2022 CASCADIA PRAIRIE-OAK PARTNERSHIP CONFERENCE

Oak and Prairie Conservation at a Crossroads: Setting a Path for Success

November 7-10 | Vancouver, WA

ABSTRACTS

Presentations linked when available

Cascadia Prairie-Oak Partnership

Providing coordination for the technical prairie community in the Georgia Basin, Puget Trough, Willamette Valley and beyond.

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ORAL ABSTRACTS

2022 Cascadia Prairie-Oak Partnership Conference
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CONSERVATION IMPLEMENTATION STRATEGY: CONSERVING OAK HABITATS ON WORKING LANDS, FOUR YEARS LATER. **Nicole Ahr** and Jenne Reische, Clackamas Soil and Water Conservation District, 22055 S Beavercreek Rd, STE 1, 97004; Kammy Kern-Korot, West Multnomah Soil and Water Conservation District, 2701 NW Vaughn St # 450, Portland, OR 97210. nahr@conservationdistrict.org

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 (NRCS) to implement a Conservation Implementation Strategy (CIS) for Oregon white oak (hereafter, "oak") in oak prominent areas of Clackamas and West Multnomah counties in the Greater-Portland Metro Area. The resulting Clackanomah Oak CIS was awarded three years of funding, and funding was renewed for an additional two years in 2019. Oak mapping data from the local, collaborative Oak-Prairie Working Group was used for targeted outreach efforts beginning in the fall of 2017. After multiple years of outreach, technical assistance site visits and oak habitat conservation planning, at least 16 oak habitat projects have been funded. Active oak habitat restoration practices on these properties have included oak release, weed control, prescribed grazing, and the planting of oak and associated species in both woodlands and savannas.

DEVELOPING A SURVEY PROTOCOL TO MONITOR DISTRIBUTION, ABUNDANCE AND POPULATION TRENDS OF STREAKED HORNED LARK ON PRIVATE LANDS IN THE WILLAMETTE VALLEY, OR. **Stephanie Augustine**, Gary Slater; Ecostudies Institute, P.O. Box 1614, Olympia, WA 98501; Matt Stevenson, CoreGIS, 355 NW 47th St, Seattle, WA, 98107, John D. Lloyd; 15 Mine Road, South Strafford, VT 05070. saugustine@ecoinst.org

Tracking the status of recovery efforts for imperiled species requires accurate information on the species' distribution, abundance, and population trends. The streaked horned lark (*Eremophila alpestris strigata*) is a federally threatened songbird found in open and early successional habitats in western Washington and Oregon. More than 50% of the population is believed to breed in the Willamette Valley, OR, a region largely composed of privately-owned agricultural lands where land ownership and ephemeral habitat suitability precludes the use of an existing standardized line transect survey protocol. Thus, as the first phase in developing a program to monitor the breeding population of streaked horned larks in the Willamette Valley, we designed and collected pilot data for a road-based survey protocol. We modified an existing lark habitat suitability model using a multi-year compilation of NDVI to generate spatially balanced survey

points distributed within three USFWS-designated streaked horned lark recovery zones. Locations with higher predicted habitat suitability were more likely to be selected for surveys. Between 1 and 30 June 2022, we conducted 8-min point count surveys at 214 points recording information on age, sex, time since first detection, and distance from observer. We detected 55 streaked horned larks at 28 points, of which 76% were male. Subsequent phases of the project will involve exploring data analysis options, collecting additional pilot data in 2023, completing a power analysis, and providing a final recommendation for implementing a standardized monitoring plan specific to the Willamette Valley capable of estimating streaked horned lark population size and trends.

SUPPORTING ADOPTION OF CONSERVATION GRAZING PRACTICES FOR PRAIRIE SPECIES PROTECTION; OUTCOMES OF AND NEXT STEPS AFTER A 3-YR RESEARCH TRIAL. **Stephen Bramwell,** Washington State University Extension.

Working lands offer significant and essential opportunity for critical species recovery west of the Cascades, particularly where development pressure is limiting land available for habitat enhancement. This three-year, Western Sustainable Agriculture Research and Education (WSARE) project holistically evaluated the economics, social dynamics, and ecological impacts of conservation grazing practices (CGPs) for prairie habitat enhancement. Outputs of the research included a conservation grazing survey to better understand landowner interests and concerns regarding adopting CGPs, enterprise budgets and a contributions analysis using IMPLAN to help elected County and other decision-makers understand the economic implications of recruiting working grazing land into prairie conservation efforts, and assessments of the impact of CGPs on forage, soils, critical species occupancy, and native species diversity on three working ranches and three prairie preserves. Results are being used in the economic analysis and Environmental Impact Statement for the Thurston County Habitat Conservation Plan; to develop a prairie landowner outreach and recruitment program through a Department of Defense-funded Sentinel Lands effort; establish a regional Prairie Grazing Association and attendant annual educational program; scope marketing opportunities for prairie-friendly livestock products, and; implement WSARE Research to Grassroots and Western Coastal Restoration and Resiliency Initiative grants that will facilitate leaseholds between veterans (and other aspiring ranch operators), provide training in livestock and forage management, and encourage adoption of CGPs among existing and new grazing operations.

AN OAK MONITORING TOOL FOR HABITATS EAST OF THE CASCADES. **Mary Bushman**, Lindsay Cornelius, Columbia Land Trust, Vancouver, WA. / Scott Harris, Tom Kaye, Denise Giles, Institute for Applied Ecology, Corvallis, OR. oaks@columbialandtrust.org

Though Oregon white oak of the East Cascades are genetically very similar to oaks west of the Cascades, the ecology on the east side differs dramatically from the west where much of the

focused academic research on oak systems has been concentrated. The Institute for Applied Ecology, Columbia Land Trust, and land managers collaborating through the East Cascades Oak Partnership (ECOP) and the Wasco County Forest Collaborative, including personnel from the Mt. Hood National Forest Barlow Ranger District, Washington State Department of Natural Resources, Oregon Department of Forestry and the Columbia River Gorge Commission, have developed and tested a standardized oak monitoring protocol to fill this knowledge gap. Developed and adapted from Forest Inventory and Analysis protocols, the Oak Monitoring Tool enables trained observers to collect data on oak site characteristics, habitat, trees, tree health, and understory conditions. The Oak Disturbance Monitoring Tool has been deployed across the landscape by a broad group of trained partners to build data sets to address key questions relative to oak habitat disturbance mechanisms such as fire, grazing, and fuels management. ECOP intends to employ the data toward adaptations of specific management approaches for oaks of the unique oak habitats of the East Cascades.

A UNIQUE COLLABORATION FOR PRAIRIE RESTORATION: THE JBLM SENTINEL LANDSCAPE PARTNERSHIP PROGRAM. **Dan Calvert**, JBLM Sentinel Landscape Partnership Program, Olympia, WA. dan@sentinellandscapes.org

The Joint Base Lewis-McChord (JBLM) Sentinel Landscape Partnership is a coalition of federal agencies, state and local governments, and non-governmental organizations working to advance prairie restoration and agricultural viability in the South Puget Sound region. Despite once extending over 150,000 acres, prairie habitat native to Washington State's Puget Sound now covers only 23,000 acres, 90% of which is located on JBLM. Regional prairie habitat degradation and loss and ongoing development pressure have resulted in Endangered Species Act listings of multiple species reliant on these ecosystems as well as ongoing training restrictions on JBLM. The Sentinel Landscape Partnership, founded in 2013 by the U.S. Department of Defense, Department of Agriculture, and Department of the Interior, is a collaboration focusing on military readiness, conserving natural resources, bolstering social and economic agricultural systems, and increasing climate change resilience. The strength of the Sentinel Landscape table stems from the partner buy-in and support built through years of continuing engagement. This presentation describes the program while highlighting the challenges and opportunities associated with this unique collaborative partnership.

ARCHAEOLOGICAL CONTRIBUTIONS TO CAMAS CONSERVATION. **Molly Carney**, University of Arkansas. molly.carney@wsu.edu

After a several hundred-year hiatus, camas is back under the spotlight and featured often in public discourse. Numerous groups across federal, tribal, provincial, state, academic, and private institutions are foregrounding camas conservation and research. But for many, camas never left the stage. In this paper we argue that if camas conservation requires long-term collaborative commitments, restoration and management plans must include long-term data to inform those

actions. We share several examples in which archaeological research has illuminated deep-time traditional harvesting practices and expanded upon our collective knowledge of human-camas relationships. We also offer future avenues for research that will inform contemporary conservation, suggestions for archaeologists working with descendent communities, and methods of adapting past land stewardship practices into modern plans.

USING THE USDA-NRCS PASTURE CONDITION SCORING SYSTEM TO EVALUATE PRAIRIE GRAZING SYSTEMS. **Marty Chaney**, USDA NRCS, Olympia WA, marty.chaney@usda.gov

The USDA Pasture Condition Scoring (PCS) system is an evaluation to assess how well a pasture is being managed and resources protected. A pasture rated with a high score is well-managed with productivity (plant and animal) being sustained or enhanced. By rating the key indicators common to all pastures, pasture condition can be evaluated and the primary reasons for a low condition score can be identified. PCS involves the visual evaluation of 10 indicators, which rate the pasture vegetation and soils. Indicators include: Percent Desirable Plants; Percent Legume; Live Plant Cover; Plant Diversity; Soil Cover; Grazing Utilization & Severity; Livestock Concentration Areas; Soil Compaction & Regenerative Features; Plant Vigor; & Erosion. Ideally, this evaluation is repeated periodically, allowing trends to be monitored. Typically used as a measure of forage productivity and quality for grazing animals, PCS can also be used as an evaluation of a prairie plant community when livestock grazing is utilized as a method to maintain and increase the cover of native species on the site. While a target score for these indicators for productive, healthy non-native pasture is typically a 5, the optimum situation for prairie species may result in a lower individual score for some indicators, since prairie species tend to thrive and compete better under slightly different conditions than non-native pasture species. Suggested target scores for prairie grazing situations will be discussed. The PCS can be found here: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/rangepasture/pasture/pub/

CONSERVATION ACTIONS TO SUPPORT THE RECOVERY OF THE ISLAND MARBLE BUTTERFLY. **Julie K. Combs** and Ann Potter, Washington Department of Fish and Wildlife, Olympia, WA; David Wilderman, Washington Department of Natural Resources, Olympia, WA.

The island marble butterfly (*Euchloe ausonides insulanus*) once thought extinct until its rediscovery in 1998 is now listed as a federally endangered butterfly. Arguably, one of the most imperiled butterflies known, this subspecies is limited to one population on San Juan Island, WA. In 2019, DFW began implementation of a Candidate Conservation Agreement with Assurances (CCAA). Candidate Conservation Agreement with Assurance enrollees engage in primary activities such as protecting habitat, enhancing habitat and monitoring of island marble butterflies. The Department of Natural Resources is a CCAA member and has been enhancing host plant habitat (*Sisymbrium altissimum*, tumble mustard) and native nectar plants at Cattle

Point Natural Resource Conservation Area (NRCA) to support the recovery of the island marble butterfly. We present results of habitat enhancement efforts and the abundance of the island marble butterfly eggs and larvae utilizing host plants at Cattle Point, NRCA.

WHAT HAPPENED HERE? OAK SYSTEM CLASSIFICATION AND ASSESSMENT IN A COMPLEX LANDSCAPE. **Lindsay Cornelius**, Columbia Land Trust, White Salmon, WA. lindsayc@columbialandtrust.org; Irene Weber, Washington Department of Natural Resources – Natural Heritage Program, Olympia, WA; Irene.Weber@dnr.wa.gov

The East Cascades ecoregion is characterized by some of the steepest elevation and precipitation gradients on the globe. Additional climatic complexity stems from temperate marine air flowing through the Columbia River Gorge, moderating the harsh climate of the Columbia Plateau, generating unique niches for endemic species and creating a fascinating landscape of oak system diversity. When the East Cascades Oak Partnership launched in 2017, partners were frustrated by a lack of spatial information about oak extent and condition, and lacked a classification framework that reflected the complexity of the oak landscape. Management decision-makers in the East Cascades continue to face a great deal of uncertainty and messiness when classifying and assessing oak systems for management. What was the natural range of variability in these oak system types and how might they be altered by decades of grazing, fire suppression, and conifer encroachment? Irene Weber, Vegetation Ecologist with WA DNR, and Lindsay Cornelius, Manager of the East Cascades Oak Partnership, will present a draft assessment tool meant to standardize classification and assessment across oak systems in complex ecological settings for a variety of users. The tool was adapted from WA DNR Natural Heritage Program's Ecological Integrity Assessment tool for rapid assessment of East Cascade oak systems, providing users with a simple framework for puzzling through historical condition and assessing current condition.

TRIAL AND ERROR: OAK THINNING MANAGEMENT OUTCOMES AT DILLACORT CREEK NATURAL AREA. **Lindsay Cornelius**, Columbia Land Trust, White Salmon, WA. lindsayc@columbialandtrust.org

In 2003 Columbia Land Trust mechanically thinned 150 acres of Oregon white oak woodlands on the Klickitat River to promote stand vigor and reduce intraspecies competition thought to be the result of fire suppression. The objectives were to reduce fuel loads and reduce stand density in a mosaic pattern by up to 50% canopy cover using mechanical methods –with a low impact skid steer and hand falling, piling, and burning. Seventeen years later we had effectively improved tree vigor, but we also increased overall stem density, created additional ladder fuels, increased oak tree regeneration, and increased the extent of invasive annual grasses. In the spirit of adaptive management, we set out to determine which methods of stump sprout control might be effective, evaluating the effectiveness of two methods of herbicide application and

pruning. We also initiated a trial to observe domestic cattle grazing impacts on oak regeneration from acorns and sprouting. Lindsay Cornelius, Natural Area Manager for Columbia Land Trust, will summarize the results of PSU graduate student Kara Caselas' 2018 Master's thesis: "Evaluating the Effectiveness of Restoration Treatments to Enhance Oregon White Oak Systems within the Klickitat River Watershed"; and PSU graduate student Nick Lewis's 2021 Master's thesis: "Oregon White Oaks of the East Cascades: Evaluating Restoration Thinning Treatments" in the context of on-going management at Dillacort Creek Natural Area near Lyle, WA, and the struggles of the East Cascade Oak Partnership to find a clear management path forward in the oak woodlands of the East Cascades.

TAYLOR'S CHECKERSPOT LARVAL HABITAT PILOT STUDY. **Andrew C Dechaine**, Mary J. Linders, Gail Olson, Ilai Keren, Washington Department of Fish and Wildlife, Olympia, WA. andrew.dechaine@dfw.wa.gov

The Taylor's checkerspot butterfly (*Euphydryas editha taylori*) is a federally protected species in the Pacific Northwest that was listed as endangered in 2013. In the 1990's, WDFW began working to restore habitat in an effort to improve the species status. Limited larval habitat quality data is slowing the pace and consistency of successful translocations. We designed a pilot study to identify and characterize high-quality prediapause larval habitat to inform release site readiness, restoration efforts, and identify new potential restoration and colonization sites in South Puget Sound. Specifically, we aimed to investigate the relationship between larval host plant density and larval nest density from an occupied Taylor's checkerspot site using a randomly sampled, spatially stratified design. We planned to conduct this pilot study at Scatter Creek Wildlife Area in Thurston County, WA, but were unable to implement the project in 2022 due to the very low number of adults detected during the flight season. In response, we collected larval host plant data using Rapid Habitat Assessment (RHA) from five occupied sites in the South Sound. Here, we present the methods of our pilot study and results of RHA showing a decline in host plants across all sites over the last few years. We emphasize the importance of annual habitat monitoring and the need to improve methods for maintaining habitat at occupied and potential future Taylor's checkerspot sites.

FENDER'S BLUE BUTTERFLY POST-FIRE ASSESSMENT: A CASE STUDY. **Soledad Diaz**· Institute for Applied Ecology, Corvallis OR; Carolyn Menke, Greenbelt Land Trust, Corvallis OR; Thomas N. Kaye, Institute for Applied Ecology, Corvallis OR. soledaddiaz@appliedeco.org

Fender's blue butterfly (*Icaricia icarioides fenderi = Plebejus icarioides fenderi*) is listed as an endangered species by the US Fish and Wildlife Service. Two critical elements of its habitat are host plants for larvae (primarily Kincaid's lupine (*Lupinus oreganus*, but also *L. albicaulis* and *L. arbustus*) and nectar plant species for adult butterflies. Adult butterflies are believed to have

limited dispersal ability, typically remaining within 2 km (1.2 miles) of the lupine patch they emerge from. Butterflies also have strong fidelity to areas with lupine present. Baskett Slough National Wildlife Refuge is a critical recovery site for the Fender's blue, supporting a network of butterfly habitats. In Fall 2019, a prescribed fire at Baskett expanded beyond its planned boundaries, resulting in a significant area of butterfly habitat being burned. This burn occurred after larvae had entered diapause and were located near the soil surface. The purpose of this study is to gain a better understanding of the rates of mortality and the patterns of Fender's blue recolonization after fire, with the following objectives: 1) identify rates of mortality after the fire through comparing larval activity in burned and unburned areas in March/April 2020, 2021 and 2022; 2) examine recolonization of the burned area during the first (2020), second (2021) and third (2022) butterfly flight season after fire by measuring egg abundance in burned and unburned areas; and 3) evaluate the relationship between distance from unburned habitat and recolonization rates.

THE DECLINE OF SOUTH SOUND PRAIRIES: USING PLANT INTERACTIONS FOR CONSERVATION. **Alejandra Feliciano**, Washington State University, Puyallup, WA. alejandra.feliciano@wsu.edu

This paper takes a systematic look at the scientific literature published in relation to Washington's South Sound prairie plant communities, specifically to address changes in plant diversity and community composition. Has there been plant diversity loss? And what are the community assembly dynamics behind these changes? Scientific papers published to date on the phylogenetic composition of the South Sound prairies were collected to gather information on habitat loss and plant community composition. These prairies have undergone a 51% reduction in overall plant species richness in the last 130 years. Invasive species today contribute roughly 44% of total species richness. Although most species within the community remain native, only 27% of historical native species remain in the community. In terms of functional diversity, we can observe a reduction (-6.3%) in mean competitive investment, and stagnation (-0.4%) in mean stress tolerance. The largest functional change comes from an increase (+7.7%) in mean ruderality. Higher comparative stress-tolerance allotment between historical and contemporary natives suggests that, as community assembly filters shifted, those natives better adapted to the environmental abiotic regimes than exotics where selected to persist. To displace invasive exotics through community interactions, two functional strategies could be envisioned: 1) lowering the ruderality requirement from the current dispersal filter and/or 2) introducing natives of superior ruderal fitness to that of exotic, as measured through leaf traits.

RESTORING A WILLAMETTE VALLEY ENDANGERED ENDEMIC: ESTABLISHING WILLAMETTE DAISY FROM SEED IN THE WEST EUGENE WETLANDS. **Denise Giles**, Jean Fleming, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97333.

Willamette daisy (*Erigeron decumbens var. decumbens*) is an endangered plant endemic to the Willamette Valley, Oregon. Habitat loss due to agriculture and development have contributed to the decline in the species. Meadow encroachment from woody and shrubby species, and competition from introduced species threaten the remaining scattered and relatively small Willamette daisy populations. In 2019, in partnership with the NW District BLM, IAE established 15 paired treatment plots at two sites in the West Eugene Wetlands (total 60 sub-plots). In the fall of 2021, each sub-plot received a management treatment and was seeded with Willamette daisy at a relatively high rate of 10 lbs/acre. Management treatments include Control, Burn + Glyphosate, Glyphosate only, and Burn Only. Burning was conducted using a propane torch; herbicide was applied approximately two weeks post-burn and seed was applied after all management activities were completed in November 2021. In the spring of 22 (6 months post seeding) statistically more seedlings were noted in all treatment plots over the control. The Burn + Glyphosate had the most seedlings followed by Glyphosate Only and then Burn Only. These findings suggest that ground preparation is important for successfully re-establishing Willamette daisy. During surveys for a range-wide survey for the species in the spring of 2022, no seedlings were found in areas that had received some form of ground preparation and been seeded at lower seeding rates, indicating that both ground preparation and seeding rate are important factors in seedling establishment.

STRATEGY AND GUIDANCE FOR MINIMIZING HYBRIDIZATION RISK OF GOLDEN PAINTBRUSH WITH HARSH PAINTBRUSH. **Erin Gray**, U.S. Fish and Wildlife Service, Lacey, WA. erin_gray@fws.gov

Golden paintbrush (*Castilleja levisecta*, CALE), a prairie plant species of the Puget Trough and Willamette Valley, was listed as threatened under the Endangered Species Act in 1997. In 2007 a novel threat was identified: hybridization with harsh paintbrush (*Castilleja hispida*, CAHI), one of the preferred host plants for the endangered Taylor's checkerspot butterfly (TCB). To minimize the potential for hybridization, the U.S. Fish and Wildlife Service, the Washington Department of Natural Resources and the Washington Department of Fish and Wildlife entered into an Memorandum of Understanding to manage this threat to CALE and provide long-term conservation of the species. We developed a Hybridization Strategy and Guidance document to outline a landscape level, long-term strategy for outplanting CALE and CAHI. The primary goals are to communicate the issue of hybridization as a threat to CALE, outline solutions for long-term protection of CALE viability, and use of CAHI as a host plant for TCB. This document includes a decision-making framework and proximity guidelines for outplanting and geographic regions for species priority to help guide restoration activities in Oregon and Washington. For regions where both *Castilleja* species are utilized, a proposal process will be available for practitioners to submit outplanting plans to gain guidance, maintain consistency with the landscape level strategy, and ensure there will be no risk of hybridization. This

partnership illustrates a lasting commitment to balance the conservation of both CALE and TCB and provides solutions that will benefit both species into the future.

THE SALISH SEEDS PROJECT: A CASE STUDY IN DEVELOPING A LOCAL PLANT MATERIALS PROGRAM. **Eliza Habegger**, San Juan County Land Bank, Friday Harbor WA. elizah@sjclandbank.org

Limited availability of native seed and plants is a common barrier to grassland habitat restoration. The Salish Seeds Project, an 8-year old partnership between the San Juan County Land Bank and the San Juan Preservation Trust, was created in order to supply San Juan County area land managers with North Puget Sound provenance plant materials. The project is centered around a 1/3 acre nursery facility which grows seeds, plugs, and bulbs of over 60 species native to grassland and coastal habitats. While the nursery is small and its output modest, it has transformed opportunities for small-scale restoration using locally-adapted plant materials. Keys to success have included support from and coordination with other regional nurseries; access to grants and private donations for infrastructure; and a dependable source of staff funding provided by the Land Bank. With the nursery serving as a learning hub, the outreach and educational offshoots of the Salish Seeds Project have been powerful in promoting community awareness of grassland conservation and restoration. A popular twice-annual plant sale supports island residents who desire to increase native species diversity on their own lands. Challenges include the high cost of small-scale seed production and the difficulty of planning ahead to meet land managers' needs. Looking to the future, near-term goals for growth include increasing capacity for seed production through contracts with local vegetable seed farmers, improving outreach materials and plant selection guidance for landowners, and securing funding for additional infrastructure.

PROMOTING OVIPOSITION HABITAT FOR OREGON SPOTTED FROG USING TARGETED SEASONAL GRAZING STRATEGIES. **Melissa Habenicht**, Sarah Hamman, Ecostudies Institute, Olympia, WA. Sanders Freed, Center for Natural Lands Management, Olympia, WA; Jake Yancey, Tracking Y Ranch, Olympia, WA. mhabenicht@ecoinst.org

The alteration of wetland habitat by non-native species is a primary driver in the decline of Oregon spotted frog (*Rana pretiosa;* OSF). Oregon spotted frogs require short-statured vegetation in seasonally inundated wetlands for oviposition. Reed canary grass (*Phalaris arundinacea*) can degrade breeding habitat by forming dense monocultures of tall vegetation, which can eliminate open areas and low-statured plants preferred by OSF. Current practice for reed canary grass management in OSF oviposition habitat includes fall mowing to reduce vegetation height. However, mowing is labor intensive and may not be feasible when access by heavy equipment is limited. Managed cattle grazing may be a viable alternative for improving OSF habitat, as it can create openings in vegetation and shift the plant community composition,

favoring native sedges and rushes over more palatable, non-native grasses. We compared the effects of continuous and rotational summer-fall grazing, relative to ungrazed controls, on vegetation height, thatch depth, reed canary grass cover, plant composition, water quality, and soil nutrients. After two years, vegetation height and thatch depth decreased in the grazed treatments, but not in the control. Reed canary grass cover remained consistent across all treatments over the study period. Both grazing treatments showed an initial decline in species richness in the first year but rebounded over time. Finally, grazing appeared to have minimal negative impacts on soil or water quality. Corresponding to oviposition habitat improvements, OSF egg mass numbers increased in the continuously grazed area and were found in the rotationally grazed area for the first time.

PRESCRIBED FIRE EFFECTS ON ACORN FRUGIVORES AND OAK CULTURAL RESOURCE SYSTEMS. **Arielle Halpern**, Southern Oregon University.

Seasonally specific prescribed fire applied by Indigenous Peoples in their ancestral territories is used to increase the quality and quantity of cultural resources, promote desired patterns of habitat diversity, and support the heath, wellness, and safety of Tribal communities. Traditionally, the Karuk and Yurok Tribes of California applied fire in tanoak and oak (*Notholithocarpus densiflorus/ Quercus spp.*, Fagaceae) acorn gathering areas during the fall to reduce infestation in acorns by larvae of the filbertworm (*Cydia latiferreana*, Tortricidae) and filbert weevil (*Curculio occidentalis*, Curculionidae). Results from this and continuing collaborative studies highlight the importance of seasonally-specific prescribed fire in managing tanoak/oak-associated cultural resource systems and supporting Tribal eco-cultural revitalization.

EXPANDING NATIVE PRAIRIE CONSERVATION VALUE TO GRAZED WORKING LANDS. **Sarah Hamman,** Melissa Habenicht, Ecostudies Institute, 900 Jefferson St., SE, P.O. Box 1614, Olympia, WA 98273; Stephen Bramwell, Washington State University Extension, 3054 Carpenter Rd SE, Olympia, WA 98503. mhabenicht@ecoinst.org

Working lands have the potential to contribute to native prairie conservation by supporting and connecting diverse communities and populations within fragmented landscapes. The capacity of grazed lands to provide rare species habitat while maintaining productive fields for cattle is currently unknown. We investigated the effects of conservation grazing (rotational grazing with spring deferment and native seeding), relative to traditionally grazed (continuous grazing with no native seeding) and ungrazed restored prairie on native plant establishment, forage production, and Mazama pocket gopher activity. In 2018, we established six 1-acre treatment paddocks at three ranches in the south Puget Sound and three native ungrazed prairie preserves. We monitored species richness (native and non-native), forage species abundance, and fresh gopher mound presence in replicate plots within each paddock at each site for three years. Native species richness was significantly higher in the conservation grazing treatments in 2019 & 2020, largely

due to the experimental seeding and subsequent persistence of native forbs. There was no significant treatment effect on forage species abundance in grazed areas, with forage species comprising on average 92% cover. Finally, Mazama pocket gopher occupancy increased across all treatments over the project period, but had the greatest increase (27%) in the conservation grazing treatments. These results suggest that conservation grazing can elevate a select mix of native prairie species, maintain forage species abundance, and promote habitat and activity for the federally threatened Mazama pocket gopher. These benefits provide important conservation value across fragmented landscapes, while supporting an economically viable operation for producers.

INVENTORY AND CONNECTIVITY ASSESSMENT METHODS FOR *Q. GARRYANA* HABITATS. **Lori Hennings,** Metro, Portland, OR; Ted Labbe, Urban Greenspaces Institute, Portland, OR. Lori.hennings@oregonmetro.gov

Two regional work groups in the greater Portland/Vancouver area – the Oak Prairie Work Group (OPWG) and the Regional Habitat Connectivity Work Group (RHCWG) – recently completed mapping efforts for (1) *Q. garryana* distribution and (2) potential biodiversity corridors. The results are informing both work groups. The OPWG's project engaged diverse partners and over a hundred community volunteers mapping oaks in the field, followed by intensive efforts by Metro and Urban Greenspaces Institute to systematically hand-map approximately half a million oak points using aerial photos at a 1:15,000 scale. Meanwhile, the RHCWG developed habitat and connectivity models for a suite of "surrogate species" representing wildlife needs for basic habitat types including oak, forest, and wetlands, plus field methods to assess habitat quality and potential wildlife movement barriers. Oak-associated surrogate species include White-breasted Nuthatch, western gray squirrel and southern alligator lizard. Field assessments completed by several entities are being collected for input into a common database, and the RHCWG plans to develop a Survey123-type app for all RHCWG partners to enter their information into the regional database directly from the field. The RHCWG's finer scale connectivity work parallels and complements the OPWG's larger-scale prioritization work currently in process. The RHCWG and OPWG are well along in writing their respective strategic action plans. Both work groups' products are currently being used to inform prioritization for land protection, potential new transportation projects, new urban area planning, identifying private landowners to approach for conservation partnerships, and more.

MEASURING EFFECTIVENESS OF OREGON SILVERSPOT HABITAT MANAGEMENT AND REINTRODUCTIONS. **Erica Henry**, Breeana Sheffield, Cheryl Schultz, Washington State University, Vancouver, WA. erica_henry@wsu.edu

Endangered butterfly conservation often relies on both habitat restoration and captive breeding and reintroduction programs. Key to success of these programs is understanding when

conservation actions are, or are not, meeting their goals. Oregon silverspot butterfly, *Speyeria zerene hippolyta*, is an endangered butterfly for which meadow management and captive rearing and reintroduction efforts have been ongoing for 20+ years with little indication of long-term success. To better understand the effectiveness of Oregon silverspot management, we conducted two studies in 2021: 1) we measured larval survival in response to invasive grass and thatch removal, and 2) we conducted a mark-recapture study of both wild and captive-reared butterflies. We found that reducing the density of invasive grasses and associated thatch, increased larval survival by 50%. We also found that captive butterflies emerged, on average, three weeks after wild butterflies. This mismatch in timing resulted in observations of only 15% of captive females laying eggs as opposed to 45% of wild females, suggesting that captive-reared females are contributing very little to the overall population. For Oregon silverspot recovery efforts to succeed, continued management of invasive grasses is key, as is further work to match the timing of releases of captive butterflies with flight of wild butterflies. Our work highlights the importance of evaluating effectiveness of management actions so that strategies can be refined to maximize conservation outcomes.

AN INTEGRATIVE APPROACH TO ASSESSING THE ECOLOGICAL IMPACTS OF SUCCESSION AND RESTORATION IN OREGON WHITE OAK HABITAT. **Ava R. Howard**, Western Oregon University, Monmouth, OR; David R. Woodruff, USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR; Ashley T. Stolp; Cassandra L. Borcher; Henry C. Roberts; Jeffrey W. Snyder; Bryan E. Dutton; Samantha M. Sackett; Oswaldo A. Moreno; Shayla M. Solomon; Kayley R. Arpaia, Western Oregon University, Monmouth OR; Catherine Couture, Université du Québec à Montréal, Montréal, QC; Connor S. Park; Yasmin I. Schulberg; Nichole A. Hernandez; and Gareth R. Hopkins, Western Oregon University, Monmouth OR. howarda@wou.edu

Oregon white oak (*Quercus garryana*) savannahs and woodlands were once large components of the landscape from British Columbia to California. Land use changes over the past century have removed much of this habitat, threatening its unique biodiversity. Understanding how these ecosystems function at various stages of succession and restoration is a key research objective. Limited information exists from studies that integrate across scales from individual tree physiology to community biodiversity, and track dynamics over time. To address this, we have developed a long-term, intensive study that spans ecological scales, and experimentally assesses the effects of habitat restoration. We created a 22-ha research site in the Willamette Valley in western Oregon in partnership with private landowners. Our initial study investigated stress-physiology in 12 oaks across two habitats (savannah and closed-canopy forest). We later expanded the study to include data collection in 12 study plots across four habitats (savannah, woodland, forest thinned to oak woodland, and control forest) that encompasses 47 trees and associated vegetation, invertebrates, amphibians, reptiles, birds, and their interactions. Preliminary results show oak woodland and savannah habitats are more similar across a range of

ecological scales relative to later successional habitats where oaks become mixed into closed-canopy forest. Results to date also suggest a trade-off between oak drought and carbohydrate stress among habitats and variation in composition or richness at multiple trophic levels, including ground vegetation, invertebrates, and birds. Interactions across these scales are evident and will be the focus of future research.

BURNING DOWN COLONIAL CONSTRUCTS: ONE MOCCASIN IN THE BLACK. Dean Bravo, **Ka-Voka Jackson**, Bo Johnson, Jesse Kidd, Arianna Nava, **Jae Viles-Erdelt**, Willamette Valley Fire Collaboration – Ecostudies Institute, Eugene, OR. wvfire@ecoinst.org

Cultural burning is vitally important for Indigenous people, ecosystems, and community-building. Since time immemorial, Indigenous lifeways have coexisted with and stewarded fire-adapted landscapes for weaving materials, cultural foods, wildlife, and overall ecological health. Anti-fire rhetoric and policy have been forced upon Indigenous communities as an act of colonization, separating Indigenous people from their land and sovereignty. Prescribed burns without Indigenous leadership lack the respect and deep relationship with the land that local Indigenous people hold, thus it is essential for cultural and prescribed burning to be Indigenous-led, especially women, transgender, and 2spirit individuals, who are most underrepresented in fire professions. The Wagon Burners crew is an all-Indigenous cultural burn crew with the Willamette Valley Fire Collaboration, housed under Ecostudies Institute, which aims to uplift and uphold Indigenous voices and land stewardship through fire. The future of fire is Indigenous, thus one of the goals of the Wagons Burners is to build up fire capacity for Tribal communities across the region by providing resources for cultural burns. Through this work, the Wagon Burners' crew members are expanding their cultural experiences and connecting to their cultural lifeways, while revitalizing Indigenous land stewardship.

BEES DO IT, FLIES DO IT: POLLINATION BIOLOGY AND POLLINATOR COMMUNITIES OF THE ENDANGERED WILLAMETTE DAISY IN OREGON PRAIRIES. **Thomas N. Kaye**, Institute for Applied Ecology, Corvallis, OR; Susan Waters, Quamash EcoResearch, Olympia, WA; Scott Harris, David Cappaert, Christina Mitchell, Institute for Applied Ecology, Corvallis, OR. tom@appliedeco.org

Managing for sexual reproduction is crucial for supporting population viability in most rare species. Willamette daisy (Erigeron decumbens) is an endangered plant endemic to prairies in the Willamette Valley of Oregon. Little is known about the species' pollination biology, from its breeding system to pollinators. In 2019-2021 we conducted experiments and field observations to understand the importance and role of pollinators in seed production of the species. We found that the species relies on insect visitors for seed set in the field; caged plants did not set seed while open pollinated plants averaged 61% seed set. Pollen supplementation treatments showed that pollinator service to Willamette daisy flowers is below optimal across three years and six

sites, with an average increase in seed set of 6% to 15%, depending on the year, but this margin of benefit varied substantially from place to place. Controlled crosses between wild plants in the field show that the species is highly self-incompatible, with <5% seed set for selfed and unpollinated plants. Controlled outrosses within and between populations resulted in an average of ~50% seed set. Insects visiting the flowers of Willamette daisy included several species of Hymenoptera (mostly Halictidae including *Halictus*, *Lasioglossum* (*Dialictus*), *Andrena*, with some examples of Megachilidae and Apidae) and Diptera (mostly Syrphidae especially *Platycheirus*, *Sphaerophoria*, *Toxomerus*). Pollinator communities differed significantly from site to site and year to year, and reveal that insects visiting Willamette daisy are members of networks that rely on a wide range of co-occurring plants. Conservation of Willamette daisy populations hinges on supporting a thriving and diverse network of insect pollinators and flowering plants in the prairie ecosystem.

CONIFER ENCROACHMENT AND REMOVAL IN A NORTHERN CALIFORNIA OAK WOODLAND: INFLUENCES ON ECOSYSTEM PHYSIOLOGY AND BIODIVERSITY.
Lucy P. Kerhoulas, Gabriel S. Goff, Nicholas J. Kerhoulas, Humboldt State University, Arcata, CA. gsg91@humboldt.edu

Oregon white oak (*Quercus garryana*) woodlands across their range are becoming increasingly threatened by encroaching Douglas-fir encroachment (*Pseudotsuga menziesii*) as a result of fire exclusion. Using physiology, stable isotope analysis, and three metrics of biodiversity, this study investigates the effects of conifer encroachment and removal at the ecosystem-scale. Findings indicate that heavily encroached stands have the least amount of water stress and gas exchange. A moderate level of conifer encroachment appears to buffer water stress and support high productivity throughout the growing season. Trends in water potential and stomatal conductance suggest that coniferous shade improves oak water status via reduced evapotranspiration but limits productivity. Further, xylem water stable isotopes confirm that oaks and Douglas-firs are likely not directly competing for water, as oaks appear to use a relatively deeper water source. Thus, physiological results indicate that oak mortality to encroachment is likely light due to light, not water, limitation. Following conifer removal, moderately encroached stands did not respond dramatically during the first and second post-treatment years. However, heavily encroached stands increased gas exchange in both post-treatment years compared to unthinned counterparts. For ecosystem biodiversity, plant and bird diversity did not meaningfully differ among encroachment levels or between treatments, but mammal diversity was greatest in encroached stands. Collectively, findings from this work demonstrate that conifer removal is physiologically beneficial for light-limited oaks and that heavier thinning treatments are likely needed to yield long-term responses and influence biodiversity.

THE CAMAS COLLABORATIVE. **Joyce LeCompte**, PhD, Camassia Resource Stewardship and **Sarah Hamman**, PhD, Ecostudies Institute joyceklecompte@gmail.com

The Camas Collaborative was organized to facilitate meaningful co-stewardship between tribal communities and other caretakers of the camas prairies and oak woodlands of western WA through cross-cultural research, outreach and education. Our diverse group, composed of collaborators from academic, Tribal, nonprofit and government entities work together to identify and address the challenges to both harvesting camas and integrating tribal priorities and practices into prairie management in the South Sound. In this presentation, we will share lessons learned through our collective activities over the past five years about the benefits of, and challenges to, meaningful cross-cultural collaboration. We will also share our vision for the future of the Camas Collaborative and possibilities for co-management of the South Sound prairies.

SONG DISCRIMINATION BETWEEN TWO SUBSPECIES OF VESPER SPARROW: *POOECETES GRAMINEUS AFFINIS* and *POOECETES GRAMINEUS CONFINIS*. **Timothy Leque**, Joint Base Lewis-McChord Fish and Wildlife Program, Colorado State University, JBLM, WA. timothy.leque@colostate.edu

Vesper sparrows (*Pooecetes gramineus*) are grayish-brown songbirds of the family Passerellidae, found in open spaces such as prairies, meadows, and sagebrush steppe. Like other songbirds, male vesper sparrows sing throughout the breeding season to attract mates, as well as to delineate and defend territories. The Oregon vesper sparrow (*Pooecetes gramineus affinis*) is a subspecies endemic to the Pacific Northwest that has been identified as a species of conservation concern throughout its range. There is little research on the Oregon vesper sparrow, with some uncertainty regarding taxonomic status due to a lack of genetic analysis. Western vesper sparrows (*Pooecetes gramineus confinis*) occur east of the Cascade Mountains and are common and widespread throughout the western United States. The degree to which the boundary of the Cascades affects speciation among vesper sparrows is unknown, as wintering ranges for the two subspecies overlap in California. Differences in territorial response to conspecific song playbacks are often associated with evolutionary divergence between subspecies. This study involved exposing individual male vesper sparrows of two subspecies to playback of consubspecific and heterosubspecifc songs. The vesper sparrows in this study demonstrated some discrimination between subspecific song with differences in flight behavior between playback treatments. There were also differences in behavioral responses to playback, with Oregon vesper sparrows responding to playback with more singing, and western vesper sparrows responding to playback with more flights.

RESTORING CAMAS AND RECONSTRUCTING KALAPUYA CULTURE AND HISTORY. **David G. Lewis** Assistant Professor of Anthropology and Ethnic Studies, OSU; Citizen of the

Confederated tribes of Grand Ronde (Santiam, Chinook, Takelma, Molalla).
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Current research reconstructing the culture of the Kalapuya tribes and environments of the Willamette Valley. These environments were important for food production including camas, acorns, wapato and other resources. Traditions addressed will be culture fire and natural water systems, all of which have been restructured by settler communities. Reconstructing the traditional environment is key to restoring of camas traditions.

TAKING THE LONG VIEW: WESTERN BLUEBIRD REINTRODUCTION IN THE SAN JUAN ISLANDS--- A LAND TRUST'S PERSPECTIVE. **Kathleen Foley Lewis,** San Juan Preservation Trust. 468 Argyle Ave # B, Friday Harbor, WA 98250. kathleen@sjpt.org

In 2007, with multiple project partners, the San Juan Preservation Trust (a non-profit land trust working in the San Juan archipelago), developed a project to reintroduce the extirpated Western Bluebird (*Sialia mexicana*) to its historic range. As Western Bluebirds are closely tied with Garry oak (*Quercus garryana*) ecosystems though the Puget Sound-Georgia basin, a secondary focus of this project was education of island communities about the importance of Garry oak habitat in an effort to further conservation efforts. Over a 10- year period, bluebirds were captured at the Joint Base Lewis-McChord military installation in southern Puget Sound, where the northernmost robust breeding population could be found, and translocated to San Juan Island. Since the reintroduction effort, a small breeding population of these migratory passerines have established themselves on San Juan Island; the project was further expanded to Vancouver Island, B.C., in 2012 in an attempt to more fully reestablish their historic breeding areas and population dynamics. At the time this project was established, there were no other known efforts to reintroduce migratory songbirds in the United States. This was also the first species-specific recovery project undertaken by the San Juan Preservation Trust, the oldest land trust in Washington State. As a pioneering effort on many fronts, there have been equal successes and disappointments. After fifteen years, there is still much to learn about the fate of this conservation-dependent species, as the population of Western Bluebirds at the northern extent of their historic breeding range still hangs in the balance.

THE RISE AND FALL OF TAYLOR'S CHECKERSPOT: PATTERN OR PANDEMONIUM? **Mary Linders** and Andrew Dechaine, Washington Department of Fish and Wildlife, 600 Capitol Way N. Olympia, WA 98501. mary.linders@dfw.wa.gov

Habitat loss and degradation together with small population size and isolation are the primary threats contributing to the endangerment of Taylor's checkerspot butterfly. Successful species recovery requires that threats be identified and mitigated so imperiled populations can return to a state where they are again resilient and redundant. However, factors affecting population persistence are complex and declines may result from the impacts of a "perfect storm", from

longer-term trends that erode critical resources/utilities, or a combination of these. Under current conditions, Taylor's checkerspot populations are particularly vulnerable to extirpation because the forb-rich habitat on which they depend for population growth and cohesion is rare and/or lacking. In addition, extreme weather events and climatic shifts increase the uncertainty around restoration and reintroduction outcomes, while also generating new threats. Based on the literature, 18 years of field observation and expert opinion, we've compiled known and potential threats to Taylor's checkerspot and evaluate the likelihood of each resulting in additive vs. compensatory mortality. Using observed population declines and/or losses from reintroduction failure, we identify where patterns exist and where such events are likely to have resulted from a combination of disparate factors. Mitigating the challenges posed by overlying threats operating at multiple spatial scales will require new research, detailed monitoring, and creative solutions.

WHICH BEES ARE VULNERABLE TO URBANIZATION? DIFFERENCES IN BEE COMMUNITIES BETWEEN URBAN AND RURAL SITES NEAR SALEM, OR. **Briana C. Lindh**, Annie Jolliff, Samantha Coleman, Kallen Skelton, Olivia Mack, Molly, Hansen, Grace Shiffrin. Biology Department, Willamette University, 900 State St, Salem, OR 97301.

We sampled bee communities in the city of Salem, OR and in nearby restoration sites in order to identify which bee species are potentially harmed by urbanization and which are particularly reliant on native plants. Based on the literature, we expected that urban areas would have large populations of small-bodied cavity nesting bees and of floral generalists, and might lack ground nesting bees and floral specialists. We found that urban and rural sites exhibited distinctly different bee community composition, both in 2018 and 2019. Some species of *Bombus* (bumblebees) and of *Lasioglossum* (sweat bees) were much more abundant in rural than urban areas, but we were surprised to find that these bees relied on non-native floral resources. The two species of true floral specialist bees that we found were present only in rural restoration sites, but their numbers were too small to generate statistically significant patterns. Our results suggest that rural and urban land managers should be aware of the importance both of the mass of floral resources provided by exotics and of the crucial importance of certain native plants that host specialist bees.

GRAZING STRATEGIES TO SUPPORT AND ENHANCE ENDANGERED SPECIES. **Maynard Mallonee**, Mallonee Family Farms, LLC, Curtis, WA.

I am Maynard Mallonee, 3rd generation Organic Valley dairy farmer. We will be discussing how my family uses grazing to protect and improve habitat for the federally endangered Kincaid's lupine as well as other state sensitive and threatened plants. We use rotational grazing, pasture deferment, cross fencing, and stockpiling to promote the biodiversity of our soils and plants to enhance the population of Kincaid's lupine.

ARE WE MAKING IT BETTER OR JUST DIFFERENT? SOUTH SOUND PRAIRIE MANAGEMENT A DECADE IN. **R. Adam Martin**, Ecostudies Institute, Olympia, WA. amartin@ecoinst.org

Since the Federal listing of several prairie-associated species in 2013, significant resources have gone into managing the South Sound Prairies. On Joint Base Lewis-McChord we use a landscape-scale monitoring and management approach to assess and improve prairie conditions for listed species and the prairie ecosystem in general. Because funding under the Endangered Species Act is generally species-specific, we created species-specific functional-habitat goals that focused on managing for different vegetation heights, functional group composition, and open ground objectives. However, we also tried to incorporate prairie composition goals to support the maintenance and expansion of high-quality prairie. To meet both goals, we used fire, herbicide, mechanical control, and seeding. This study assesses eight years of landscape-scale vegetation monitoring to ask two questions: 1) how effective has management been at meeting species and composition goals? 2) how well do species goals support composition goals? Management has generally been effective at meeting species goals, but meeting and maintaining prairie composition goals has been challenging. In particular, fire is effective for creating and maintaining open ground, but has also promoted the increase of invasive annuals. Invasive annuals are likely increasing because native perennials are slow growing and comprise most of the available seed to sow after burns, and most native annuals are rare. This disparity has likely driven the decrease of nativity on some prairies. Thus, fine-tuning and creating smaller-scale management actions that support listed species as well as prairie nativity will likely be the frontier of prairie restoration for the next decade.

THE RESTORATION OF OREGON WHITE OAK/ROCKY BALD HABITAT ON JONES ISLAND USING PRESCRIBED FIRE AND DIRECT SEEDING. **Samantha Martin**, Ecostudies Institute. Orcas Island, WA. smartin@ecoinst.org

Located in the San Juan Islands archipelago, Jones Island State Park contains a mosaic of rocky bald and forested habitats. Scattered throughout the rocky balds are rare Oregon white oak-red fescue communities which cover approximately 10% of the total 188 acres of the island. Since 2019, Ecostudies Institute staff have been working collaboratively with Washington State Parks to use prescribed fire and direct seeding to restore a 4-acre area of Oregon white oak habitat along the west side of the island. Controlled burns have taken place in September of 2019 and October of 2022. Due to the varied topography of the rocky balds and heavy deer herbivory, results have varied greatly across the site in relation to soil depth, sun exposure, and deer access. Patterns of seeding success have emerged which have helped inform ongoing seeding efforts, yet invasive annual grasses pose ongoing challenges to the success of these efforts. Deer exclosures installed across the project area display the possibility of establishing a diverse array of understory species when herbivory pressure is removed.

RESTORATION STRATEGIES FOR PROPAGATION OF *CAMASSIA QUAMASH* ON THE WEIPPE PRAIRIE. **Katy Matthews,** National Park Service - Nez Perce National Historical Park, Big Hole National Battlefield, Whitman Mission National Historical Park. Kathryn_Matthews@nps.gov

Camassia quamash (camas) is a plant that is well-known throughout its native habitat in the Pacific Northwest of the United States, despite the growing decline of its preferred habitat type across the region. This plant requires specific site conditions to ensure a successful growing season. Its habitats, often referred to as camas prairies, were important traditional harvest sites for many Indigenous cultures. In the 19th century federal land policies removed many tribes and first nations from their ancestral homelands and transferred ownership of those lands to early Euro-American settlers. Ultimately, these land uses proved particularly destructive to wetland prairies, including camas prairies. The decline of wetland areas across North America has resulted in significant loss of a habitat type that provides valuable ecosystem functions, while also reducing and degrading culturally significant landscapes. Camas' cultural and ecological significance make it an ideal species to focus on for wetland restoration projects. Weippe Prairie, a well-recognized traditional harvest area used by the Nez Perce people within the Palouse Bioregion, of north-central Idaho, provides an ideal site to both study and restore camas prairie habitat. This study identified site characteristics and evaluated different restoration techniques to aid in creating a restoration protocol that can be used to rehabilitate camas prairies across the Pacific Northwest.

GRAZING GRASSLANDS FOR OREGON VESPER SPARROW. **Carolyn Menke,** Greenbelt Land Trust; **Bob Altman**, Avifauna Northwest, Corvallis, OR; Matt Blakeley-Smith, Greenbelt Land Trust, Corvallis, OR. carolyn@greenbeltlandtrust.org

Range-wide declines in Oregon Vesper Sparrow (OVS) populations are due in part to the challenge of creating and maintaining suitable habitat. This Federal Candidate sub-species prefers grasslands with heterogeneous vegetation heights and areas of sparsely-vegetated ground during its nesting season, which spans April – July in the Pacific Northwest. Greenbelt Land Trust's Bald Hill Farm conservation property supports one of the largest populations of OVS in the mid-Willamette Valley, in habitat that has likely been grazed for over 100 years. The objectives of our project were to continue long-term demographic monitoring of the site's OVS population, track habitat suitability relative to OVS preferences in restored prairie and grazed pasture and use this information to adaptively manage and integrate these preferences with objectives for prairie restoration and grazing. Principal methods included nest monitoring for metrics of productivity and color-banding and resighting for metrics of survival and dispersal. In 2022 we initiated vegetation monitoring every 7-14 days from April through July to describe the distribution of vegetation height classes and estimate the cover of forbs, moss, plant litter, and bare ground. We will present preliminary results on these attributes, discuss the important role of grazing in providing suitable OVS habitat at this site, and provide context with examples from other sites in the Willamette Valley.

OAK AND PRAIRIE RESTORATION AT ROCKY POINT BRITISH COLUMBIA – THE IMPORTANCE OF PERSISTENCE AND LUCK. **James Miskelly**, Natural Resources Canada, Victoria, BC. james.miskelly@nrcan-rncan.gc.ca

Rocky Point is a Department of National Defence property at the southern tip of Vancouver Island that includes large areas of degraded prairie and woodland. Restoration actions applied over the last 15 years include invasive shrub removal, conifer thinning, seed addition, and prescribed fire. Response of native plants to restoration treatments has generally been slow. Positive results have come from continuing treatments over a period of years without immediate evidence of their efficacy. In some cases, plant communities have appeared to respond suddenly after years of treatment while in other cases improvements have been gradual. On several occasions, unusual natural events have interacted with treatments in a synergistic way. These observations highlight the importance of not giving up on a potentially helpful technique prematurely, as well as the role of luck and stochasticity in ecosystem management.

COMMUNITY-FOCUSED NATIVE PLANT PROJECTS TO AID RESTORATION IN URBAN AREAS. **Kristen Miskelly**, Satinflower Nurseries, Victoria, BC. info@satinflower.ca

Satinflower Nurseries: Native Plants, Seeds & Consulting is a native plant nursery serving Southern Vancouver Island and the Gulf Islands, British Columbia, since 2013 (previously Saanich Native Plants). The nursery aims to empower and inspire people to connect with nature through native plants and offers a suite of nature-based education and outreach to the community. The nursery's newest educational program, MeadowMakers, was developed with the intention of empowering the local community through education to convert and enhance underutilized spaces into pollinator-friendly native plant meadows. Developed with Pollinator Partnership Canada, and partnered with the City of Victoria, the 7-month course offers participants a series of interactive webinars and field trips focused on native plants, pollinators, and restoration. In its first year, MeadowMakers saw 100 participants learn practical information regarding site preparation, seeding and planting, pollinator identification, invasive species, plant propagation, and long-term monitoring and maintenance. Programs such as these inspire ecological stewardship in the community by strengthening the public's plant knowledge and related skills and demonstrate how businesses can work synergistically with other groups such as local governments, land managers, and First Nations communities.

BRINGING BUTTERFLIES BACK TO BALD HILL FARM. **Andy Neill** and Carolyn Menke, Greenbelt Land Trust, Corvallis, OR. andy@greenbeltlandtrust.org

Greenbelt Land Trust conserves and restores lands in the mid-Willamette Valley. Bald Hill Farm is a 590-acre property at the center of a larger 1000+-acre complex of conserved lands, making it a key location for connectivity of high-quality habitat. Since the acquisition of Bald Hill Farm 10 years ago, Greenbelt has been converting agricultural lands to prairie and restoring adjacent oak

savanna and woodland. More recently, Greenbelt is working with USFWS to introduce Taylor's checkerspot butterfly (*Euphydryas editha taylori)* to restored upland prairie and savanna habitats. We are also working with the Institute for Applied Ecology to plant Kincaid's lupine (*Lupinus oreganus*) with the hope of drawing Fender's blue butterfly (*Icaricia icarioides fenderi*) from nearby occupied sites. By increasing the quantity and quality of upland prairie and building the availability of butterfly host and nectar species, we hope to establish sustainable populations of Fender's blue and Taylor's checkerspot at Bald Hill Farm and contribute to their recovery.

TRIBAL KNOWLEDGE SENSITIVITY. **Clarice Paul,** Wanapum Band. wanapum36@gmail.com

Collaborative relationships between Native and non-Native peoples to restore camas and other First Foods can have positive impacts for tribal communities. For positive outcomes to occur, non-Native collaborators must understand and respect the specific information sharing protocols of tribal communities with whom they collaborate. In this presentation, I will share my perspectives on appropriate Tribal Knowledge sensitivity as a Wanapum woman and root digger.

HOGS, HAZELNUTS, AND HAWKS: ADAPTIVELY MANAGING FOR WILDLIFE IN THE AGRICULTURAL-WILDLAND MATRIX. **Calvin Penkauskas**; Alejandro Brambila; Drew Donahue, University of Oregon, Eugene, OR; Taylor Larson, My Brothers' Farm, Creswell, OR; Betsey Miller, Oregon State University, Corvallis, OR; Lauren Hallett, University of Oregon, Eugene, OR. cpenkaus@uoregon.edu

Oaks are imperiled in Oregon, and their conservation is often in conflict with agricultural production. Managing for key pests and mitigating the effects of climate change are some of the most pressing issues for the domestic hazelnut industry; most of which is found in the Willamette Valley. To help resolve this conflict, we conducted a prescribed hog-foraging experiment to reduce filbertworm populations between 2018 and 2020 at an organic farm, and performed a farm bird observational study at three large-scale hazelnut operations in 2022. Prescribed hog-foraging was found to be effective at reducing pest pressure in a woodland and may not entail a trade-off with understory vegetation change. Similarly, older hazelnut orchards may promote farm bird diversity – especially along edges of other habitat, such as oaks, wooded-wetlands, and younger orchards. These case-studies may serve to inform adaptive management techniques for the conservation of oak habitat and their associates along the agricultural-wildland interface.

THREE-LEGGED RACE: INNOVATIVE CONSERVATION PLANNING WITH DEPARTMENT OF DEFENSE. **Zachary Radmer**, U.S. Fish and Wildlife Service, 510 Desmond Drive SE, Lacey, 98503, WA. Zachary_Radmer@fws.gov

The Endangered Species Act compels federal agencies to utilize their authorities to conserve threatened and endangered species. However, it remains unclear when that commitment has been completed or how those commitments affect future interagency cooperation between the federal agency and the U.S. Fish and Wildlife Service. The ability to maximize the value of 27 million acres of habitat managed by the Department of Defense is paramount to the more than 450 threatened and endangered species that live there and to the soldiers who train on those finite lands. To tackle those challenges and to achieve better outcomes for species conservation and training flexibility, the Department of Defense and the Department of the Interior are developing new approaches for implementing endangered species regulations on and around military installations. Joint Base Lewis-McChord contains 12,000 acres of the remaining prairie-oak habitat in the ecoregion and is a 'Pilot Project' for the Conservation Policy Initiative. The traditional paradigm is that the Service and the DoD create static rules regarding endangered species. The new paradigm is that the Service and DoD will establish "defined conservation commitments" beyond which the Service would not impose rules and requirements. We hypothesize that the new paradigm will align the interests of state and federal conservation agencies with the desire of the DoD to train effectively and realistically. Only by creating a regulatory landscape where the DoD benefits from the expanding occupancy of rare prairie-oak species can we make the partnership into a three-legged race.

SPATIOTEMPORAL PATTERNS OF RISING ANNUAL PLANT ABUNDANCE IN GRASSLANDS OF THE WILLAMETTE VALLEY, OREGON. **Paul B. Reed**, Institute for Applied Ecology, Corvallis, OR; Lauren M. Hallett, University of Oregon, Eugene, OR. paulreed@appliedeco.org

Plant invasions have been increasing around the world. An example of this with dire ecological consequences is the rising dominance of nonnative annuals across much of the western United States. Here, we sought to quantify change in annual plant abundance and determine the landscape sensitivities contributing to that change over the past 35 years for the Willamette Valley, Oregon. We combined a recently developed remote-sensing vegetation cover dataset with gridded soils data and topographic variables to understand the spatiotemporal patterns of annual plant abundance between 1986-2020. We determined the rate of change in annual (%) cover for each pixel and regressed annual cover against heat load, soil depth, and sand content to determine landscape sensitivity through time. We found an overall tendency toward increasing annual (%) cover in this region, with a median gain of +15% cover over 35 years among pixels that experienced a significant increase. However, change in cover was far from uniform across the landscape, with rising annual cover occurring to the strongest degree in areas with high heat load and shallower soils. Conversely, areas with lowest heat load tended to exhibit a decline in annual cover through time. Thus, we identified steep, south-facing slopes as being particularly sensitive to annual invasions. Disturbance in these areas may present high risk to increase annual dominance. Western PNW grasslands may be lagging behind the explosive annual invasions that have already occurred in California and the Great Basin, but trends here suggest it may just be a matter of time.

CAMAS AS A FOCAL SPECIES MOTIVATES COLLABORATIVE EFFORTS AND WET PRAIRIE RESTORATION AT TWO NATIONAL PARKS. **Thomas J. Rodhouse,** Kathryn Matthews, Devin S. Stucki, National Park Service. Tom_Rodhouse@nps.gov

The National Park Service and partners have studied common camas (*Camassia quamash*) at the Nez Perce National Historical Park Weippe Prairie and Big Hole National Battlefield park sites since 2005 in an effort to understand population dynamics in response to weather and climate and other factors including past and present management. We review a suite of study results and outline next steps which will include increased collaboration with other camas prairie land managers around the Pacific Northwest in order to leverage collective knowledges and experiences. Current estimates of camas populations at both sites suggest relative stability over the 15 year period with short-term fluctuations in response to dry winter and spring conditions. Fire and Indigenous bulb harvest techniques, when tested in combination, appear to have yielded net increases in camas abundance. Infilling of a Settler-era drainage ditch has successfully inundated surrounding prairie with apparent benefit to camas and other wildlife such as cinnamon teal and phalarope birds. Reed canarygrass presents a growing threat in some of these newly inundated areas. These and other studies conducted at both sites have provided important opportunities for doing more collaborative cultural landscape and biological conservation actions. Camas as a focal species has been a key catalyst for conversations and group learning, suggesting that a focal-species model collaboration, whether of camas or other species of relevance elsewhere, can bring multiple stakeholders together for common purpose.

MAPPING PRIORITY OAK HABITAT IN THE GREATER PORTLAND-VANCOUVER REGION. **Nicole Ruggiero**, Tualatin Soil and Water Conservation District, Hillsboro, OR. nicole.ruggiero@tualatinswcd.org

The Oak Prairie Working Group worked with Biohabitats, Inc. to create spatial prioritization models of oak conservation opportunities across the Greater Portland-Vancouver Region (also known as the Regional Conservation Strategy planning area (RCS) and the Intertwine). Identifying and prioritizing high value conservation opportunities in both rural and urban landscapes is needed to inform investments in land protection, restoration, and education and outreach. Our process included overlaying mapped Oregon white oak trees with landcover data and identifying and scoring the presence of oak at two different spatial configurations while also accounting for connectivity between high value habitat cores. Habitat patches were scored separately in rural areas than in urban areas to allow for the variability in habitat quality among these different landscapes and to ensure that corridors and connectivity across the urban matrix was included. In addition to the methods and results of this analysis, a few recent examples of how partners are using these models for outreach and conservation project selection are included.

TENDING OAKS WITH CULTURAL FIRE. **Joseph Scott**, Traditional Ecological Inquiry Program, Eugene, OR. joe@teiprogram.org

Since time immemorial, Indigenous ecologists have been tending the land with fire. In what is now Western Oregon, people burned to maintain oak trees for acorns, tools, and materials, used fire in meadows for camas and other foods, and burned hazel patches for basketry. Traditional foods and materials depend on Indigenous peoples' deep understanding of fire ecology and corresponding burning regimes to maintain health and productivity. The connection Tribal people have to the fire-adapted landscapes that support them are the result of countless generations of practice and co-evolution. In pre-contact times, Cultural Fire maintained the open, park-like savannas, wetlands, and riparian areas that are a defining feature of the Willamette Valley. The catastrophic changes brought by settler-colonial approaches to land management resulted in fire suppression and the disruption of traditional tending practices. These interruptions in ecological continuity ultimately became part of a larger effort to disenfranchise Indigenous people of their land base, traditional foods and materials, and cultural identity. Seasonal rounds – the cycle of tending and gathering - depend on Cultural Fire. Indigenous people recognize that using this fire in tending traditional food producing places has a direct and tangible impact on the health of Indigenous individuals and communities. Learning about the deep ecology found throughout Indigenous fire practice is a step toward recognizing the role Traditional Ecological Knowledge has played in shaping our shared places, and in appreciating the skills of Cultural Fire Practitioners in healing compromised landscapes.

GEOECOLOGY OF THE OLYMPIC MOUNTAIN RAINSHADOW. **Fred Sharpe,** Olympic Peninsula Prairies (OPP) Sequim WA; Forest Shomer OPP, Port Townsend WA; Anita McMillan Washington Dept. of Fish and Wildlife & OPP, Port Angeles WA. fsharpe@alaskawhalefoundation.org

The rainshadow cast by the Olympic Mountains represents the driest portion of the west Cascade Ecoregion and CPOP areas of focus. This temperate rainshadow (16" inches annual precipitation) is characterized as unipolar, where both solar input and wind-bearing rains arrive from a southernly direction. This generates a rainshadow that typically falls on shady, northward oriented slopes. Consequently, landscape declivities that produce south-facing exposures are among the most important sites for arid-land vegetation. In the rocky foothills, chaparral (manzanita, ceanothus, madrone, juniper) is found on resistant basalt and sandstone, especially where the Juan de Fuca glacier eroded east-west trending valleys (in contrast to the Olympic Mountains' radial drainage pattern). In the NE lowlands, aridity is intensified by stony, excessively drained glacial deposits and by northwesterly summer winds blowing along the Strait. A dynamic fire regime formerly kept the landscape more open, allowing for greater ecological contiguity between lowland prairies, foothills rock outcrop and subalpine meadows. The most productive geophyte growing areas were presumably near wetlands and on deep silt-

loams along the lower Dungeness River. During Vancouver & Menzies explorations (1792) they observed: “luxuriant grass, diversified with an abundance of wild flowers”. At abandoned S’klallam villages they also noted young growth, indicating local cessation of prescribed burning. Intensive irrigation-mediated agriculture and residential development has decimated the bunchgrass ecotype, with less than 1% remaining. Conservation efforts include bulb salvage, soil reclamation and floristic reconstruction based on S’Klallam oral histories, herbarium records and the propagation of species found in extant prairie fragments.

CONSERVING IMPERILED PRAIRIE-OAK BIRDS IN THE PUGET LOWLANDS OF WESTERN WASHINGTON. **Gary Slater**, Ecostudies Institute, P.O. Box 1614, Olympia, WA 98501. glslater@ecoinst.org

The loss and degradation of prairie-oak habitats has negatively impacted the distribution, abundance and conservation status of numerous breeding birds in the Puget lowlands of Washington State, including the streaked horned lark, Oregon vesper sparrow, Western bluebird, and slender-billed white-breasted nuthatch. Although proximate causes for historic population declines are generally known, the current factors limiting populations can be elusive and complicated by new and interacting threats, including the effects associated with small, isolated populations. Gathering the information necessary to develop comprehensive recovery strategies requires basic information on population distribution and abundance and habitat needs. It also requires more complex information such as the demographic factors limiting populations, yet these data can take over a decade to acquire. An iterative, stepwise approach embraced by collaborators in the region has been useful in producing provisional and interim conservation strategies while continuing to collect information necessary to develop comprehensive approaches to species recovery. These approaches can be broken into the following categories: 1) determining distribution and abundance, 2) collecting natural history and habitat use information, 3) understanding factors limiting populations, 4) and developing, implementing, and adapting management approaches that lead to positive population growth rates and the establishment of new populations. Examples of ongoing work with several imperiled species will be presented to highlight conservation progress and challenges. The examples also help inform conservation practitioners on the time frames necessary to recover avian populations.

PRAIRIE HABITAT RESTORATION ON JOINT BASE LEWIS-MCCHORD. **Gina Smith,** Joint Base Lewis-McChord Fish & Wildlife, JBLM, WA. Gina.Smith@colostate.edu

Management of the approximately 20,000 acres of prairie on Joint Base Lewis-McChord entails balancing the requirements of three federally listed species and military training objectives. To reach those goals, we must adapt to frequently changing conditions, and collaborate with neighboring agencies. By working closely with biologists and experts from agencies including the U.S Fish and Wildlife Service, Washington Department of Fish & Wildlife, and Ecostudies

Institute, we develop management plans using a variety of habitat enhancement and monitoring techniques to help recover populations of the Taylor's checkerspot butterfly, streaked horned lark, and Mazama pocket gopher. Additionally, we work with the Department of Defense to help establish and maintain grassland and savannah-type ecosystems to help facilitate military training objectives. Scotch broom and exotic shrub removal facilitate a landscape more inviting to prairie-obligate species while creating more open space for military training activities and reducing catastrophic wildfire risk to adjacent communities. We use many tools to reach our objectives, including prescribed fire, herbicide application, manual removal, seeding, and plug planting. We must be flexible and adapt our restoration techniques in many ways based on observations made in the field. Several factors require us to be adaptive in our management techniques, including an influx of new weeds, climate change and extreme weather events, a shortened burn season, reduced availability of locally adapted seeds, turbulent funding, and lack of personnel. Our ability to remain flexible in the face of challenges, and our long-term partnerships with neighboring organizations, allow us to continue to restore the largest prairies in the South Sound.

LARGER-SIZED NATIVE SEED USED FOR RESTORATION AT HIGH RISK OF RODENT PREDATION IN RECENTLY BURNED GLACIAL-OUTWASH PRAIRIES. **Gina Smith,** Joint Base Lewis-McChord Fish & Wildlife, JBLM, WA. Gina.Smith@colostate.edu

Abstract: Low native plant seedling establishment rates are a common challenge for land managers restoring many ecosystems. This study focuses on one frequently suspected but rarely studied component: seed predation. Using exclusion cages, we tested if small mammals and invertebrates predate on seed from five functionally important and difficult-to-establish plants with <5% establishment rates in Pacific Northwest prairies: *Balsamorhiza deltoidea, Dichanthelium oligosanthes, Armeria maritima, Viola adunca,* and *Erigeron speciosus.* Additionally, three other factors were tested to see their influence on predation: seed size, edge effect, and timing. Five prescribed burned Western Washington prairies were studied, each with three 50-meter transects including three plots along a gradient from the unburned edge to the burned interior. Each plot contained four subplots (treatments): Insect entry, small mammal entry, complete exclusion (control), and no exclusion. Each treatment contained a seed dish with 20 seeds of each species. These seeds were counted after 24 hours, 48 hours, and one week to determine predation. Findings showed a clear preference by small mammals for larger-sized seeds (*B. deltoidea, D. oligosanthes,* and *V. adunca*). Insect predation was not observed for any species. Furthermore, no evidence of an edge effect influencing predation was found, and the majority of seed predation by small mammals was observed at the one-week count. These findings suggest that attempting to mitigate seed losses from small mammals could positively influence seedling establishment rates for *B. deltoidea, D. oligosanthes,* and *V. adunca* in these Pacific Northwest prairies.

SEEDS FOR CHANGE: PRESERVING OAK PRAIRIE FORBS FOR AN UNKNOWN FUTURE. **Adrienne St. Clair**; Jonathan Soll, Marsha Holt Kingsley, Metro Regional Government, 600 NE Grand Ave., Portland OR 97232. adrienne.stclair@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. In 2016, Metro set a goal to document and preserve locally adapted, oak-associated herbaceous species and for 3 years we worked toward this goal by locating populations, documenting them, and collecting material for an herbarium and seed bank. What began as a master list of 708 species known to occur in a handful of sites became a target list of 72 species of conservation concern. We defined our seed and voucher collection protocols through a balance of science and practicality,and set out to locate as many populations of our target species as possible. In all, we collected 178 vouchers which are housed at the PSU herbarium, and 133 seed accessions stored in the Rae Selling Berry Seed Bank. Along with successfully storing seed for future restoration needs, we also gained unexpected insights into the health of our herbaceous plant populations which is already proving invaluable to future management decisions.

CAMAS AS A CULTURAL KEYSTONE AND LONG-TERM INDIGENOUS ECOLOGICAL MANAGEMENT OF CAMAS PLACES. **Linda Storm,** Ethnoecologist/Ethnobotanist, Seattle, WA. **William Thoms**, Cultural Resource Specialist, Confederated Tribes of the Chehalis Reservation. prairiefire22@gmail.com

The genus *Camassia* includes multiple species and subspecies of wild edible plants that have been tended, harvested, managed, and maintained for thousands of years by multiple North American Indigenous peoples. Camas as a cultural keystone reflects long-term interactions between people and plants in the places where it grows. Specific *Camassia* subspecies reflect the environmental conditions of where they grow, from soil type to hydrologic regime. My research focuses on the complex co-evolutionary relationships between people and plants, with specific emphasis on the Upper Chehalis and Cowlitz camas prairies and their landscapes. These prairie places include both wetland and dryland ecosystems, including dry gravel outwash plains (including Mima mound prairies) and deep silt-loam soil wetlands like the Willamette Valley wet prairies. Indigenous traditional ecological management of the land over thousands of years maintained abundant camas bulbs for food and promoted numerous other wild food plants to harvest throughout the year. The legacy of long-term camas cultural ecosystem tending with highly sophisticated fire management and harvesting techniques, maintained biodiversity on species, patch, and landscape scales. Without ongoing indigenous management, these places have become dominated by later successional stage forest and/or non-native invasive species. Pacific Northwest Tribes today are working to recover access to and co-manage camas places, bringing back traditional foods and practices for health and well-being. This presentation will share about some culturally significant camas places with examples of past Coast Salish Pacific Northwest Tribes' management and present day ecocultural restoration efforts.

SUCCESS STORIES & LESSONS LEARNED FROM A NATIVE SEED PARTNERSHIP.
Kate Wellons, Institute for Applied Ecology, 563 SW Jefferson Ave, Corvallis, OR 97333. Alexislarsen@appliedeco.org

The Willamette Valley Native Plant Partnership (WVNPP) was established in 2012 to provide high quality, diverse native seed for restoration, revegetation, and mitigation projects throughout the region. The goal was to create a supply of seed that is genetically diverse and ecologically appropriate by collecting seed from many source populations throughout the Willamette Valley to capture a broad genetic base for each species. This seed was used to establish farm fields of high priority native species for partners. Over the past nine years, crews have collected 72 pounds of seed from 27 different native species from hundreds of wild populations scattered throughout the Willamette Valley. Twenty-one species have been put into production which has resulted in a yield of over 4,100 pounds of native seed. Approximately 2/3 of this seed has been distributed to partners to be used in prairie and oak habitat projects. As we reflect back on nearly a decade of native seed production, we recognize the challenges of this effort, but also take note of successes. This work can be applied to other regional plant material partnerships as well as the WVNPP as we turn towards another decade of native seed partnership.

PRESCRIBED GRAZING AS A HABITAT MANAGEMENT TOOL. **Jake Yancey**, Tracking Y Ranch, Olympia, WA.

Currently operating a cow/calf to finish cattle grazing and direct marketing beef operation in the South Puget Sound area of Washington State, Jake will discuss how he uses "Prescribed Grazing" as a tool for habitat management. His concept of "Prescribed Grazing" helps to describe how his grazing operations, in partnership with ecological specialists, has helped to control non-native plants, maintain open space, and helped to mitigate wildfire risks. Through the use of monitored livestock rotations in small paddocks in relation to the targeted vegetation or property outcomes, along with fence design and location, this tool has helped to improve habitat for wildlife, such as the endangered Oregon spotted frog, while also helping to control Scotch broom, reed canary grass, and rattail fescue. Come along with Jake and his cattle, as he discusses a fiscally sustainable tool in habitat management, "Prescribed Grazing."

POSTER ABSTRACTS

2022 Cascadia Prairie-Oak Partnership Conference
November 7-10 | Vancouver, WA

A PILOT STUDY OF THE ECOLOGICAL HISTORY OF OREGON WHITE OAKS IN BUSH PASTURE PARK, SALEM OREGON. David P. Craig, **Kaiona Apio**, Blake Carlile, **Emelia Sherman, Maddy Specht**, Willamette University, Department of Biology, 900 State Street SE, Salem OR. dpcraig@willamette.edu

The conservation of oak habitats in the Willamette Valley is critical for the native biodiversity co-evolved with this keystone tree species. Bush's Pasture Park is a 90.5-acre city park located in the heart of Salem, Oregon, that is famous for its groves of Oregon white oaks (*Quercus garryana*) and associated biodiversity. The park's location in the Capital of Oregon has contributed to a relatively rich documentation of the changes in land use. Based on dendrochronology, we know some of the oaks are old enough to have been actively managed by the Kalapuya in the 1700s. Historical records include original land surveys and extensive photography by land users. There are also numerous reports from various municipal departments and non-governmental organizations that have promoted the general conservation of the oaks. In the summer of 2022, we initiated a pilot study to precisely map and measure every oak in the park. We document more than 1,000 oaks in two major groves in the first comprehensive survey of individual trees. This tree inventory is the baseline for a historical ecology focusing on interactions between people and the environment in the area going back in time to at least the early 1830s. Based on our pilot study, we are planning a decade-long research plan for an ecological history project focusing on intersections of public health and biodiversity across an urban-rural gradient.

REINTRODUCTION OF THE FEDERALLY-THREATENED STREAKED HORNED LARK: (*Eremophila alpestris strigata*): DEVELOPING EFFECTIVE RELEASE TECHNIQUES AND AN IMPLEMENTATION STRATEGY. **Keith Bagnall,** Gary L. Slater; Ecostudies Institute, P.O. Box 1614, Olympia, WA 98501; Hannah A. Sipe, School of Environmental and Forest Sciences, University of Washington, 98195, Abby E. Bratt, Quantitative Ecology & Resource Management (QERM) Program, University of Washington, 98195 Seattle, WA. Sarah J. Converse, U.S. Geological Survey, Washington Cooperative Fish and Wildlife Research Unit, University of Washington, 98195 Seattle, WA. kbagnall@ecoinst.org

Establishing new local populations of streaked horned larks (SHLAs) is a critical strategy to meet recovery goals listed in the Draft SHLA recovery plan. The current range-wide population is comprised of small (mostly < 20 pairs) and isolated occupied sites, restricted to three discrete subpopulations: the Willamette Valley in Oregon, the southwest coast of Washington and the

lower Columbia River, and the south Puget Lowlands of Washington. Currently, only nine occupied sites are considered resilient (>20 pairs): three in south Puget Lowlands, four in Coast/Columbia River, and two in the Willamette Valley (SHLA Biological Report). Reintroduction is a proposed strategy to establish new populations, yet reintroductions decisions are often complex, highly uncertain, and involve substantial risk. In 2022, we initiated a 2-year project to develop a comprehensive SHLA reintroduction implementation plan. Objectives include trialing soft-release techniques on a horned lark subspecies and initiating a decision-analytic process to support collaborative decision-making. Fieldwork was conducted at the Wild Horse Wind and Solar Facility. Year one accomplishments included designing and constructing a portable and durable aviary and conducting successful trials with independent juveniles. Our decision-analytic process brings together experts, decision makers and stakeholders to identify constraints and objectives and generate alternatives. We will use a spatial SHLA integrated population model to evaluate and optimize alternatives, yielding transparent outcomes for collaborative decision-making. In 2023, we will continue modeling efforts and reintroduction trials, including with pre-breeding pairs and pairs with dependent young. Outcomes will inform the SHLA reintroduction implementation plan.

RESEARCH OPPORTUNITIES IN OAK AND PRAIRIE, EAST OF THE CASCADES. **Mary Bushman**, East Cascades Oak Partnership, Hood River, OR; Lindsay Cornelius, Columbia Land Trust, Hood River, OR.; oaks@columbialandtrust.org

The East Cascades Oak Partnership is seeking research partners to address the gap in scientifically based knowledge around a variety of questions relating to oak and oak pine habitats. Though Oregon white oak are genetically similar to oaks west of the Cascades, the ecology of East Cascade oaks differs from West Cascade where much of the focused academic research on oak systems has been concentrated. As a result, practitioners in the East Cascades lack the opportunity to develop best management practices based on research in our oak systems. Land managers collaborating through the East Cascades Oak Partnership and the Wasco County Forest Collaborative, including USFS personnel from the Mt. Hood, Columbia River Gorge National Scenic Area, and Gifford Pinchot, have identified critical areas of research. Some of the key areas of research that have been *identified as high priorities* include: How do oak systems respond to wildfire of varying intensities? How does understory structure and species composition impact fire intensity, timing, and frequency? When do root crown buds initiate following disturbance? How does understory vegetation respond to mechanical thinning? Can livestock grazing regimes improve composition, structure, and forage quality in the understory? How do mechanical treatments, fuels reduction, or prescribed fire impact wildlife habitat features for priority species such as Lewis' woodpecker, white-headed woodpecker, gray squirrel, deer, elk, and pollinators? How can ecological restoration approaches support climate resilience? ECOP is interested in sparking conversations with students and researchers about opportunities to fill these fascinating data gaps. Stop on by!

CREATING COMMUNITY THROUGH CAMAS. **Molly Carney**, University of Arkansas; **Katy Matthews**, National Park Service; **Clarice Paul**, Wanapum Band; **Linda Storm**.

Camassia sp. is a genus of blue to white flowering, bulbous perennial plants commonly found from the Pacific coast to the eastern margins of the Rocky Mountains. Collectively known as camas, these plants are both ecological and cultural keystone species and are integral sources of nourishment to ungulates, pollinators, and people. Camas is quickly gaining popularity as many groups look to restore this facultative forb across Pacific Northwest landscapes and revitalize cultural traditions. This poster chronicles recent efforts to join together across Northwest institutions and environments as we collectively seek to build a camas-themed community. We hope that by working together, we can share successes and fiascos and learn from each other to foster healthy camas relationships across cultural and natural realms.

VARIATION IN TERRESTRIAL INVERTEBRATE COMMUNITIES ACROSS HABITATS IN AN ENDANGERED OAK ECOSYSTEM. **Jessica Chong**; Ava R. Howard; Shayla M. Solomon; Kayley R. Arpaia; and Gareth R. Hopkins, Western Oregon University, Monmouth OR. hopkinsg@wou.edu

Terrestrial invertebrate communities are sensitive to changes in their habitat including light and moisture levels, and as such can be considered important indicators of environmental change. We studied the abundance, diversity, and composition of invertebrate (principally insect and arachnid) families within three contrasting habitats in a 22-ha endangered oak ecosystem in central Oregon to gain baseline knowledge of these communities and how they might change with habitat restoration. Sampled habitats included an oak savannah, semi-open oak woodland, and a conifer-oak mixed forest. Over 3000 invertebrates were collected in 2019 and identified to family. There was no significant difference in the mean number of invertebrates collected in the different habitats. However, there was a difference in the composition of insect communities, with mixed conifer-oak forests having significantly different types of insects than the savannah and woodland. This important baseline information will allow us to assess the success of ongoing restoration efforts by landowners in this endangered ecosystem.

A REVIEW OF THE DIET AND FOOD WEB FOR SLENDER-BILLED NUTHATCHES. **David P. Craig, Blake Carlile,** Kaiona Apio, Emelia Sherman, Maddy Specht, Willamette University, Department of Biology, 900 State Street SE, Salem OR. dpcraig@willamette.edu

The slender-billed nuthatch (*Sitta carolinensis aculeata*; SBNU) is a Species of Concern in Oregon. The slender-billed nuthatch is highly associated with oak woodlands in the Willamette Valley and has been identified as a surrogate species for oak woodlands in Oregon. As is true for most songbirds, the SBNU diet is poorly documented. Still, the details of diet may be necessary to understand how to manage both oak habitats and individual oaks best to support nuthatches

through their annual cycle. We completed a comprehensive literature review of SBNU diets and have begun exploring the utilization of digital photography to document SBNU foraging in the field. In addition, we are building an SBNU-centered food web that will improve understanding of how the surrogate species relates to the full richness of biodiversity using Oregon Oaks in the Willamette Valley.

LIVESTOCK GRAZING AS A TOOL FOR MANAGING KINCAID'S LUPINE (*Lupinus oreganus* var. *kincaidii*): THE INTERSECTION OF RARE SPECIES RECOVERY AND SUSTAINABLE LIVESTOCK FARMING. **Cassie Doll, Nick George, Erin Gray**, U.S. Fish and Wildlife Service (USFWS), Lacey, WA; **Maynard Mallonee**, Mallonee Family Farms, Curtis, WA; **Marty Chaney**, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Olympia, WA. cassandra_doll@fws.gov.

Greater than 99% of grasslands in southwestern Washington (Clark, Lewis, and Cowlitz counties) have been converted to agriculture and development. Kincaid's lupine (*Lupinus oreganus* var. *kincaidii*), a federally threatened plant species, currently occupies upland prairie habitats from Lewis County, Washington to Douglas County, Oregon. In Washington, only four remnant occurrences remain, all on private land. The largest occurrence, in Boistfort Valley, is on a 60-acre organic heifer ranch, which is part of a 225-acre Organic Valley dairy farm that has been family-owned for four generations. In 2006, the landowners worked with USDA NRCS to develop and follow a conservation grazing plan to maintain sustainable livestock grazing and the population of Kincaid's lupine. In the plan, grazing management is based on forage stubble height and soil moisture, with cattle rotation based on plant phenology, avoiding the Kincaid's lupine during specific time-periods to prevent potential negative impacts to the cattle and the plant. In over 12 years, this management resulted in an approximately 30% increase in Kincaid's lupine cover. The USFWS Partners for Fish and Wildlife Program is currently working with the landowners to increase infrastructure including pipeline and watering facilities that will enable more options in the grazing rotation schedule to benefit not only the grazing operation but the Kincaid's lupine and its habitat. These partnerships have resulted in and continue to support the successful stewardship of the largest Kincaid's lupine population in Washington, serving as a case study that with carefully planned management and infrastructure, grazing can be an effective tool to maintain habitat for federally listed species.

NATIVE PLANTS GROWN AS HAZELNUT COVER CROPS STABILIZE ORCHARD SOIL MOISTURE AND BENEFIT NATIVE POLLINATORS. **Marissa Lane-Massee**, University of Oregon's Institute of Ecology and Evolution & Lane-Massee Farms. mlanemas@uoregon.edu

The rapidly expanding Willamette Valley hazelnut industry offers a unique opportunity for restoring ecosystem services to private lands that were historically oak-prairie habitat. Here, we explore the possibility of using native herbaceous species as cover crops in Willamette Valley

hazelnut orchards. We ask whether native species can establish and persist in an orchard context, and how they can provide two services: soil moisture conservation and pollinator resources. Soil moisture is a increasing concern under climate change, while loss of habitat threatens native pollinators. Our study sites include three hazelnut orchards of varying age and canopy cover in Marion County, seeded with native and non-native species. We saw many native species thrive in orchards, increase and/or maintain soil moisture, and increase pollinator visitation. We evaluated herbaceous cover and soil moisture before and after mechanical treatments required for nut harvest, and identified a set of species that are able to sustain and/or increase their populations in orchard settings. Native species increased soil moisture 3-5% relative to controls and non-native species in our first year, and have been able to establish moderating effects on soil moisture in our second and third years, depending on mechanical treatments and rainfall patterns. Ultimately, this research will help to create a sustainable and cost effective cover crop seed mix suitable for agricultural environments while stabilizing soil moisture and orchard trophic cascades.

DOES THE FLOAT TEST WORK TO ACCURATELY PREDICT OREGON WHITE OAK ACORN VIABILITY AND DAMAGE BY INSECTS? **Anastasia Popchock**, Ava R. Howard, Oswaldo A. Moreno, Jeffrey W. Snyder, and Gareth R. Hopkins; Western Oregon University, Monmouth OR. hopkinsg@wou.edu

Restoration of endangered oak ecosystems relies on planting acorns. Yet, collected acorns are often rendered unviable due to damage by insects such as the filbert weevil (*Curculio occidentis*) and worm (*Cydia latiferreana*). Conservation practitioners need an easy and reliable way to quickly determine if an acorn will be viable before they plant it. A “float test” is often proposed, whereby acorns are dropped in water and those that float are deemed damaged and discarded. However, the efficacy of the float test on Oregon white oak (*Quercus garryana*) has not been explicitly tested. We collected 822 acorns from beneath 42 *Q. garryana* oak trees in the Willamette Valley, Oregon, in 2019. Acorns were examined for external damage, floated, and then dissected to determine the degree of internal damage and the presence of filbert worms or weevils. The float test was highly effective in determining whether an acorn had both internal and external damage caused by insects, with acorns more likely to float when they had higher levels of insect-related damage. In 2021 we expanded this study by explicitly testing whether the float test accurately predicted acorn viability by measuring germination success in newly collected acorns that did or did not float. The float test accurately predicted germination success ~82% of the time. Our results provide evidence that the float test is a highly accurate way to determine insect-caused damage and subsequent viability of acorns when planting and restoring Oregon white oaks.

VARIATION IN FORM, GROWTH AND REPRODUCTION OF QUERCUS GARRYANA ACROSS HABITATS IN AN ENDANGERED OAK ECOSYSTEM. **Hannah Porter, Emil Ricci, Ariella Estrada, America Betancourt Perez, Calvin Cade, Marco Galindo, Jakob Gutheridge, Triston Hesedahl, Justin Ingram, Brooke Roberts, Calder Smith, Madison Smith, Heather Tovar,** Ava Howard, Western Oregon University, Monmouth, OR 97361. howarda@wou.edu

Over the past 100 years, distribution of the Oregon White Oak (*Quercus garryana*) has declined by over 90 percent across its native range in the Pacific Northwest due to post-settlement fire suppression, invasive species, and land conversion. We studied *Q. garryana* in three distinct habitats in the Central Willamette Valley: savannah dominated by grasses with scattered oaks, control forest where Douglas firs overtop oaks, and restored woodland where Douglas firs were logged in 2019. In each habitat, we measured oak canopy interactions with light, structural dimensions of oaks, and reproductive output from 2019 through 2022. Preliminary results show habitat canopy coverage is negatively correlated with light penetrating to the understory. Light capture by *Q. garryana* canopies was greatest in the savannah where oaks are short in stature with crown lengths over 80% of tree height. Light capture was substantially less efficient in the forest and restored woodland where oaks are taller in stature with vase shaped crowns that constitute less than 50% of tree height. Preliminary data collected from 2019 through 2022 suggest *Q. garryana* in the savannah produce approximately 4 times the quantity of viable acorns as forest or restored woodland trees. Understanding how *Q. garryana* structure interacts with habitat resource availability is a vital piece of developing a holistic approach to protecting these important habitats.

GROWING OAKS - A STORY OF PROPAGATING HOPE ONE ACORN AT A TIME. **Grace Shiffrin, Angelina Wang,** and David P. Craig**,** Willamette University, 900 State Street, Salem, OR 97301. axwang@willamette.edu

The Willamette University undergraduate group, Growing Oaks, was created to build hope in response to despair following unprecedented fires, ice storms, and political unrest. Willamette's campus is in downtown Salem adjacent to the Oregon State Capitol, which set up a harrowing start to the 2020 academic year. During September, Oregon experienced one of the most destructive wildfires in recorded history, the Santiam Fire, which created oppressive red skies and suffocated the campus. At the same time the Capitol was engulfed in violence with demonstrators against racism and police brutality clashing with police officers and right-wing groups including the Proud Boys. In February 2021, a historic ice storm led to the downfall of many legacy Oregon Oaks (*Quercus garryana*) in the neighborhoods surrounding campus. A group of students viewed the tense times as an opportunity to create something meaningful and impactful on the residents of the local community. Using these trees as a symbol of our goals of conserving Oregon's native ecosystems, the group has highlighted and educated the community about the indigenous, historical, and ecological importance of the species. Through acorn

collections, the project establishes connections between various communities that share our passion for stewarding the Oaks. As of May 2022, the project has collected over 1,500 acorns across 11 private and public properties, potted and grown over 800 acorns, submitted a public comment regarding the destruction of oak ecosystems, created a donation system, and formed connections with the local indigenous tribes.

OLYMPIC PENINSULA PRAIRIES; **Fred Sharpe**, Olypic Peninsula Prairies (OPP), Sequim, WA. **Anita McMillan,** Washington Dept. of Fish and Wildlife & OPP, Port Angeles WA, Forest Shomer**,** Olympic Peninsula Prairies (OPP) Port Townsend WA. forest@insidepassageseeds.org

Rising to nearly 8,000 feet, the Olympic Mountains are surrounded by lowland prairies. These meadowlands are diverse and reflect the Olympic Peninsula's extreme rainfall gradients, complex glacial history, past sea level changes and enduring stewardship by Native Peoples. On the windward western Olympics, excessive moisture inhibits tree growth and favors bogs, swards and fens. At Forks, Quillayute and Humptulips, extensive fire-maintained camas prairies were situated on more course-textured soils. In contrast, dry rainshadow regions on the eastern Olympic Peninsula's support bunchgrass, cactus, dry savanna. Good examples are found in Port Townsend on the Olympic Peninsula's NE tip (the "dragon's head") which prehistorically hosted hundreds of acres of fire-managed camas prairie. Most notable is Qatáy Prairie, a diverse, high-quality, half-hectare parcel that survives in an urban setting as a golf-course "rough". Qatáy Prairie received formal protection in 1986 via an agreement between the city and the Olympic Chapter of the Washington Native Plant Society. Several other prairie remnants endure, mostly due to their designation as pioneer cemeteries or county airports. Some of these areas include centuries-old oaks and are now either receiving care or being reviewed increased protection. Collectively, the wet and dry prairies that wrap the Olympic Mountains are home to a variety of invertebrates that are catching the limelight, including the Makah & June's Coppers, Taylor's Checkerspots, Beller's Ground Beetle and Hatch's Click Beetle. Inventories of these species has resulted in discovery of key populations and increased awareness of the unique diversity of Olympic Peninsula prairies.

RARE BUTTERFLY MANAGEMENT IN THE RAINIER TRAINING AREAS AT JBLM. **Mollie Steele, R. Adam Martin**, Ecostudies Institute, Olympia, WA. msteele@ecoinst.org.

The Rainier Training Areas at Joint Base Lewis McChord are home to three butterfly species of greatest conservation need: Puget blues, great spangled fritillaries, and hoary elfins. While these species do not have endangered status which enforce legal protection or provide dedicated funding, prairie managers are interested in supporting these populations. By monitoring their populations and understanding their life cycles, we can refine our land management to benefit host plant populations and reduce land management impacts during vulnerable life stages. For example, prescribed fire is an important tool in the preservation of the prairie ecosystem, and to

maintain suitable habitat for butterflies. It can also have a lethal effect at the local level on insect larvae, depending on timing and intensity. When populations are already so few and fragmented, we must use a careful hand. To mitigate the impact of prescribed fire Ecostudies has been monitoring butterfly and host plant populations to inform where to install exclusions within prescribed fire unit boundaries. This hopefully provides refugia for larvae to repopulate surrounding areas.

THE LEGACY OF OAKS - COLLECTING IMPRESSIONS ACROSS GENERATIONS AND LOCATIONS. **Angelina Wang, Grace Shiffrin, Isabella Stone, Sophia Rosenburg**, and David P. Craig, Willamette University, 900 State Street, Salem, OR 97301. axwang@willamette.edu

Growing Oaks is a project led by Willamette University undergraduates building community appreciation of the legacy of the Oregon Oak (*Quercus garryana*). Many forms of outreach and communication are being explored including meeting landowners at acorn collections sites, presentations to diverse audiences, web-based surveys, and in-person interviews. The project has brought together a variety of people that care deeply about these oaks. The goal is to document the reasons why people support protection of the oak and its ecosystem. To understand the importance of the oaks to the community, the survey questions focus on people's personal connections and experiences with the oaks. When do you notice Oregon Oaks? What is your first impression/interaction with Oregon Oaks? Where are the oaks that are the most important to you? If you have previous knowledge of oaks, how did you acquire it? Would you be supportive of conserving Oregon Oaks? After conducting the interviews, the values, and perspectives we gather are used to create a map, showing specific markers of key words the interviewees used to describe the oaks. We are interested in collecting links between oaks and their effect on communities of diverse generations at a variety of cultural and spatial scales. We aim to promote equitable, and multigenerational stewardship of individual oaks with appreciation of the geography and indigenous history of this land, to both people and oaks.