL

FROM LAWN TO LILIES: A BLANK SLATE ECO-CULTURAL RESTORATION PROJECT IN COASTAL B.C. **Aimée Pelletier**, Species at Risk Engagement Officer, Fort Rodd Hill & Fisgard Lighthouse National Historic Sites, Parks Canada, 603 Fort Rodd Hill Rd, Victoria, BC V9C 2W8. aimee.pelletier@pc.gc.ca

The Garry Oak Learning Meadow is a blank slate eco-cultural restoration project initiated by Parks Canada in 2010 as a way of engaging the public in restoring a site from a patch of degraded lawn to a diverse wildflower meadow that attracts and supports local biodiversity. The one-acre site includes an area of woodland with an existing canopy of Garry Oaks, an open meadow, and a small rock outcrop. Prior to restoration, the area was heavily impacted by years of military use from the late 1890s to 1956 and subsequent visitor use as an historic site managed by Parks Canada. First Nations, volunteers, students and community partners have been integrated into the project every step of the way, starting with two years of mulching with leaves from urban curbside leaf collections, installation of a deer fence, establishment of native shrub thickets, planting of native plant bulbs and seedlings, and installation of an interpretive trail. A large percentage of the plant material for site restoration was grown in an onsite Conservation Nursery, which was purpose built as a teaching location for demonstrating how to propagate native plants as well as a site for growing many species at risk that Parks Canada is working to recover. Now in its 6th spring, the wildflower show in the Garry Oak Learning Meadow is a peak visitor attraction at a site better known for its military history. It has become an education hub for the public to learn a wilder way to garden for wildlife, an outdoor classroom for students to learn about nature and restoration, and a living laboratory for citizen science research.

ORAL

GRAZING PRACTICES TO SUPPORT POLLINATORS. **Emma Pelton**, Stephanie McKnight, Candace Fallon, Rich Hatfield, Sarina Jepsen, and Scott Black, Xerces Society for Invertebrate Conservation, 628 NE Broadway, Suite 200, Portland, OR 97232. emma.pelton@xerces.org

Many wild pollinator species, including monarch butterflies and some bumble bee species, are in decline. Grazed lands are essential to the conservation of pollinators, but land managers need science-based, actionable guidance. The Xerces Society for Invertebrate Conservation is working with multiple public land management agencies to develop meaningful Best Management Practices (BMPs) for monarchs and pollinators on grazed lands. The BMPs are based on 1) a thorough literature review of peer-reviewed and technical materials related to grazing and pollinators and 2) surveys and interviews with practitioners and researchers who understand the science, practice, and economic issues related to pollinator conservation and habitat management. Management practices addressed in the BMPs are focused on grazing, but also include recommendations on mowing, fire, pesticide use, restoration practices, and invasive species management. Guidance is region-specific and include optimal methods and timing of management activities for relevant species. The management practices are summarized in clear, concise guidance which can be used by practitioners in the field. The BMPs provide both a roadmap and technical guidance for incorporating pollinator conservation into grazing practices in the West.

ORAL

MONITORING OCULAR ESTIMATION AND OBSERVER BIAS IN LONG TERM ECOLOGICAL RESEARCH. **Sasha R. Porter,** Integrated Training Area Management, 4074 Kaufman Ave, Joint Base Lewis-McChord, WA 98433. sashaporter@gmail.com

Ocular estimation methods in which a trained monitor assesses the cover of a vegetative functional group can quickly produce data covering large areas. However, the precision of the technique is difficult to measure, and even within the same ecosystem individuals may produce inconsistent results. Each year the Range and Training Land Assessment (RTLA) program monitors cover of native grass (NG), native forb (NF), exotic grass (EG), and exotic forb (EF) in 2,600 25x25 meter sample quadrats across 9,000 acres in Joint Base Lewis-McChord's prairie habitat. We developed a secondary project to statistically quantify rates of error between monitors, in different quadrat sizes, within functional groups, and through time, to inform interpretation of data from our larger long-term monitoring. There was no difference between individuals for any functional group in either plot size, though estimates varied less in larger plots. For functional groups that represented <10% mean cover, overall (NG, NF, EG) coverage was almost twice as high in larger plots, while there was no difference in EF (31.35–32.6%) between plot sizes. This may indicate that differences were not observation based, but due to functional groups clumping within a landscape, and highlights the importance of selecting an appropriate quadrat size based on ecosystem characteristics. RTLA photographed all 24 plots every three weeks to allow for future monitoring to calibrate to previous years, and have basis on plant phenology rather than calendar date. This research has increased confidence in data collection methods to produce useful information on landscape change and management effects over time.

ORAL

SONORA SKIPPER AND OREGON BRANDED SKIPPER: CONSERVATION STATUS UPDATES FOR TWO AT RISK BUTTERFLIES IN WASHINGTON STATE. **Ann Potter**, Washington Department of Fish and Wildlife, P.O. Box 43141, Olympia, WA 98504-3200; Thor Hanson, 351 False Bay Dr, Friday Harbor, WA 98250; and Loni Beyer, 315 Date St, Imperial Beach, CA 91932. ann.potter@dfw.wa.gov

Sonora Skipper (*Polites sonora siris*) and Oregon Branded Skipper (*Hesperia colorado* Salish Sea segregate) are designated as Species of Greatest Conservation Need in Washington State. The first species occurs only in southwestern Washington, and the latter in western Washington and southern Vancouver Island, British Columbia, Canada. Both butterflies inhabit native grasslands which have significantly declined in amount and condition, and rely on select graminoid plants for egg-laying and larval feeding. From 2013-2017 we conducted surveys to determine the occupancy status of previously documented populations and locate new populations. We monitored extant populations located in the South Puget Sound region to understand within site distribution and relative abundance. We also collected key natural history information for both butterflies. We documented reduction in population numbers and sizes, new life history information, and identified new threats for both imperiled butterflies.

POSTER

SAFE HARBOR FOR RARE BUTTERFLIES. **Zachary Radmer**, U.S. Fish and Wildlife Service, 510 Desmond Dr SE, Lacey, WA 98503. Zachary_Radmer@fws.gov

The Endangered Species Act encourages voluntary cooperative conservation of threatened and endangered species. Specifically, the U.S. Fish and Wildlife Service can enter into Safe Harbor Agreements with non-Federal entities to provide a net conservation benefit for ESA-listed species and provide regulatory certainty and incidental take protection for the cooperator. Rare butterflies in the Northwest's glacial outwash prairie and coastal headland ecosystems, specifically Taylor's checkerspot butterfly (*Euphydryas editha taylori*), Fender's blue butterfly (*Icaricia icarioides fenderi*), and Oregon silverspot butterfly (*Speyeria zerene hippolyta*) are benefitting from these agreements. A central challenge in completing Safe Harbor Agreements is the establishment of the "baseline" condition of the species on the enrolled property – which is a measure of the seasonal or permanent use of the property by the covered species. Safe Harbor Agreements for listed butterflies inevitably use different strategies for establishing "baseline" and may include a variety of net conservation benefits.

ORAL

PRAIRIE PHENOLOGY RESPONDS TO MANIPULATED TEMPERATURE, BUT NOT PRECIPITATION, ACROSS A LATITUDINAL GRADIENT. **Paul B. Reed**, Laurel E. Pfeifer-Meister, University of Oregon, 1585 E 13th Ave, Eugene, OR 97403; Sarah T. Hamman, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501; and Bitty A. Roy, Bart R. Johnson, Graham T. Bailes, Aaron A. Nelson, and Scott D. Bridgham, University of Oregon, 1585 E 13th Ave, Eugene, OR 97403. preed@uoregon.edu

By the end of the 21st century, climate change in the Pacific Northwest (PNW) may increase temperatures by approximately 2.5°C, with the potential for more severe and frequent droughts. Such climate change may be expected to impact plant demographics and cause shifts in the phenology of native prairie plants. At three prairie sites across a 520 km latitudinal Mediterranean climate gradient within the PNW, we monitored flowering phenology of 12 prairie grasses and forbs, planted at or beyond their current northern ranges, under four climate treatments (control, drought, warming, and warming with increased precipitation). We counted numbers of plants and calculated first and peak dates for budding, flowering, and floral senescence. Temperature was the overwhelming control within a site, while additional precipitation and drought had no effect. Warming almost always advanced phenology relative to ambient temperature. Site also affected the timing of flowering, although the direction of the response did not always follow the expected latitudinal temperature gradient. For several species, many plots had few to no flowering plants, and this was generally more common at the southern and central sites relative to the northern site. These results suggest that while flowering times are likely to advance for many native PNW prairie species near their current northern range limits, survival to reproduction will be a much more important constraint in a future with increasing temperatures.

ORAL

LESSONS FROM CATTLE GRAZING ON NATIVE PRAIRIES IN THE TUALATIN BASIN.

Nicole Ruggiero, Tualatin Soil and Water Conservation District, 7175 NE Evergreen Pkwy #400, Hillsboro, OR 97124; and George Kral, Ash Creek Forest Management, LLC, P.O. Box 231208, Tigard, OR 97281-1208. nicole.ruggiero@tualatinswcd.org

Land managers of prairie and savanna sites in the Willamette-Puget Trough-Georgia Basin (WPG) ecoregion are tasked with reestablishing native species, managing the threat of invasive species, and encouraging or introducing regular disturbance regimes to maintain ecosystem function. Historic disturbance regimes included anthropogenic burning and grazing by native ungulates. While fire remains critical from an ecological perspective, a number of climatic and logistical barriers exist in places like the urban-fringed and populated Tualatin basin. Using cattle to manage native prairie is a growing tool and area of study in the WPG. With cooperation and support from the Wildlife Conservation Society Climate Adaptation Fund, Tualatin Riverkeepers, landowners, and cattle operators, we grazed and seeded two Tualatin basin prairie sites during 2016 and 2017. The goal of grazing was to create disturbance and improve diversity and composition of the native herbaceous plant community. We captured baseline vegetation conditions before grazing and tracked change in height and percent cover of vegetation groups as a result of grazing. Cattle provided the necessary disturbance to both prairies to facilitate a change in height of vegetation during the grazing period, however results in percent cover of bare ground and thatch/litter differed between sites. After one year, native forb cover increased, as did non-native forb cover. In addition to preliminary ecological data, we will discuss challenges, successes, management implications, and the importance of partnerships in implementing this type of program.

ORAL

PERSPECTIVES FROM A CATTLE RANCHER ON GRAZING FOR CONSERVATION BENEFIT. **Darrick Salyers,** Landowner. Creswell, OR. Corresponding author: ekim@cnlm.org

Creswell Oaks is a nearly 1,700-acre property just south of Eugene. The property contains multiple ridges of oak woodlands, oak savanna, large grasslands, and over 4 miles of stream. The woodlands on the property have been managed for timber for decades and are currently managed to support and sustain oak, consistent with future conservation goals. The property is currently a working ranch, with the ongoing grazing goal focused on vegetative structure over economic benefit. The grazing regime provides a cost-effective way to manage invasive species throughout the property and maintain suitable habitat for grassland birds. Multiple generations of the Salyers family live on the property and are committed to growing the conservation values that are already present. The Center for Natural Lands Management is in the process of placing a conservation easement just over 1,600 acres on this property with funding from the Willamette Wildlife and Mitigation Program. The property is currently grazed using rotational grazing with many conservation measures already in place. Timing of pasture management is coordinated to protect habitat, breeding, and nesting of the Oregon vesper sparrow, as this property hosts the Willamette Valley's largest population of this rare bird. This presentation will provide the perspective of the landowner on incorporating restoration activities into his grazing regime.

ORAL

HYBRIDIZATION BETWEEN *CASTILLEJA LEVISECA* AND *C. HISPIDA*: IMPLICATIONS FOR TAYOR'S CHECKERSPOT BUTTERFLY MANAGEMENT. **Isaac J. Sandlin,** Oregon State University, Department of Botany and Plant Pathology, Cordley Hall, 2701 SW Campus Wy Corvallis, OR 97331; Ryan Contreras, Department of Horticulture, Oregon State University, 4017 Ag and Life Sciences, Corvallis, OR 97331; Thomas N. Kaye, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97333. isaac.sandlin@oregonstate.edu

Conservation conflicts may develop on restoration sites with multiple species recovery objectives. For example, the recovery of Taylor's checkerspot butterfly (*Euphydryas editha taylori*) and golden paintbrush (*Castilleja levisecta*), two federally listed species, has come into conflict on several remnant prairies in southwest Washington. This conflict arises from the routine planting of harsh paintbrush (*C. hispida*), which is a favored host plant for Taylor's checkerspot larvae. Recently, biologists have observed putative *Castilleja* hybrids on recovery sites where golden paintbrush and harsh paintbrush have been planted in close proximity, prompting fears that genetic swamping could threaten golden paintbrush. The primary objective of this research is to assess the introgressive threat to golden paintbrush through the evaluation of hybrid fertility. To that end, we conducted a series of controlled crosses between golden paintbrush and three cytotypes of harsh paintbrush, and measured the resulting fruit set, seed set, and seed germination. Seed set from crosses between golden paintbrush and diploid harsh paintbrush averaged 55% (± 5%), while golden paintbrush crosses with 4n and 6n harsh paintbrush yielded 9% (±3%) and 0.4% (±0.1%) seed set, respectively. Also, seed germination from golden paintbrush crossed with diploid harsh paintbrush averaged 73% (± 5%), while germination of seeds from golden paintbrush crossed with tetraploid harsh paintbrush averaged

15% (±13%). Hybrid crosses between the diploid types appear to pose a potential threat to golden paintbrush through introgression and genetic swamping. However, crosses with polyploid harsh paintbrush appear to have lower risk of successful hybridization.

POSTER

AN UPDATE ON WESTERN BLUEBIRD RECOVERY IN THE PACIFIC NORTHWEST.
Gary Slater, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501; Kathleen Foley and Rob Roy McGregor, San Juan Preservation Trust, Friday Harbor, WA 98250; Genevieve Singleton and Ryan Hetschko, Cowichan Valley Naturalists Society, Duncan, BC, V9L 1M2; Jim Lynch, Joint Base Lewis McChord Military Base, Fish and Wildlife Program, Joint Base Lewis McChord, WA 98433; and Bob Altman, American Bird Conservancy, Corvallis, OR 97330. gslater@cnlm.org

Since 2007, numerous partners have been working to restore a regional population of Western bluebirds (*Sialia mexicana*) to their former range in western Washington and southwestern British Columbia through reintroduction. This secondary cavity-nester and short-distance migrant was considered common in oak-prairie habitats during the early 1900's, but populations began disappearing in the mid-1900s due to habitat loss and fragmentation and competition for nesting cavities. We translocated and released 134 (99 adults) individuals on San Juan Island, WA and 110 (56 adults) individuals into the Cowichan Valley, BC during the periods from 2007-2011 and 2012-2016, respectively. Joint Base Lewis McChord in south Puget Sound served as the primary source population. At both reintroduction sites, initial results indicated reintroduction success: population sizes increased (max: 38 adults on San Juan Island, 29 adults in Cowichan Valley) and demographic rates were similar to other large populations in the region. However, both populations declined following cessation of translocations, and emergency translocation were initiated in 2014 on San Juan Island. Major threats to project success include: high nest predation rates and adult female mortality from urban predators and house sparrows and low juvenile recruitment rates. Active management to make nest boxes safer will be required for the long-term success of the project. Dispersal events have been recorded among the reintroduction sites and the donor population in south Puget Sound. Conservation actions that help expand the size of the South Sound population will also likely improve long-term viability of the regional reintroduced population.

ORAL

BEYOND STABILIZATION: NEXT STEPS FOR STREAKED HORNED LARK RECOVERY IN SOUTH PUGET SOUND.
Gary Slater, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501. gslater@cnlm.org

In south Puget Sound, the primary conservation goal for the federally-listed streaked horned lark (*Eremophila alpestris strigata*) has focused on stabilizing the population because previous research indicated the population was declining by as much as 38% per year. The main strategy to accomplish this goal has involved minimizing impacts of military training at Joint Base Lewis McChord Military Base (JBLM), which supports approximately 55% of the regional population. These activities appear successful, as the number of human-caused nest failures on JBLM have

declined and lark numbers have increased. Further, recent analyses by Keren and Pearson (2016) indicate the South Puget Sound population numbers 252 individuals (95% CRI: 197-344) and most occupied sites appear stable. Having achieved the goal of stabilization, the time seems appropriate for conservation practitioners to consider shifting the conservation goal for larks to population growth and expansion. Adopting a new perspective and implementing new strategies and tools is relevant and timely as the lark recovery plan, which is near final review, will undoubtedly call for substantial increases in the number of individuals and occupied sites as recovery criteria. The goal of this talk is to outline conservation strategies for population expansion that integrates recent advances in our knowledge about lark dispersal, limiting factors, and habitat suitability. In particular, I will discuss the challenges of establishing larks at new sites, including describing conditions where reintroduction might be considered appropriate.

ORAL

EXTENDING THE REACH: GETTING NATIVE SEED ON THE LANDSCAPE. **Sierra Smith,** Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA, 98501. ssmith@cnlm.org

Native plant communities in our region are imperiled. Restoration activities rightly focus on habitat with a remnant native component of some quality, however this leaves behind ever-expanding areas of high-human-use nearly devoid of any native plant community. Re-establishing a native component to working lands, recreation lands, and private lands may not fit traditional concepts of restoration but can greatly increase regional habitat value and connectivity. If native plants in city parks, pastures, and housing developments are going to truly increase population resilience and wildlife value, several aspects of our native seed production and use need to be re-envisioned. A great diversity of land owners have some interest in using native seed. Providing information, incentives, and customized services can help to turn interest into action. New, unconventional products could incorporate regionally native seed into mixes that are typically non-native such as pasture, wildflower and erosion control mixes. But first, truly regional native seed must be accessible to individuals and local organizations at an affordable price. And, prevalent public mis-conceptions about natives need to be addressed with information on provenance and appropriate planting ranges for available seed. In the South Sound a new model building off the regional native seed cooperative will be required to reduce prices, expand access and foster the demand for appropriate native seeds. A combination of new partnerships, new business strategies and public incentive programs could greatly expand native plant populations beyond our limited restoration footprint.

ORAL

DOES FIRE ALTER SOIL FUNGAL COMMUNITIES IN *FESTUCA ROEMERI* RESTORED PRAIRIES? **Hannah Soukup** and Bitty Roy, Onyx 464, University of Oregon, 1585 E. 13th Ave, Eugene, OR 97403; and Sarah Hamman, Center for Natural Lands Management, 120 E. Union Ave #215, Olympia, WA 98501. hsoukup@uoregon.edu

Prairies in the Pacific Northwest were maintained by Native American burning for around 10,000 years, and prairie restoration in this region often employs prescribed fires to reduce

woodland incursion and control invasives. Within restored and remnant upland prairies of Oregon and Washington, we are characterizing the fungal communities, both above and below ground, in terms of species richness, most abundant taxa present, and how these communities respond to current fire management practices. Here we discuss only the response of soil fungi to fire. From three prairies in Oregon and three prairies in Washington, soil cores were taken to include the rhizosphere, roots, and shoots associated with the dominant native grass *Festuca roemeri* from an unburned and burned portion of each sample prairie, including two control sites from each region that have not been burned in approximately 150 years. Fungal DNA was extracted for Next Generation Illumina Sequencing using the MiSeq platform. Sequence data will provide information about the effects of fire on specific soil fungal species as well as diversity and evenness between burned and unburned areas at local and regional scales. The sites differ in many factors, including climate, fire, edaphic properties, plant community structure, and vegetative cover. As soon as the sequence data are back, we will use NMDS and variance partitioning to determine which factors have the most influence on soil fungal communities.

ORAL

FOSTERING PUBLIC SUPPORT OF URBAN OAK RESTORATION THROUGH COMMUNITY OUTREACH AND ENGAGEMENT. **Audrey Squires**, Middle Fork Willamette Watershed Council, P.O. Box 27, Lowell, OR 97452; Fraser MacDonald, Willamalane Park and Recreation District, 682 36th St, Springfield, OR 97478. restoration@mfwwc.org

Willamalane Park and Recreation District and Middle Fork Willamette Watershed Council have partnered to restore oak woodland and prairie habitat at two sites within and near Springfield, Oregon's urban growth boundary. Beyond the traditional restoration goals, we seek to build public acceptance and support of restoration through increasing knowledge and awareness of oak habitat, actively engaging students and other community members in restoration and monitoring, and integrating recreation with restoration. Because Dorris Ranch is a beloved site in the community, we have been conducting thorough outreach in order to foster public acceptance and support. We hosted a pre-project science pub and tour with local experts to explain project rationale and plan to host a post-project community planting event to provide local citizens an opportunity to reestablish a sense of place in the restored woodland. In contrast to Dorris Ranch, Thurston Hills is a newly acquired site and, therefore, we are in a unique position to begin this work before the public will be seeing it for the first time and continue it while they begin exploring the area through a new trail system. We plan to partner with a local mountain biking club to create a connection between recreation and restoration, work with a local high school to involve students in restoration work, and utilize community members in citizen science bird monitoring. We expect that these outreach and engagement efforts will help the public establish a sense of ownership at Thurston Hills and thus increase support of oak habitat restoration.

ORAL

BURNING FOR BUTTERFLIES, BIRDS, AND BLOOMS: PRESCRIBED FIRE IN THE WILLAMETTE VALLEY. **Amanda Stamper**, The Nature Conservancy, 87200 Rathbone Rd, Eugene, OR 97402. amanda.stamper@tnc.org

For thousands of years, fires provided countless services to Oregon's landscapes and peoples. Some of these fires were ignited by lightning, while others, particularly those in the Willamette Valley, were started intentionally by people. Some of the foods relied upon by the Kalapuya, who inhabited the valley prior to settlement, responded favorably to fire, as did many other plants and animals. With settlement and agricultural development came the demise of fire, and the diverse species that had come to depend upon it. Today, many of those species are listed as sensitive, endangered, or threatened, and prescribed fire practitioners, restoration ecologists, wildlife biologists, and botanists are working together using fire to restore and maintain species and habitats favored by frequent fire. This presentation explores the history and foundations of fire's role in the ecology of the Willamette Valley, and modern techniques in the application of controlled ecological fire through cooperative partnerships that aim to restore and conserve the species and habitats that depend upon fire.

POSTER

PLANT MATERIALS FOR WILLAMETTE VALLEY PRAIRIE RESTORATION: EVALUATING SUCCESS. **Diane Steeck,** City of Eugene Parks and Open Space, 1820 Roosevelt Blvd, Eugene, OR 97402. Diane.M.Steeck@ci.eugene.or.us

Many plant materials programs in the western U.S. have been initiated in the last decade to address needs for restoration and enhancement. In their early stages, most programs focus on seed collection and propagation techniques, since seed increase requires years of experimentation to achieve high yields from native species about which little is known. As seed programs mature, they identify a core set of native plant species that are tractable in a nursery or grow-out setting. Eventually, large amounts of seed or plants have been produced and outplanted to wildland restoration settings where their ability to create viable populations can be assessed. This poster and associated materials will describe strategies from a mature plant materials program and assess the success of restoring populations of diverse Willamette Valley prairie plant species. It will draw on the results and strategies of the West Eugene Wetlands Plant Materials Program that has been active for almost 20 years.

ORAL

A BIRD'S-EYE VIEW OF OAK RESTORATION: PRELIMINARY RESULTS FROM A BEFORE-AFTER STUDY IN SOUTHERN OREGON AND NORTHERN CALIFORNIA. **Jaime L. Stephens** and Caitlyn R. Gillespie, Klamath Bird Observatory, P.O. Box 758 Ashland, OR 97520. jlh@klamathbird.org

From 2012-2016 oak restoration was implemented on private lands in three geographic focal areas of southern Oregon and northern California through an NRCS Cooperative Conservation Partnership Initiative led by Lomakatsi Restoration Project and completed in partnership with the USFWS Partners for Fish and Wildlife Program. The goal of the project is to implement restoration guidelines using the best available science to protect, enhance, or restore declining oak habitats. Planning treatments that meet desired vegetation conditions and associated ecological response requires a multi-disciplinary approach with multi-faceted implementation and effectiveness monitoring to determine whether restoration successfully reached the desired

conditions. As a component of restoration planning, Klamath Bird Observatory incorporated desired conditions using birds as indicators of ecological condition. To measure restoration success, we established a Before-After-Control-Impact (BACI) design to quantify changes in individual bird species abundance and bird community composition following restoration at 43 white and black oak stands. Birds are considered excellent indicators of ecosystem health because they respond relatively quickly to habitat change, individual focal species are sensitive to environmental variation at multiple trophic levels and at multiple spatial scales, and as a community, birds are relatively easy and cost-effective to monitor. Results from one year pre and two years post restoration provide a measure of success and will inform future actions at existing and planned restoration sites contributing to adaptive management of oak ecosystems within the Klamath Siskiyou Oak Network.

ORAL

SO MANY WEEDS, SO LITTLE TIME: PRIORITIZING USE OF LIMITED RESOURCES.
Elaine M. Stewart, Metro – Conservation Program, 600 NE Grand Ave, Portland, OR 97232. Elaine.stewart@oregonmetro.gov

Invasive species have many impacts, including reduced crop production, toxicity to livestock, native plant community disturbance, and water quality degradation. There are many resources for invasiveness and impacts, ranging from web sites (e.g., invasives.org, NatureServe), jurisdictional weed lists developed by state and local governments, published literature and professional expertise. However, practitioners have little time for research and must decide where and how to allocate limited resources. At Metro, the Parks + Nature program maintains and restores more than 17,000 acres of parks and natural areas in a region with more than 500 exotic plant species. We manage upland forests, wetlands, oak and prairie habitats, riparian forests and nature parks. I will present a decision support tool developed to distill hundreds of plants into a framework that guides Metro scientists and technicians in assessing treatment needs. A two-way table places species in treatment contexts such as public areas where toxic plants cannot be tolerated. A number of species are targeted for treatment in prairie and oak habitats that would not be controlled in other settings such as riparian plantings. This framework helps staff focus resources where they are needed most. It provides consistent guidance across the natural areas program and saves time in planning treatments among areas. A discretionary tool, it is designed to be flexible and adaptable as new weeds arrive and new tools and knowledge emerge.

POSTER, ORAL

SPEAKING AS WHITE: LEARNING ABOUT EQUITY IN CONSERVATION PRACTICE.
Elaine M. Stewart, Metro – Conservation Program, 600 NE Grand Ave, Portland, OR 97232. Elaine.stewart@oregonmetro.gov [*click 'Poster' or 'Oral' for link to presentations*]

I have seen a lot of changes during more than 30 years as a public servant managing natural resources, but our field continues to lack racial and ethnic diversity. My puzzlement has become impatience, spurring me to learn more about this persistent deficit and work to change it. This is a personal journey, but themes and tools gleaned from experts may help all of us in this

important work. Part of the solution is a broader understanding of history and part is moving outside our comfort zones to actively disrupt institutionalized racism. In order to create welcoming environments and foster candid conversations, it is incumbent on Whites to become more literate in the history and systems that support inequity. I will discuss how institutionalized racism creates skepticism and suspicion of conservation in the U.S., ways to change our habits and welcome equity into our work, and roles and responsibilities of White people in this effort. It is critical for White people to educate ourselves and to not expect help from people of color. As beneficiaries of the status quo, it is our job to disrupt it. As a shrinking majority that will be outnumbered by people of color in the next 20 years, our legacy is tied to our ability to diversify our ranks and avoid the mistakes of the past. Useful strategies in advancing equity include seeking out voices of color and accessing available opportunities for training. A few of the many resources are provided.

ORAL

RECONSTRUCTING LONG TERM INTERACTIONS BETWEEN PEOPLE AND PLANTS: TRADITIONAL ECOLOGICAL MANAGEMENT OF UPPER CHEHALIS RIVER BASIN PRAIRIES. **Linda E. Storm**, PhD Candidate, University of Washington, Department of Anthropology, Seattle, WA 98126. prairiefire22@gmail.com

This study addresses reconstructing long-term interactions between people and plants in the Upper Chehalis River basin prairies. Hypotheses were tested with field experiments to address how fire management and Mima mound topography influence the abundance and distribution of wild plant food crops (such as *Camassia quamash*) and diversity of other culturally significant plants. Indigenous practices of firing, tending, harvesting and caring for prairies and their oak woodland edge plant communities maintained abundant ethnobotanical plant resources. Though fire ecologists and anthropologists acknowledge that western Washington prairies were managed and maintained by Native American burning practices, reconstructing the timing, frequency, and duration of intentionally lit fires is difficult. This is, in part, because of the lack of direct ecological indicators, such as fire scars on trees, poor charcoal area recruitment (CHAR) analysis for the area, how pollen cores are interpreted, and issues of scale. Because of these difficulties, this research draws upon multiple data sources and methods to synthesize evidence for long term prairie management. In addition to ecological field experiments, ethnohistorical, archaeological, ethnographic and other cultural data were analyzed to understand the traditional ecological knowledge and management practices of the indigenous peoples who managed the Chehalis River Basin prairies for potentially thousands of years. TEK/M was derived from recorded oral histories, place name data, and linguistics. TEK/M is reflected in the historical prairie landscape as a dynamic relationship between culture and ecology. Understanding this dynamic relationship can help inform current collaborative eco-cultural restoration of these landscapes.

ORAL

ANT ATTENDANCE AND CONSERVATION OF PRAIRIE BUTTERFLIES. **Cameron C. Thomas and Cheryl B. Schultz**, Washington State University – School of Biological Sciences, Vancouver, WA 98686. cameron.thomas@wsu.edu, cameron.thomas@wsu.edu

Ant attendance, an interaction in which ants protect larvae from predators and parasitoids in exchange for nutrient rich excretions, is beneficial for many butterfly species. Factors affecting this mutualism are important for the conservation of most at-risk North American butterflies for which this interaction has been studied—including Fender's blue butterfly, *Plebejus* (syn. *Icaricia*) *icarioides fenderi* (Macy), a federally endangered species which survives in remnant native prairie habitat in Oregon's Willamette Valley. In the western United States, ant attendance and its effect on larval survival are unknown in most at-risk species. Here, we discuss the status of at-risk prairie butterflies with ant-butterfly mutualisms in the western US and the state of knowledge on ant attendance in those species. Work in our research group from 2013 – 2017 indicates survival of larval Fender's blue is three times higher when frequently tended by ants and tending is associated with habitat structures we can influence with restoration efforts. Finally, we review ongoing work with at-risk ant-tended butterfly populations and their attendant ants in Oregon and Washington prairies. Our work aims to inform restoration efforts relative to the importance of this mutualism for the conservation of these species.

ORAL

SEED DISPERSAL AMONG LASTHENIA CALIFORNICA PATCHES IN A SOUTHERN OREGON PRAIRIE. **Pamela Thompson** and Mitch Cruzan, Portland State University, Portland, OR 97201. thompson@pdx.edu

Seed dispersal is a critical ecological process with strong impacts on the distribution of plant populations. Understanding the landscape features that influence seed dispersal is an important goal in ecology. We studied patterns of seed dispersal among patches of *Lasthenia californica* (California goldfields), a vernal pool plant species, near Medford, OR. Because seed dispersal is difficult to observe, we examined variation among patches of *L. californica* using whole chloroplast genomes, which are generally maternally inherited, and therefore represent a record of seed movement. We sampled 20 individuals from 20 populations of *L. californica* from a 400m^2 prairie site maintained by The Nature Conservancy. We assessed the impact of geographic distance and landscape features such as habitat type, patterns of vole (*Microtus californicus*) trails, and flower density, on landscape resistance surfaces, and then correlated these with genetic distances to see which variable impacts gene flow the most strongly. We used images captured with a small drone to map several of the landscape features, on a very fine geographic scale. We found a high number of haplotypes across the populations, but many patches had unique haplotypes, indicating very limited seed dispersal. However, there was also evidence of limited haplotype sharing across the length of the prairie (>300 meters), suggesting some long distance dispersal events. Flower density had the strongest effect on genetic distance, which may reflect gravity as the main dispersal mechanism.

ORAL

PATTERNS OF ABUNDANCE AND HABITAT USE BY STREAKED HORNED LARKS FOLLOWING DEPOSITION ON TWO ISLANDS IN THE LOWER COLUMBIA RIVER. **Jerrmaine Treadwell** and Gary Slater, Center for Natural Land Management, 120 Union Ave SE #215, Olympia, WA 98502. jtreadwell@cnlm.org

In the lower Columbia River, the federally-threatened streaked horned lark (*Eremophila alpestris strigata*) occurs on islands that receive regular depositions of sand from dredging operations conducted by the U.S. Army Corp of Engineers (USACE). Habitat suitability for larks, however, varies with time since deposition, with the assumption that peak suitability occurs between 2 to 3 and 7 to 8 years after deposition. Better understanding how lark abundance and habitat use tracks the cycle of deposition and habitat succession is important for developing long-term management strategies that maximize the benefits and costs of dredged material placement for larks. We investigated lark abundance, home range size, and habitat use through deposition cycles by conducting intensive mapping of lark territories on two islands, Brown and Crims Islands, in the USACE lower Columbia River deposition network. Fieldwork was conducted during the 2015-2017 breeding seasons. We visited islands $\geq$ 6 times from mid-May to early July with the goal of collecting $\geq$ 30 locations from each territory. Preliminary data analysis indicates that home range size varies from 1.0 to 3.5 ha. At one site, we observed a large number of unpaired males establishing territories following deposition. Results confirm the assumption that larks tend to avoid deposition sites for the first year after deposition and then slowly begin to recolonize areas thereafter. We will discuss how these results can be integrated into the development of deposition management plans and their contribution towards refining a landscape-scale habitat-suitability model currently being developed for the region.

POSTER

LANDOWNER ATTITUDES TOWARDS CONSERVATION OF OAK WOODLANDS IN HUMBOLDT COUNTY, CALIFORNIA. **Anna Urias.** Humboldt State University. 927 J St, Arcata, CA 95521. azu1@humboldt.edu

Oak woodlands are vital components to the cultural, ecological, and economic composition of California. The majority of these woodlands exist on private property within the state. They are in decline as a result of ecological and economic factors such as conifer encroachment, sudden oak death, and land conversion. Conservation and restoration of oak woodlands proves challenging due to lack of accessibility to private land and participation by landowners. This research presents a preliminary model of identifying and classifying private landowners' attitudes towards the conservation and restoration of oak woodlands. The goal of the future study will be to provide a comparative assessment of landowner attitudes and motivations towards oak woodland conservation within the regions of the Mattole Valley and Yager-Van Duzen in Humboldt County, California. Approximately 78% of oak woodlands in Humboldt are located on privately owned property with the majority of the land used for ranching. Conservation of oak woodlands in California is dependent on landowner participation with established conservation programs and agencies. The assessment of the differences between landowners in Humboldt County can create further development of conservation programs and practices that benefit landowners' needs. This will potentially increase participation in oak restoration projects and aid in the retention and conservation of oak woodlands within California.

POSTER

WILLAMETTE VALLEY ENDANDGERED SPECIES PROPAGATION EFFORTS. **Leanna Van Slambrook**, Institute for Applied Ecology, US Army Corps of Engineers, 26275 Clear Lake Rd, Junction City, OR 97448. Leanna.g.vanslambrook@usace.army.mil

Without restoration and conservation, the ESA listed species within the Willamette Valley prairies are being propelled towards extinction. Depending upon the quantities of seed available and how limited resources are, a few different propagation methods can be used to restore these plant populations. I assess the time and materials required for the plug production of 1000-5000 ESA listed species; *Lupinus oreganus, Lomatium bradshawii* and *Erigeron decumbens*, by comparing qualitative assessments of transplant success compared with direct seeding *in situ* or transplanting bare root material propagated in the nursery. The effort to success ratio of each species helps determine which method may be the most efficient in terms of costs and loss of genetic materials and how successful these ESA species are in the restored habitat. By assessing multiple introduction methods, I will determine the most effective and efficient method for establishment of these ESA listed species. The production facility consists of a greenhouse that is $400ft^2$ and a $2112ft^2$ nursery, so I am limited by how many plugs can be grown out in one season. Direct seeding and vegetative propagation beds provide a means to increasing the production capacity in a fraction of the time and cost, allowing for resources to be freed up in order to concentrate efforts on species that may need more time and attention.

ORAL

CHANGES IN EXOTIC PLANT FLOWERING PHENOLOGY PRODUCE STRONG POLLINATOR-MEDIATED EFFECTS ON NATIVE PLANT SEED SET. **Susan Waters**, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98506; Wei-Ling Cherry Chen and Janneke Hille Ris Lambers, Department of Biology, Box 351800 University of Washington, Seattle, WA 98195-1800. swaters@cnlm.org

Conservation is intimately intertwined with promoting positive demographic outcomes (i.e., population growth) in species of concern, and these outcomes are often strongly influenced by species interactions. However, by promoting phenological shifts that vary among species, climate change is altering time envelopes for species interactions, often with unexpected demographic consequences. Indirect interactions (e.g., competition between plants for pollinator visits) are especially likely to change in duration because they involve multiple interactors, increasing the likelihood of asynchronous phenological shifts. If so, conservation practitioners should anticipate ecological surprises in native plant demographics. We explored this possibility in a system likely to experience asynchronous phenological shifts. Specifically, we accelerated and delayed the flowering phenology of two ubiquitous exotic prairie plants, *Hypochaeris radicata* and *Cytisus scoparius,* relative to seven native perennial forb species. We quantified impacts of these experimental phenological shifts on pollinator visitation and seed set of all native species. Native seed set was strongly affected by changes in exotic flowering phenology in all cases, but the magnitude and direction of effects were not predicted by the nature of the original indirect interaction (facilitative vs. neutral vs. competitive) and the change in interaction duration. Changes in pollinator foraging behavior in response to changes in available floral

resources are probably responsible for the effects we observed. We therefore propose that asynchronous phenological shifts have the potential to produce large and unexpected changes in plant communities. This result suggests the need for frequent, widespread monitoring in order to respond rapidly when such ecological surprises occur.

ORAL

NEW INSIGHTS FROM PLANT-POLLINATOR NETWORKS FOR CONSERVATION AND PRAIRIE RESTORATION. **Susan Waters**, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98506. swaters@cnlm.org

Plant-pollinator interaction networks are useful tools that have been little used in conservation so far. Networks can (i) help practitioners learn more about species of conservation concern by providing insights into interactions that may affect their demographic success; (ii) help improve restoration practice by identifying native plants playing key pollinator-supporting roles; and (iii) provide valuable information about community-wide resilience to species losses. We employed this new tool to examine community resilience and Taylor's checkerspot host plant interactions in 6 sites along a gradient of restoration. We collected pollinator visitation data for every flowering forb occurring at each site. All pollinators were identified, and visitation data were used to construct and analyze interaction networks at each site. We found that: (i) Networks identified multiple other plants linked indirectly to Taylor's checkerspot host plants, including several cases where non-native and/or later-blooming plants probably support insects that pollinate these key host plants. Best management practices should therefore include removing non-native forbs *in stages* rather than attempting to eliminate them wholesale, risking a gap in resources for pollinators of key native plants. (ii) Networks identified several forbs not previously high-priority in restoration that support a wide range of pollinators. We suggest that restoring these species as early as possible could draw pollinators that in turn may support other native plants. (iii) Complexity and several key measures of community resilience increased as sites experienced more restoration. These results should be used as a baseline to follow the effects of restoration on resilience over time.

POSTER

SOUTH SOUND PRAIRIE PLANTS AND ANIMAL POLLINATOR DEPENDENCY. **Susan Waters**, **Amber Hailey**, and **Brittany Oxford**, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA, 98501. swaters@cnlm.org

More than 85% of terrestrial plants require pollinators for reproduction, so it is highly likely that pollination is essential to restoring, maintaining and protecting Puget Trough prairies. However, some plants also achieve fertilization via wind pollination or selfing. Surprisingly, we lack basic information about the overall importance of animal pollinators in prairie-oak ecosystems, as well as species-specific data on pollinator dependence that could inform restoration practices.
We assessed pollinator dependence of 53 native and exotic forb species on Joint Base Lewis-McChord's high-quality Johnson Prairie in 2017. We established 8 pairs of individual plants within each species. One individual in the pair was left open to pollinators, while the other individual's flowers were bagged during the bud stage to exclude pollinators and allow only

autogamous selfing. Some replicate pairs were destroyed by elk and rodent grazing; we report results here for 44 species (30 native, 12 exotic). 84% of forb species were pollinator dependent (defined when selfing treatments produced less than 25% of seed produced in control (open) treatments). Native and exotic flora did not differ in proportion of pollinator-dependent species. We suggest that this is a conservative estimate of pollinator dependence, since seed production may have been pollinator-limited even in open treatments, given a low-pollinator season.

ORAL

RANGE-WIDE PATTERNS OF NATAL AND ADULT DISPERSAL IN STREAKED HORNED LARKS. **Adrian Wolf** and Gary Slater, Center for Natural Lands Management, 120 Union Ave SE #215, Olympia, WA 98501**;** Scott Pearson, Washington Department of Fish and Wildlife, 1111 Washington St SE, 5th Floor, Olympia, WA 98501; Hannah Anderson, Washington Department of Fish and Wildlife, 600 Capitol Wy N, Olympia, WA 98501; and Randy Moore, Department of Fisheries and Wildlife, 104 Nash Hall, Oregon State University, Corvallis, OR 97331. awolf@cnlm.org

Dispersal decisions by juvenile and adult individuals in animal populations have important effects on population dynamics, including colonization of new, unoccupied, sites and genetic structuring. Understanding patterns of dispersal can help guide conservation strategies aimed at species recovery, especially for endangered species. We investigated range-wide patterns of dispersal in the federally-listed streaked horned lark (*Eremophila alpestris strigata*). We analyzed band-resight records between 2002 and 2016 from four ecoregions (south Puget lowlands, lower Columbia River, Washington Coast, Willamette Valley) and determined frequency and distances of dispersal events for first-year adults (natal dispersal) and established adults (breeding dispersal). Of 159 first-year adults originally banded as dependent young and subsequently resighted as breeders, 120 (75.5%) returned to their natal breeding site and 39 (24.5%) dispersed to new sites. Only three individuals dispersed to a different region. For natal dispersers that left their natal site, mean dispersal distance was 23.4 km (± 4.7 SE), although most (70%) travelled less than 20 km. Although sample sizes were low, we found that first-year females dispersed to new sites more frequently (26%) than males (21%), consistent with typical female-biased dispersal in birds. In contrast to natal dispersal, breeding dispersal was dominated by philopatric individuals (65 of 68; 96%) that remained at their first breeding site. No adults left their initial breeding region. We'll discuss how these patterns of natal dispersal, emigration, and immigration can inform conservation planning by facilitating mitigation site ranking and identifying conservation lands for protection.

POSTER

USING AND EVALUATING AN INTEGRATED APPROACH TO MANAGING HERBACEOUS BIOMASS AT TWO PRAIRIE AND WOODLAND SITES IN THE TUALATIN RIVER BASIN. **Curt Zonick**, Metro Parks and Nature, 600 NE Grand Ave, Portland, OR 97212. Curt.zonick@oregonmetro.gov

Metro's Parks and Nature Program has been protecting, restoring and enhancing prairies and woodlands for a nearly a generation. Two of these places, Cooper Mountain Nature Park

(CMNP), and Quamash Prairie (QP), support diverse prairie and woodland habitat. Both sites required intensive restoration by Metro. The 250-acre CMNP was acquired in 1996 after the site was clearcut. The 160-acre Quamash Prairie was acquired in two phases, in 1996 and 2007, and was released by Metro from generations of cultivation and pasture. Both sites retained, at the time of acquisition, important remnant populations of rare native herbs, including pale larkspur (*Delphinium leucophaeum*), thinleaf pea (*Lathyrus holochlorus*) and Lemmon's needlegrass (*Acnatherum lemmonii*) at CMNP, and Rydberg's penstemon (*Penstemon herperius*) at QP. QP also supports a large legacy camas lily population which is significant to the region's Native American Community. Both sites had heavy weed populations resulting from past agricultural and timber practices. Metro's management of these sites is discussed, focusing on strategies used to suppress non-native herbs and promote native grasses, forbs and sedges/rushes. Our approach has focused on restoring habitat structure on the macro scale (oak release, hedgerow removal, correcting hydrologic alterations) while seeking to mimic disturbance regimes that occurred naturally, or were employed by Native People. Toward this goal, Metro has used an integrated approach involving prescribed fire, managed grazing, strategic mowing and herbicide applications, and aggressive native seeding and planting. Both sites have been tracked with targeted monitoring (botanic and selective wildlife sampling). Successes have been realized. Significant challenges remain.