Northwest Scientific Association 2025 Annual Meeting Schedule

Monday, March 17

NWSA Annual Board Meeting 13:00 - 16:00 - Condon Hall

NWL Andrew Reasoner Preserve Field Trip 13:45 - Best Western Hotel Parking Lot

NWSA Annual Meeting Opening Social 17:00 - 19:30 - Museum of Natural History

Tuesday, March 18

Plenary 1

Opening Ceremony - 8:30am - Redwood Ballroom

Plenary 1 - Redwood Ballroom

Presenter	Start time	Title	Abstract
Katharine Cashman	9:00	The Onset and Impacts of the c.7700 ybp eruption of Mount Mazama (Crater Lake), OR	--

Break - 10:00 - 10:15

NWL Eagles Rest Field Trip 11:00 - Best Western Hotel Parking Lot

Morning Session 1

Eastern Oregon Agricultural Session - Redwood Ballroom

Virtual session - all presenters will be presenting remotely

Presenter	Start time	Title	Abstract
Kirk Davies	10:15	Post-fire management decisions have consequences	Wildfires and the demand for post-fire seeding are increasing in the sagebrush ecosystem threatened by invasive annual grasses. We investigated the effects of the disturbance of drill-seeding (without seeds) and the impacts of co-seeding introduced bunchgrasses after wildfire in sagebrush communities at four sites up to six years post-seeding. The disturbance of drill-seeding increased invasive annual grasses from ~10% to >15% cover and increased its density by >200 plants·-2 by the end of the study. Bunchgrasses appeared to not be influenced by the disturbance of drill-seeding; however, drill-seeding slightly reduced perennial forb density. These results suggest that restoration practitioners need to consider potential negative consequences of drill-seeding, especially if selected plant materials may fail to establish in high abundance. Co-seeding introduced bunchgrasses limited co-seeded native bunchgrasses and slightly decreased native perennial forbs. However, co-seeding introduced bunchgrasses reduced invasive annual grasses by ~50%, while seeding only native bunchgrasses did not reduce annual grasses. These results suggest that co-seeding introduced and native bunchgrasses may not be advisable. We suggest: 1) If native bunchgrasses are unlikely to establish in high abundance, then introduced bunchgrasses should be used, and 2) If seeded native bunchgrasses are likely to meet management objectives, then introduced bunchgrasses should not be co-seeded. Additional investigations are needed to determine the applicability of the results of this study to the larger sagebrush ecosystem. Clearly, the potential consequences of post-fire management will need to be considered as restoration plans are developed and additional research is needed to better inform management decisions.
Jon Bates	10:30	Post-fire grazing management in sagebrush steppe	There is limited knowledge on grazing impacts to plant communities following fire in sagebrush steppe. We evaluated vegetation response to timing of grazing after fire (2003-2006) and to different intensities (low, moderate, high) of deferred rotation cattle grazing spanning 18 years (2007-2024) on big sagebrush steppe in eastern Oregon. Vegetation dynamics were assessed by repeated measures analysis of; 1) canopy cover and density of shrub and herbaceous species and functional groups and 2) herbaceous functional group production. In the timing study, recovery of herbaceous response variables (cover, density, composition, production), levels of bare ground, and litter did not differ among burn-grazed and burn non-use treatments. The results demonstrated that grazing within two years following prescribed fire did not hinder recovery of herbaceous plant communities in big sagebrush steppe. In the grazing intensity trials, tall perennial bunchgrass, Sandberg bluegrass, and perennial forb cover and density did not differ among the treatments but decreased over time in all treatments. Cover of cheatgrass and annual forbs varied among years but was greater among the burned grazed and non-use treatments than the Control. Sagebrush recovery did not differ among burn grazed and non-use treatments and was estimated to require 125 to 200 years to return to pre-burn cover levels. Herbaceous functional group production did not differ among the burned treatments (grazed, non-use) and total and perennial bunchgrass production were all greater than the Control. Annual weather variability accounts for most of the compositional dynamics and production variability of the various grazed and ungrazed treatments.
Daav Sannerud	10:45	Thinning Dense Wyoming Big Sagebrush to Replenish Herbaceous Understories: Three Years Post-Treatment	Wyoming big sagebrush (Artemisia tridentata subsp. wyomingensis) comprises ~25% of the sagebrush steppe. These ecosystems are prone to degradation which often results in a depleted perennial herbaceous understory and a relatively high sagebrush cover. Recovery of the understory is likely limited by the dense sagebrush canopy and requires an active restoration strategy (e.g., seeding). We designed an experiment to assess how reducing sagebrush cover and seeding herbaceous perennials restores degraded sagebrush sites (~15.86 % sagebrush cover). In November 2021, we applied four low rates of Tebuthiuron (0-kg ai/ha, 0.1-kg ai/ha, 0.23-kg ai/ha, 0.45-kg ai/ha) to reduce sagebrush cover. In March 2022 we seeded three native perennial bunchgrass species and two native perennial forb species at a combined rate of 12.3-kg/ha per plot. We used four planting methods: hand broadcast, drill, combination drill-broadcast, and control (not seeded) which were nested within each shrub reduction treatment. We hypothesized that 1) moderate shrub reduction promotes greater seeding success through balancing light exposure with microclimate buffering; and 2) drill-broadcast seeding allows greater variety in seed-to-soil contact, promoting improved germination and understory recruitment. Three years post-herbicide application and seeding, sagebrush cover was reduced by 65% at the lowest herbicide application rate and 85% at the highest. Perennial bunchgrass density increased by at least 100% in all treatments, and up to 400% in plots that were drill seeded and received no herbicide. Preliminary results suggest that low rates of Tebuthiuron, combined with seeding is successful at restoring degraded Wyoming big sagebrush ecosystems under favorable conditions.
Stella Copeland	11:00	Invaluable insights from a long-term grazing experiment: plant communities in 89 year-old exclosures at the Northern Great Basin Experimental Range	Grazing has complex, variable effects dependent upon ecosystem characteristics like climate and soils, and plant communities, may vary over long or short-timescales, and depends upon the intensity and type of grazing system. We know relatively little regarding the effects of livestock grazing on sagebrush steppe communities, despite the extent of this ecosystem in the Intermountain west, it's importance to rural communities, and widespread historic and current livestock grazing. Almost 90 years of cattle grazing exclusion and associated monitoring and experiments at the Northern Great Basin Experimental Range have yielded several insights on grazing effects, particularly on plant communities. Plant communities recovered over several decades from high intensity grazing prior to the establishment of the research range (1936). Grazing exclusion is associated with only subtle differences in community composition. However, some species and/or functional groups, including biocrust groups, vary with grazing. Comparison with long-term grazing research sites in other regions suggests higher resistance to grazing effects and other disturbances like fire and invasion, but lower resilience in this ecosystem, particularly when high intensity grazing and other disturbance combine. Ongoing research by multiple scientists at NGBER is poised to deliver further insights on the complexity of livestock grazing effects on diverse and imperiled sagebrush steppe ecosystems.

Vanessa Schroeder	11:15	Differences in sagebrush-obligate songbird nest survival in grazed landscapes in southeast Oregon	Precipitous population decline in some sagebrush-obligate species has generated an intense focus on the management of remaining habitat for sagebrush-obligate species in the Great Basin. As the predominant land use in the sagebrush ecosystem, livestock grazing is a central factor considered in most habitat conservation planning efforts. We have five years of data from a grazing experiment designed to assess the influence of two grazing regimes (dormant and spring-summer rotation; moderate utilization of native grasses, 30-40% by weight) and grazing exclusion using nine 15-20 acre sagebrush pastures on the reproductive success of sagebrush-obligate songbirds including Brewer's sparrow (Spizella breweri) and sagebrush sparrow (Artemisiospiza nevadensis). We created an informed null model that incorporated temperature, precipitation, and vegetation variables, which we used to assess the added influence of grazing regime on nest survival. Preliminary results from the informed null model suggest that effects of temperature and precipitation on daily nest survival rate varied by timing within the nesting season for both species, and Brewer's sparrows that nested higher in shrubs had higher daily survival rates. We found limited evidence of an interactive effect of the pre-/post-treatment timeframe and cattle grazing treatment, suggesting a potential positive grazing effect on sagebrush sparrow and a neutral effect on Brewer's sparrow nest survival. Our results indicate that variable weather and nest placement within shrubs, factors outside of management control, may have larger effects on nest survival than reductions in herbaceous cover caused by moderate grazing under the studied conditions.
Rory O'Connor	11:30	Carbon security, carbon stocks, and managing rangeland carbon	Within semi-arid rangelands, most organic carbon is stored within the soil profile, but plant communities dictate where in the soil profile carbon is sequestered and stored. Managing carbon within rangelands needs to be viewed through the lenses of maintaining current carbon stocks and securing that carbon from losses and not focus heavily on carbon sequestration. We developed the carbon security index model (CSI) to help identify areas of high carbon security and areas of concern for carbon security, but we need to combine CSI with carbon stock values to get a better assessment of carbon in rangelands. To accomplish this, we used the 10-year soil carbon dataset from the SageSTEP project and extracted the CSI values for plots within the SageSTEP sites. Preliminary results suggest that carbon security has decreased overall across all SageSTEP sites since 1989. However, carbon security values did increase in the years following the initial application of land management treatments. The magnitude of CSI increase varied based on initial plant community type. When we analyzed the data to see the relationship between CSI and total belowground carbon stocks we found no pattern. These preliminary results between carbon security and carbon stocks make sense because of how each is calculated and their purpose of either being an index or an actual quantity. These results also help managers think about how to address carbon within their management objectives for the landscape of whether to think about managing for kilograms of carbon or securing carbon.
Chad Boyd	11:45	Threat-Based Strategic Conservation to Inform Post-Fire Planning	Invasive annual grasses (IAG) are the leading cause of loss of intact sagebrush plant communities throughout the sagebrush biome and the continuous fuel bed conditions created by these species are associated with a dramatic increase in the frequency and extent of wildfire in sagebrush habitats. Competition from native perennial bunchgrasses can reduce invasion by IAGs but bunchgrasses are often killed in wildfire, creating ideal conditions for IAG invasion in the post-fire environment. Post-fire management strategies to maintain or restore perennial bunchgrasses can reduce spread and infill of IAGs, but the increasing size and frequency of wildfire suggest that limited restoration resources will need to be strategically deployed in the post-fire environment. We developed a threat-based strategic conservation framework for informing allocation of limited restoration resources to help combat post-fire IAG expression. Our framework uses geospatial layers representing pre-fire plant community composition, likelihood of IAG invasion, and burn severity to partition areas within burn perimeters into three classes of polygons indicating 1) largely intact plant communities with high potential for post-fire annual grass abatement, 2) moderately degraded areas where post-fire perennial bunchgrass restoration is most likely to be successful, or 3) areas where high pre-fire IAG infestation suggests containment practices are warranted. Additional biotic and abiotic properties are then used to assign specific management actions to polygons. While our focus is on the post-fire environment, the majority of this process can be completed prior to fire to highlight opportunities and challenges for proactively increasing wildfire resilience.
Lauren Svejcar	12:00	Post-wildfire restoration of key sagebrush species	Millions of US dollars are spent annually on ecosystem restoration following wildfires in order to restore critical ecosystem services. However, non-native species that invade following fires can be a major challenge to the establishment of desired native species, especially along environmental gradients. Understanding the natural revegetation potential of a site is therefore critical for maximizing dollars spent on restoration, prioritizing key species that do not return following wildfire disturbance and understanding the interactions of native and non-native species along environmental gradients. Utilizing a precision restoration approach and creating a wider toolbox for land managers will be increasingly critical . In this presentation, we'll discuss three studies that exemplify the process of understanding ecological context and utilizing that information to create flexible restoration plans. First we'll discuss a natural revegetation study following a megafire in southeastern Oregon that monitored plots across an elevational gradient. Second we'll discuss a laboratory study that builds our knowledge of possible tools that can be developed for land managers. And lastly, we'll discuss how these two studies were used to inform a series of studies following the devastating Oregon wildfires of 2024.

Dendrochronological advances in the Pacific Northwest, Part 1 - Lease Crutcher Room

Presenter	Start time	Title	Abstract
Amanda Brackett	10:15	Kick-off to the special session "Dendrochronological Advances in the Pacific Northwest"	Dendrochronology is the science of using tree rings to date historical events to their precise calendar year. Rigorous dendrochronological reconstructions of historical fire regimes and forest dynamics are abundant in dry forest east of the Cascades and across western North America, but the rarity of these studies in the western Cascades and Oregon Coast Range limits our understanding of fire ecology, Indigenous fire stewardship, and historical landscape dynamics in "moist" forests within the Northwest Forest Plan area. Since 2017, the Tree Ring Lab at Oregon State University has been meeting this critical research need by developing multi-century fire and tree establishment records at over 130 samples sites. These fire histories, developed from Douglas-fir (Psuedotsuga menziesii), show tremendous diversity in the historical tempo and effects of fire in moist forests challenging the convention that moist forests generally align with an infrequent, high-severity fire regime. The objective of this presentation is to "kick-off" the Dendrochronology of the Pacific Northwest session by providing an understanding of methodology that is shared among research projects in the session. We will describe how dendrochronologists leverage the climatic sensitivity of annual tree rings to precisely date historical events, how dendrochronologists identify fire scars and use them to characterize historical fire regimes, and how they investigate linkages between contemporary forest conditions and historical forest dynamics. The presentation concludes with a brief tour of recent on ongoing dendrochronological research projects in the Pacific Northwest.
Charles Drake	10:30	Fire History of the McDonald-Dunn Research Forest	Numerous studies, histories and ethnographies have attributed the complex arrangement of old forests, prairies, woodlands, and associated ecotones of the Willamette Valley to frequent burning by Indigenous Peoples, prior to Euro-American colonization. However, few have tried to describe in detail the spatial and temporal aspects of this burning, its variability, or its effects on persistent forest vegetation. Some researchers have pointed out the varied ways in which old-growth Douglas-fir (Pseudotsuga menziesii var menziesii) develops in response to different fire histories, but few have applied these theories and techniques to the Willamette Valley margins. The McDonald-Dunn Research Forest is one of the most heavily studied and visited research forests in the region, yet no modern fire history exists for this area, from which the record of fire and its effect on Douglas-fir in the McDonald-Dunn can begin to be described. We sampled physical evidence of past fires by collecting fire-scarred cross-sections from 91 Douglas-fir stumps across 7 watersheds and subwatersheds that make up much of the geographical and biophysical variability within the McDonald-Dunn. We detected 88 fire events between the years 1700 and 1850, as well as additional fire events outside of this range. Preliminary results suggest fires were frequent, occurred most often in the summer months, and varied greatly in extent across watersheds. These results suggest that the existence and unique characteristics of old-growth Douglas-fir forests in the McDonald-Dunn Research Forest are inextricably tied to the occurrence and reoccurrence of fire of cultural and Indigenous origins.

Morning Session 2	Jennifer Bailey-Guerreo	10:45	The role of disturbance in shaping the mature to old-growth forest habitat for endangered Marbled Murrelets in the western Oregon Coast Range	The Marbled Murrelet (Brachyramphus marmoratus) continues to experience population declines in portions of its range across the Pacific Northwest, U.S.A. despite substantial changes in forest management practices on public lands in recent decades. Loss and fragmentation of breeding habitat are considered to be the primary causes of this decline, and restoration of murrelet habitat has been directed by the Northwest Forest Plan and mandated by the U.S. Endangered Species Act. However, for restoration projects to be successful, land managers must have an understanding of how murrelet habitat develops. The archetypal nest tree with a large crown structure and presence of wide, flat limbs used as nesting platforms is indicative of a tree grown in relatively open conditions. Potential development pathways of this canopy structure include frequent low- to moderate severity disturbance events that promote open-grown dominant trees, low-density tree recruitment that generally follow a stand replacing disturbance event, or natural ecotones such as along stream corridors. To inform restoration of forests that provide critical nesting habitat, we are reconstructing the forest development and fire history of Marbled Murrelet nest stands using dendrochronology (tree-ring) data, including cross-dated tree cores and fire scars from cross-sections taken from stumps. Using 30 historical nest sites in the central Oregon Coast Range, we found that nest trees ranged from 119 to 426 years in age and were located in mixed-aged, mixed-species stands with evidence of historical multiple low-, moderate-, or high-severity fires. There is a clear and urgent need to describe and quantify nest stand development pathways for habitat restoration to improve our understanding of how disturbance patterns, fire regimes, and coastal forest ecosystem dynamics lead to conditions favorable to murrelets during the breeding season.
	Cassidy Ruge	11:00	New insights into the ecology and history of hardwoods in the Central Oregon Coast Range	Hardwood species such as red alder (Alnus rubra) and bigleaf maple (Acer macrophyllum) are a key, yet underappreciated component of mature forests in the Oregon Coast Range. Existing research on these hardwoods has focused primarily on resprouting after fire events, responses to herbicide treatment, effects on conifer plantations, and nitrogen fixation. The dynamics, longevity, and overall ecological role of red alder and bigleaf maple in mature and old-growth forests is still a relatively new area of focus. Recent dendrochronological research at 30 Marbled Murrelet (Brachyramphus marmoratus) nest sites provide novel anecdotes about the ecology of hardwoods and motivate for further investigation into the ecology of these species. We collected 20 tree cores at 30 murrelet nest sites. Hardwoods were cored at 26 sites comprising >50% of trees at five sites and 80% of trees at two sites. In addition, murrelets nested in big leaf maple at two sites rather than a conifer. We were able to develop the first crossdated ring-width chronologies for red alder and bigleaf maple. Contrary to the expectation that red alder is generally a short-lived species, we aged several red alder that were > 120 years old and one individual that was 185 years old. Alder often established in distinct cohorts following major historical fires in the Oregon Coast Range. In contrast, big leaf maple exhibits a variety of ages within mature and old nest stands. More thorough investigation of the ecology Coast Range hardwoods may improve conservation of murrelet and other wildlife species.
	Maddie Washburn	11:15	Engage Mt. Hood: Science Communication and Community Collaboration	Effective science communication plays a key role in bringing education to communities and fostering shared understanding, particularly regarding complex environmental issues like forest fire resilience and forest ecosystem restoration. With increased wildfire risk, it is crucial for scientific communities and local stakeholders to understand historical fire regimes and forest dynamics to manage forests and surrounding communities effectively. For communities around Mt. Hood, including the Hood River Forest Collaborative (HRFC), Wasco County Forest Collaborative (WCFC), the Confederated Tribes of the Grand Ronde, the Confederated Tribes of the Warm Springs, and the Mt. Hood Corridor Wildfire Partnership, having access to engaging, accessible, and understandable science communication is needed to create a shared understanding of the fire ecology of the Mt. Hood National Forest. This project will create science delivery media to communicate tree-ring research results on historical fire regimes and forest conditions in the Mt. Hood National Forest. Videos, story maps, and learning sessions will provide community stakeholders and Mt. Hood NF staff with knowledge needed to support development of effective, ecologically appropriate, and socially acceptable fire resiliency strategies. Additionally, it aims to heal the relationship between the public and forest management agencies, fostering trust and collaboration for more inclusive management practices. This presentation will provide an overview on proposed tools with the goal of receiving feedback on creating effective science communication tools.
	Zoe Beard	11:30	Historical Fire Regimes and Forest Dynamics on the Mt. Hood National Forest	The Mt. Hood National Forest was recently designated a priority landscape under the Wildfire Crisis Strategy. The strategy's overall goal is to restore the resiliency of forest ecosystems and communities to wildfire, drought, and other disturbances. However, designing and implementing actions to achieve these objectives will be uniquely challenging. Unlike other priority landscapes in the western U.S., most of the Mt. Hood landscape is composed of highly productive but seasonally dry rainforests. Science describing historical fire regimes and the ways they vary among forest types and with topography at relatively fine spatial scales is not available to inform restoration plans. The Mt. Hood National Forest has partnered with the PNW Research Station and the Tree Ring Lab at OSU to develop 54 new fire and forest development history study sites across the Mt. Hood National Forest. Historically fires were frequent and extensive on the east side of the Cascades in middle and low-elevation forests. A rich diversity of fire regimes occurred in moist forests west of the Cascade crest and in high-elevation forests on either side of crest. This spans a range of forests that burned several times per century to sites that have evidence of only 1 fire in the past 600 years. This presentation will characterize variability in historical fire and forest dynamics with a virtual tour of distinct fire and forest development histories.
	--	11:45	Questions	--

Lunch 12:00 - 1:00pm

	Plenary 2 - Redwood Ballroom			
	Presenter	**Start time**	**Title**	**Abstract**
	David G. Lewis	13:00	Reconstructing Kalapuyan Lifeways	--

Break - 14:00 - 14:15

	Anthropogenic histories of the Northwest - Crater Lake North			
	Presenter	**Start time**	**Title**	**Abstract**
Evening Session 1	Michael Coughlan	14:15	Fire, water, wood, and glass: Landscape level socioecological dynamics seen through fire scars and obsidian hydration on the upper Middle Fork Willamette, western Oregon.	Recent dendroecological studies in the upper Middle Fork Willamette of the western Cascades reveal how frequent fire occurrence declined as Indigenous peoples were forced from their homelands and relocated to reservations in the mid-19th century. Further, interdisciplinary investigations in collaboration with Oregon Tribes suggests that the spatial and temporal dynamics of this fire history are associated with changes in Indigenous culture, land use, and cultural burning. To better understand the interplay of humans and fire in this landscape, we present chronometric evidence of long-term Indigenous land use dynamics by assembling evidence from over four decades of archaeological field investigations and laboratory analyses of artifacts from the Middle Fork. Specifically, we use a Bayesian analysis to combine obsidian (volcanic glass) sourcing and hydration rim measurements with radiocarbon dating and stratigraphic analysis from excavated archaeological sites. Although our chronological model is still being refined, it suggests that technological changes accompanied both intensification and temporary hiatuses in land use through time. These results provide a new lens through which to view and ask questions about the interplay of Indigenous land use and fire frequency in the Middle Fork.
	Katya Podkovyroff	14:30	Investigating historical land use impacts on vegetation and salmon in Coos Bay to inform Pacific Northwest estuarine restoration through biogeochemical and eDNA analyses	Understanding historical ecosystem change is crucial for predicting restoration trajectories and ensuring ecologically sound conservation strategies. The Coos Bay Estuary, OR, illustrates the complex interplay between climate shifts, land use changes, and ecosystem responses. This land supported several Indigenous Tribes, including the Coquille Indian Tribe (CIT), who relied on its resources since time immemorial. However, Euro-American settlement in the mid-19th century has since led to approximately 58% reduction in tidal vegetated wetlands in Oregon and 73% loss in Coos Bay. As research collaborators, the CIT suggests that Coos Bay once supported abundant salmon populations, and their reintroduction remains a top priority for their land stewardship. This study examines sedimentary records to determine whether eDNA biomarkers can identify past salmon populations and how landscape changes influenced plant communities. Expanding regionally, we also incorporate restored and reference estuarine sites across Oregon and Washington to assess how historical land use changes and environmental variability specifically shaped vegetation responses in Pacific Northwest estuaries. Our co-produced hypothesis proposes that land use is reflected in shifts in salmon presence, vegetation composition, and nutrient cycling, with settler occupation leading to ecosystem degradation, declining salmon populations, reduced $\delta^{15}N$ levels, and elevated C:N ratios, followed by potential reversal from restoration. Preliminary data ($R^2 = 0.66$) show a strong negative relationship between $\delta^{15}N$ and C:N ratio (Estimate = -0.449, $p < 0.001$), supporting this hypothesis. Integrating eDNA, paleoecological, and biogeochemical data will refine interpretations of nutrient cycling, long-term ecological transitions, and inform restoration strategies based on historical trajectories.
	David Lewis	14:45	Acorns, Elk, and Ponderosas; Klamath Annual Travel into the Cascades	Bands of the Klamath tribe would engage in long distance travel to hunt elk in the Willamette Valley each year. Their Cascades travel route suggests they harvested acorns and Ponderosa bark in the Central Range. This ethnographic study dovetails with additional evidence from archaeology and dendrochronology of extensive cultural use of the available resources along the Klamath Trail.

E				
	James Johnston	15:00	Diverse historical fire disturbance and successional dynamics in Douglas-fir forests of the western Oregon Cascades, USA	We created the first annually resolved records of historical (1400 to 1900 CE) fire occurrence coupled with precise estimates of tree establishment for the northern half of the west slope of the Oregon Cascades, a region that is home to some of the most productive forests on earth. Our reconstructions demonstrate that historical fire disturbance and successional dynamics in Douglas-fir dominated forests of the western Cascades were more complex and more variable than predicted by standard theory, which emphasizes stand-replacing fire followed by hundreds of years of succession in the absence of fire. While some of our study sites likely did experience fire-free periods lasting hundreds of years, most of our study sites experienced one or more non-stand-replacing fires per century, and several sites experienced chronic non-stand-replacing fires for hundreds of years until adoption of fire exclusion policies by federal managers in the early 1900s. This research demonstrates that many highly productive western Oregon Douglas-fir stands are significantly departed from historical fire disturbance regimes as a result of fire exclusion policies. Management that emphasizes rapid re-establishment of closed canopy forest conditions following fire and development of old-growth forest conditions in the absence of fire may fail to provide for the unique and highly valued ecosystem services associated with Douglas-fir forests of the western Oregon Cascades.
	Bart Johnson	15:15	Lessons from restoring an ancient savanna in Oregon's mid-elevation Cascades following forest succession	Oak-pine savanna has persisted in Oregon's Willamette Valley for thousands of years across dramatic changes in climate and human occupancy. With rapidly increasing risk to forests and people from wildfire, sustaining and restoring mosaics of oak-pine savanna can be central to both regional biodiversity conservation and reducing the risk of catastrophic fires. Yet savanna restoration faces many challenges, not the least of which include cost, invasive species, and the need to reincorporate fire in their management. PNW grasslands have long been sustained by Indigenous peoples' fire stewardship, and one of our key challenges is to reincorporate cultural fire at broad spatial extents - efficiently and yet with site-specific nuance. I explore three lessons from a 20-year effort to restore an oak-pine savanna following forest succession in the mid-elevation westside Cascades: 1) recruiting the next generation of oaks and pines is crucial to vegetation recovery and renewal; 2) seeding native grasses and forbs is essential following thinning; 3) prescribed fire is a two-edged sword for savanna recovery. I argue that resolving these challenges requires building place-based knowledge of individual prairie and savanna sites, and aligning adaptive management practices to dynamic site conditions, rather than "one-size-fits-all" prescriptions across large landscapes. I briefly introduce an approach to using fine-scale land management units derived from site physical characteristics and vegetation as a practical foundation for such an approach. It is neither a surrogate nor substitute for Indigenous cultural stewardship, which necessarily requires Indigenous leadership and engagement, but could be complementary to it.
	--	15:30	Questions	--

Evening Session 2	**Dendrochronological advances in the Pacific Northwest, Part 2 - Redwood Ballroom**			
	Presenter	**Start time**	**Title**	**Abstract**
	Andrew Merschel	14:15	Historical Fire and Climate Relationships in the Western Cascades	Climate is a broad scale driver of contemporary fires in temperate rainforests in the Pacific Northwest, but historical fire-climate relationships are unknown due to a lack of annually precise historical fire records. Recent fires in the western Cascades have raised concerns about the conservation of temperate rainforests critical to carbon storage and sequestration, threatened and endangered species, water supplies, and forest products. An understanding of historical fire-climate relationships is needed to inform how contemporary fire regimes have departed from historical fire regimes, and how future drought may influence fire activity. We developed records of historical fires at 50 western Cascade sites distributed across the Willamette, Mt. Hood, and Gifford-Pinchot National Forests. We tested for relationships between fire years and five reconstructions of historical climate using superposed epoch analysis and used generalized wavelet coherence analysis to explore regional synchrony in fire behavior and whether it was correlated with the El Nino Southern Oscillation (ENSO), the Pacific Decadal Oscillation (PDO), or their compound effects on climate over time. In contrast to drier forests east of the Cascades, there was little synchrony in historical fire years. Most historical fires were recorded at only 1-2 sites. In our SEA analysis, there was little evidence that historical fire years were preceded by or occurred in drought years. However, fire activity across the region interacted with PDO and ENSO at decadal scales until the late 19th century. Results suggest that historical ignitions, fuel structure and flammability, and fire weather were important drivers of historical fire activity.
	Sven Rodne	14:30	100 Years of Forest Structure, Composition, and Spatial Patterning Changes in Southwest Oregon's Rogue Basin	The Rogue Basin in Southwest Oregon has been recently characterized as increasingly vulnerable to spatially extensive high severity disturbances, especially wildfire. Contemporary conditions have evolved largely from forest succession in the absence of historical fire regimes that indicated median fire return intervals of eight years throughout the basin prior to the 20th century. This study analyzes inventory data and tree cores collected from 160 density plots and 8 stem maps in dry forest types across the inland Rogue Basin to reconstruct forest structure, composition, and spatial patterning in 1911 and quantify differences with conditions found in 2011 – 100 years. In those 100 years we have modeled through dendrochronological, kNN, and linear regression analyses that contemporary dry forests in the Rogue Basin have increased in trees and basal area per hectare by an average of 275% and 240%, respectively. These increases in tree density and basal area reflect an average increase in RDI from 1911 to 2011 of 255%. During the same period, native pines such as ponderosa pine (Pinus ponderosa) and sugar pine (Pinus lambertiana) declined in 44.2% and 16.9% of occupied 1911 plots, respectively. Whereas species that flourish in forest successional patterns without higher frequency disturbances such as Douglas-fir (Pseudotsuga menziesii), Pacific madrone (Arbutus menziesii), and white fir (Abies concolor) had significant (>90%) increases across plots. Spatial patterning changes reflected less proportions of smaller clumps sizes are on the landscape in 2011 compared to 1911. These results indicate the importance of frequent management intervals to emulate historical forest conditions.
	Jessica Blunn	14:45	Opportunities for paired dendrochronology, pedology, and pedoanthracology in the McDonald-Dunn Research Forest	This presentation will outline a collaboration between fire history reconstruction through dendrochronological sampling and the McDonald-Dunn Soil Carbon project. The McDonald-Dunn Soil Carbon project focuses on the relationship between fire history over the past half millennium and the quantity, quality, and ages of soil pyrogenic carbon (PyC) in old-growth reserves and pre-settlement oak habitat in the McDonald-Dunn Research Forest. The secondary objective of this project is to establish a stratigraphy for analysis of internal variability among soil PyC and lignin structures throughout soil series belonging to the Mollisols order, the soil order maintained by grass and frequent fire. The project works in conjunction with dendrochronological sampling plots and fire history reconstruction in the forest's old-growth reserves, while utilizing pre-settlement vegetation data from the Oregon Gap Analysis to identify and guide soil sampling in historical oak woodlands. Through sampling and analysis of soil PyC as a biological legacy in historical oak woodlands, this project aims to increase the understanding of the role of historical fires on soil carbon, and how soil carbon is impacted by fire exclusion on the McDonald-Dunn Research Forest.
	Isaac Bell	15:00	Monitoring and Modeling Legacy Tree Response to Restoration Treatments in the Klamath Mountains, Oregon, USA	Climate change, coupled with significant tree encroachment from past fire suppression practices, presents a serious threat to dry western U.S. forests, especially to their largest and oldest trees. These 'legacy' trees hold immense ecological value, making their conservation a top priority. Restoration thinning has demonstrated potential in improving drought resilience, yet the long-term effects warrant further investigation. This research employs tree-ring analysis to evaluate the impact of thinning on the growth, vigor, and resilience of legacy trees. By sampling four species in southwest Oregon's Ashland watershed, which underwent variable-intensity thinning between 2011 and 2013, a complex picture emerged. Overall, the growth of legacy trees has decreased in the past decade due to drought, although thinning has provided some mitigation. Responses differed by species: Ponderosa pine showed enhanced drought resistance, while sugar pine exhibited initial growth followed by a decline. Douglas-fir and Pacific madrone displayed inconclusive or masked responses. The effects of thinning also varied based on topoclimatic conditions. Moderately dry sites yielded the most significant improvements for Douglas-fir and ponderosa pine, whereas wetter sites benefitted sugar pine the most. These findings indicate that thinning can bolster vigor and drought resilience in specific legacy tree species. However, success hinges on species characteristics, site conditions, and thinning intensity, underscoring the need for thoughtful consideration of these factors in forest management strategies. Long-term monitoring is vital to fully comprehend the lasting benefits of thinning treatments.
	Constance Harrington	15:15	Growth of Douglas-fir and ponderosa pine in mixed-species plantations in Mason County, WA	Mixed-species plantations are not common in the Pacific Northwest as they require more effort during stand establishment and may complicate the timing of later silvicultural activities; however, mixing species could confer benefits if species differ in characteristics such as drought resistance or susceptibility to disease. In Mason County, WA mixed-species plantations of Douglas-fir and ponderosa pine have been established on some droughty sites with past evidence of root rot. Difference in species performance overtime could be related to early establishment and survival, as well as growth rates. Areas of four young mixed-species plantations (10 -11 years old at time of first measurement) were selected for periodic measurement of stem diameter during the growing season for 2 or 3 years. Ten trees of each species were selected in each area (80 trees in total). Ponderosa pine was initially larger in diameter than Douglas-fir in all four areas (mean of 12.7 vs 10.1 cm) indicating faster early growth since planting. However, annual growth of Douglas-fir over 2 years was greater than that of ponderosa pine in all 4 areas each year (29% of initial size for Douglas-fir versus 19% for ponderosa pine). Measurable diameter growth began in April and greatest monthly growth occurred in May or June for both species. Cambial phenology was similar for both species but there were small differences in late season growth between species or across sites or years. Crown recession is occurring more rapidly in ponderosa pine than in Douglas-fir, especially on the most productive site.
	--	15:30	Questions	--

	Mapping, Wildlife, and Geology - Lease Crutcher Room			
	Presenter	**Start time**	**Title**	**Abstract**

Evening Session 3	Richard Waitt	14:15	Mount St. Helens 18 May 1980 Clarified—Eyewitness Records of Forest-Felling Pyroclastic Surge as Two Gravity Currents	Eruption photographs, eyewitness accounts, satellite and seismic records, and stratigraphy show Mount St Helens' 18 May 1980 forest-felling flowage to have been two separate pyroclastic surges, the second far the larger. Eyewitness accounts and photographs at Mount St. Helens reveal how the surges flowed off the volcano's flanks and out to the distal fringe. A first explosion cluster spawned a small surge that ran out ~12 km and stalled. A second explosion cluster more than a minute later spawned a much larger surge that overtook the first surge and ran out as much as 27 km, flattening forests across 600 km2 in 3.5 minutes. The term "directed" or "lateral" blast is misleading at Mount St. Helens. The second explosion cluster elevated dense, broad ashclouds above the volcano flanks, which then collapsed gravitationally into a large surge that flowed off the mountain slopes and out across the landscape. Eyewitness's accounts and their photographs show that the surge's low head hugged topography as it spread across mountainous landscape. From three widely separated proximal to distal observers: (1) The ash cloud over the mountain spread down, its east base hugging topography, flowing like water. Its front disappeared into a valley and rode over a closer ridge. (2) The cloud hugged the ground, over a hill, then down, following the land. (3) From the mountain the head of the flow hugged the ground, disappeared into a valley, hopped over a ridge, and disappeared again into a valley, following the shape of the land.
	Jon Riedel	14:30	Debris Flow Magnitude, Frequency, and Precipitation Threshold in the eastern North Cascades, Washington	We examine the magnitude, frequency, and precipitation threshold of the extreme flood hazard on 37 low–order streams in the Stehekin Valley, eastern North Cascades. Morphometric variables identify the magnitude of the hazard by differentiating debris flood from debris flow systems. Thirty–two debris flow systems are fed by basins <6 km2, debris cones with slopes >10°, and Melton ruggedness ratios of 0.42–0.61. Five debris flood systems averaging 14.9 km2 have debris fans with slopes 7–10° and ratios of 0.78–3.80. Seven debris cones have soil surfaces buried by successive debris flows. Eighteen radiocarbon ages from the soils are the basis for estimates of a 200 to 1500–year range in recurrence–interval for larger debris flows and a 450 ± 50–year average. Smaller events occur approximately every 100 years. Fifteen debris flows occurred in nine drainage systems in the last 15 years, including multiple flows on three streams. Summer storms in 2010 and 2013 with peak rainfall intensities of 7-9 mm/hour sustained for 8-11 hours triggered all but one flow; the fall 2015 event on Canyon Creek occurred after 170 mm of rain in 78 hours. Several recent debris flows occurred in unburned or low intensity burn basins, while some that burned at high intensity didn't. Fourteen of 15 recent debris flows were on the valley's southwest–facing wall. Fires and debris flow frequency are linked by aspect, where the sunny valley wall has flashy runoff due to sparse vegetation from frequent fires.
	Gregory Retallack	14:45	Oregon's Neogene paleoclimate and the soil carbon dioxide planetary thermostat	A spike of carbon dioxide to 588 ± 72 ppm, well above modern (422 ppm) and Pleistocene (180 ppm) levels, is apparent from stomatal index of Ginkgo leaves and carbon isotopic composition of pedogenic carbonate during the middle Miocene (16 Ma). This spike may be due to voluminous eruptions of Columbia River Basalt in Oregon and Washington, but this spike did not become a lethal runaway greenhouse because of carbon-sequestration in productive soils and ecosystems, such as grasslands expanding into deserts, and tropical forests migrating towards the poles. Paleosols in Oregon are evidence for this view, with Oxisols forming as far north as Vancouver, Washington, and Mollisols widespread in eastern Oregon. Curbs on carbon dioxide and climatic extremes can be quantified with global soil maps derived from paleosols of the middle Miocene (16Ma) and last glacial maximum (20 ka). Carbon-greedy Oxisols under rain forest and Mollisols under grassland at 16 Ma covered 30.6 and 19.0 million km2, respectively, compared with 3.6 and 6.9 million km2 during the last glacial maximum (20 ka). In contrast, carbon-lean Aridisols covered 17.6 million km2 at 16 Ma compared with 46.8 million km2 at 20 ka, and Gelisols 11.2 million km2 at 16 Ma compared with 114.0 million km2 at 20 ka. Carbon-greedy soils expanded to curb a runaway greenhouse spike, whereas times of carbon dioxide minima had less effective soil carbon sinks. Continued volcanic emissions prevent carbon dioxide from slipping below 180 ppm, so form the other side of the planetary thermostat.
	Naomi van Roon	15:00	Modeling recreational risk factors on the landscape: a predictive GIS analysis of recreation accident response surrounding the Snoqualmie Valley, Washington.	Search and Rescue teams in Washington respond to approximately 900 incidents annually, many stemming from outdoor recreation near Interstate 90 surrounding the Snoqualmie Valley. This study utilized predictive GIS analysis to identify areas of concern within state lands, including Mount Si and Middle Fork Snoqualmie Natural Resource Conservation Areas, Raging River State Forest, and Rattlesnake Mountain Scenic Area. The predictive model was calibrated using SAR data from March to November between 2020 to 2023 and was informed by analyzing risk factors contributing to recreationalist injury potential. This research then sought to develop a decision support system to aid land managers in proactively mitigating hazards and improving emergency response times. The study identified clear areas with high incident probability potential near popular trails up Mount Si, Mailbox Peak, and Teneriffe Falls. These areas of concern were influenced by their proximity to roads and trails, their location further up the trail with some elevation gain comparable to the trailhead, generally moderate slopes, and a history of past incidents. Policy recommendations include enhanced signage regarding SAR and the risks of injury, potential reopening of closed roads for SAR use, and more frequent updates on trail conditions via online platforms. Implementing these measures has the potential to significantly improve recreation safety and emergency response efficiency in the region. Research into recreation emergency management is crucial. An informed approach to SAR can mean the difference between life and death, the severity of injury, and the time it takes before someone is found and or assisted.
	Justin Bastow	15:15	How many worlds lie beneath our feet? Topographic variation in soil conditions and food webs within a prairie restoration site	Eastern Washington grasslands are among the most endangered ecosystems in North America, as over 99% of the historic prairie has been converted to agriculture. As part of the regional efforts to protect the biodiversity endemic to these grasslands, Eastern Washington University (EWU) is restoring 50 hectares of conventional wheat field to native vegetation. Establishing the full diversity of native forbs found in remnant prairies remains a challenge. It is possible that altered soil conditions in restored prairie contribute to poor forb establishment. Our previous research found the soil at the EWU restoration site to have lower organic matter and pH than nearby remnants, and to have lower abundances of nematodes and a simpler soil food web. Addition of biochar increased pH and nematode abundance, suggesting a possible role in restoring soil conditions. The goal of this research was to determine how soil conditions vary across the restoration site to determine whether the benefits of biochar addition are likely to apply across the entire site. We found wide variation in soil conditions across the EWU site, most of which could be explained by topography. Ridges had 40% less soil organic matter ($p=0.027$) and 85% fewer soil nematodes ($p<0.0001$) than troughs. Ridges had less acidic soils (pH=7.3 compared to 5.8, $p=0.0091$). Soil micronutrients (e.g. Ca, K, Na, Cu, Zn, B) also differed substantially with topography. Our ongoing research is investigating whether the effects of biochar addition on the soil food web differ between these distinct soil conditions within the restoration site.
	James Lamping	15:30	Mapping forest structure across the coastal temperate forests of North America	The temperate rainforests of Southeast Alaska and Coastal British Columbia are globally recognized for their exceptional carbon storage capacity, harboring some of the world's highest aboveground carbon densities and extensive reserves of late-seral forests. Recent shifts in forest management have prioritized conservation, with young-growth management strategies being implemented in the Tongass National Forest and British Columbia designating large areas for protection. Despite these conservation efforts, comprehensive, cross-border estimates of forest composition and structure remain limited. Using a Gradient Nearest Neighbor modeling approach, we integrated regional forest inventory data with environmental and spectral predictors to produce spatially complete, moderate-resolution estimates of aboveground biomass, species-level biomass, basal area, and other key structural attributes across this ecologically diverse landscape. We also analyzed the distribution of mature and old-growth forests, assessing their representation within protected areas and evaluating their exposure to ongoing management changes. Collectively, the coastal forests of Alaska and British Columbia store approximately 3.58 petagrams of carbon. Our findings also reveal over 1.1 million hectares of old-growth and 2.3 million hectares of mature forests. Over 32% of these old growth forests are located within Inventoried Roadless Areas in Alaska and Old Growth Management Areas in British Columbia. Our results offer critical insights to inform transboundary conservation planning and sustainable forest management in the face of evolving policies and climate change.
	Holly Amer	15:45	Quantifying Environmental Covariate Impacts on Riparian Reforestation in Western Oregon, USA	Riparian reforestation projects are projected to have high potential for carbon sequestration, but this benefit is understudied. Over 2,000 riparian reforestation plantings have occurred in Oregon since 1995 to achieve goals such as providing wildlife habitat, streambank stability, and mitigating water temperature. Measuring the outcomes of these projects can improve strategies for maximizing carbon sequestration as a co-benefit in future plantings. We hypothesize that a combination of edaphic, climatic, geomorphic, and stand properties can be used to predict the carbon outcomes measured by Leaf Area Index (LAI), from riparian plantings over time and space. To understand reforestation trajectories, we measured LAI at 37 riparian sites in western Oregon, which ranged in their environmental and planting conditions. Our results indicate that total and canopy LAI increase with planting age, tree stem density, distance from streambank, and coarse soil content. Our model predicts that total LAI would be 43% higher and canopy LAI would be 49% higher in a 20 vs. 5 year-old site. A unique set of predictors were important for understory LAI, which increased with understory species richness, stream size, annual temperature, and the distance from streambank. Our model predicts that the understory LAI would be 119% higher in a site with the highest number of understory species present vs. a site with one understory species present. By quantifying the successes of past riparian reforestation projects and the variables that impact them the most, we can understand strategies to optimize future projects, and therefore maximize their carbon sequestration potential.
	--	16:00	Questions	--

Break - 16:45 - 17:00

Poster Session - 17:00 - Crater Lake South

Posters can be hung starting at 12:00

Presenter	Poster Location	Title	Abstract

Abigail Neat	1	Investigating the role of host-associated microbial communities in Pseudotsuga menziesii seedling response to drought stress	Plants harbor diverse microbial communities both belowground in the soil and aboveground in the foliage, and these plant-microbe interactions can range from mutualistic to pathogenic. The habitat-adapted symbiosis hypothesis argues that plant-fungal mutualisms are common in abiotically stressful environments and supports the persistence of both fungi and their plant host. Here, we explore the related hypothesis that plants and associated microbes sourced from extreme climates exhibit greater resilience to abiotic stress relative to those found in mesic climates. We test this hypothesis through a reciprocal inoculation greenhouse experiment using Douglas-fir (Pseudotsuga menziesii) seedlings sourced from across an elevation gradient present in the Western Oregon Cascade Range. This elevation gradient also represents a climate gradient, with the low elevations defined by a longer growing season, less extreme temperature fluctuations, and greater relative humidity compared to the higher elevations. Six populations of P. menziesii seedlings sourced from across the gradient were inoculated with foliar microbes, soil microbes or no microbes, with microbial communities sourced from a high elevation site or a low elevation site. Half of the seedlings were then subjected to a month-long drought event, after which we recorded plant physiological measurements including height, total biomass, stomatal conductance, fluorescence, and mycorrhizal colonization rates. This data analysis is ongoing, and in total will allow us to explore if P. menziesii-associated microbial communities either inhibit or increase a seedling's ability to withstand drought stress, if this outcome varies based on climate origin, and potential physiological mechanisms associated with the outcomes we observe.
David Shaw	2	Why a network of old-growth and mature forests across the Douglas-fir region is good for the timber industry.	The Douglas-fir region is widely known as one of the most productive forestry regions in the world, producing timber for homes and buildings with sustainable forestry built on native forest tree species, particularly Douglas-fir. The region is also known for a network of old-growth and mature forests which sustains the biodiversity of these regional forests. This biodiversity in turn, contributes to the health of young forests and expansive plantations in the region by providing a source of beneficial biota which protects young forests from pests and pathogens. Beneficial biota includes insects and invertebrates such as parasitoid wasps, predaceous insects and spiders, pollinators, and decomposers, while beneficial fungi include mycorrhizae, decomposers, and biocontrol agents. Other beneficial biota includes vertebrates, especially the insect gleaning birds. This biota is critical to the health of plantation forests. Although many people believe that old-growth forests are a source of pests and pathogens, in fact, old-growth forests moderate the influence of pests and pathogens due to their complex forest structure and biodiversity above and below ground. Therefore, on balance, I believe that old-growth and mature forests are more important in providing a source of beneficial biota. Forest plantations necessarily simplify forest structure and composition. The result is that native biodiversity can be locally excluded from plantations due to this simplification. However, with a network of old-growth and mature forests across the region, there is a source for maintenance of biodiversity to aid forest health and protection of Douglas-fir plantations.
Evan Coit	3	Composition and Structure of Axial Seamount Microbial Mat Communities	Hydrothermal vents host productive microbiomes that contribute to global biogeochemical cycling, facilitate deep-sea ecosystems, and exhibit unique metabolic abilities. As the most active volcano in the Pacific Northwest, Axial Seamount possesses a basalt-hosted hydrothermal system with both high-temperature chimney structures and mid- to low-temperature diffuse venting. Emerging from these hydrothermal vents, reduced compounds like hydrogen sulfide (H_2S) act as the primary energy source for microbes, allowing them to thrive using chemosynthesis to produce organic matter in a dark environment. These microbes cohabitate in complex communities by forming mat structures around vents, capitalizing on metabolic niches along steep geochemical gradients. Despite their prevalence across the seamount these mat communities have been minimally described. We present a broad survey of Axial Seamount microbial mat communities from five years of sampling efforts (1998 – 2002) during NOAA's New Millennium Observatory (NeMO) project, using the Canadian scientific submersible ROPOS. Through amplicon SSU ribosomal gene sequencing we census in detail microbial communities that varied spatially and temporally, identifying potential ecological niches and interactions. Sulfur-oxidizing autotrophs prevailed, with the phylum Campilobacterota serving as the majority community member across a diverse array of vent conditions. We observed a potential pattern of ecological succession among these bacteria, with a transition in genera from Sulfurimonas to Sulfurovum. Distinct changes in overall community structure were present between habitats within or just outside Axial Seamount's main caldera and those located on recent lava flows. This taxonomic survey indicates novel ecological patterns for hydrothermal vent microbiomes, providing a foundation for future -omics research.
Hirak Parikh	4	Diatom Diversity Across Habitats in Historically Mining-Affected Coeur d'Alene Lake	Coeur d'Alene Lake, located in northern Idaho, has been heavily impacted by historical mining, resulting in over 75 million metric tons of metal-contaminated sediments. Currently classified as oligo-meso trophic and phosphorus-limited, the lake faces growing concerns about potential eutrophication due to rapid population growth and increasing anthropogenic activities. Diatoms, unicellular photosynthetic algae sensitive to water chemistry changes, are valuable bioindicators for monitoring water quality. Previous studies in the lake have noted limited species diversity and insufficient understanding of spatial variability within diatom assemblages. To address this gap, multiple samples were collected across various habitats in the lake. Open-water samples showed a dominance of A. formosa and F. crotonensis, species commonly associated with mesotrophic to eutrophic conditions but also found in oligotrophic, low-nutrient lakes. The prevalence of these taxa suggests a response to elevated levels of reactive nitrogen (Nr), likely from atmospheric nitrogen deposition due to human activities such as fossil fuel combustion and agriculture. A. formosa serves as an effective bioindicator for determining the "critical load" of nitrogen, indicating the threshold above which nitrogen deposition causes significant ecological impacts. In contrast, benthic diatoms exhibited higher species diversity, with NMDS analysis revealing greater species richness at sites near the lake's mouth. This increase in diversity could be linked to human activities and higher nutrient levels in these areas. Future research will focus on seasonal variations in diversity and identifying diatom species at a finer taxonomic level to enhance ecological understanding.
Dylan Fischer	5	Forest Plant Growth Forms and Resilience Over 40 Years at Mount St. Helens	Plant characteristics such as deciduousness, clonality, growth form and Raunkiaer life form may affect resilience following disturbance. Our measurement of plant responses to tephra deposition from the eruption of Mount. St. Helens (USA) in 1980 has provided an excellent opportunity to evaluate such trends in resilience in the forest understory. We use data from four sites, and more than 600 individual plots, quantifying changes in resilience among different plant growth forms to over 40 years of post-disturbance succession. We find that inertia in response to disturbance is best predicted by plant deciduousness and clonality, driven by responses of non-clonal evergreen plants. Similarly, plant deciduousness provided the strongest predictive weight for post-disturbance recovery. Groups based on Raunkiaer life forms and localized growth forms had high within-group variability that made generalizations difficult. Resilience, as a standalone measure, was not predictable by any plant growth form grouping or inertia. These analyses suggest that while growth forms can demonstrate different patterns in resilience through time, simple categorizations based on leaf traits (such as deciduous vs. evergreen) may play a major role in determining response to disturbance in an old-growth subalpine forest. Quantification of resilience in a community context could represent a significant advancement in resilience ecology. Here we show that such methods can be applied to disturbed forest communities adjacent to the world's most studied volcano and may be broadly applicable to other ecosystems, provided that a measure of baseline (predisturbance) conditions is possible.
Lucy Heflin	6	Long -term data reveal muted avian responses to low-severity wildfire	Wildfire is increasing in frequency and severity across the western U.S., highlighting a need to understand how biological communities are responding to this disturbance. Bird communities are useful indicators of ecological change as they are relatively easy to survey and are a well-studied taxon group in terms of behavior and life history. We utilized a before-after-control-impact study design to test three hypotheses regarding bird response to wildfire in the mixed-conifer forests of the H.J. Andrews Experimental Forest, Blue River, OR following the Holiday Farm Fire of 2020. The vegetation selection hypothesis states that birds will move to forest that most closely resembles their preferred seral stage after fire, the site fidelity hypothesis states that birds will return to where they bred last year after fire, and the concussion effect hypothesis states that the landscape effect of fire will lead to birds moving into nearby, unburned territories. Point count data collected two years prior to the fire and three years after was used to model changes in total abundance for six focal bird species. Although we did not detect an effect of fire on most species, we did find moderate evidence that Hermit Warbler (Setophaga occidentalis) total abundance decreased by 1.21 in the burn in the years following wildfire, and marginal evidence indicated that the total abundance of Swainson's Thrushes (Catharus ustulatus) increased by 0.62 in the years following wildfire, supporting the vegetation selection hypothesis.
Zoe Ziegler	7	Patterns of tree damage and fuels around power lines in Northern California	Powerlines play an important role in the modern fire regime in California. About half of the most destructive wildfires in the state's recent history have been initiated by ignitions from powerline failure, and line contact with forest vegetation is one of the most likely sources of ignition. In our study, we sought to better understand the vulnerability of Northern California forests to powerline-ignited wildfire. Our field crew sampled at 59 sites along powerline corridors in Northern California, collecting data on tree health, forest structure and fuels, and microclimate. We investigated trends in four dominant vegetation types: redwood, Douglas-fir, yellow pine, and deciduous oak. Our guiding questions were: (1) how do powerline corridors compare to the adjacent forest in terms of tree damage, fuels, forest structure, and microclimate, (2) how does tree damage vary with several site conditions, and (3) how do fuels vary with site-level aridity. Paired t-tests revealed that the powerline corridors were similar to the adjacent forests in most ways, but differed significantly in microclimate, some fuels and understory conditions, and one tree damage variable. Linear models showed that tree damage varied significantly with many site-level conditions and that fuels varied significantly by dominant vegetation type and with plot-level aridity in some vegetation types. These results demonstrate that while powerline corridor management influences forest dynamics, there are larger landscape-level trends that influence tree damage and fuels. Some of these trends were revealed in our research, but more research is needed to fully understand these trends across Northern California.

Poster Session	Tatjana Beck	8	Wildfire Impacts on Avian Community Assemblages in the Conifer Forests of the Western Cascades in Oregon, USA	Understanding the effects of wildfires on bird communities is crucial for predicting changes in biodiversity amid a warming climate. A significant challenge in assessing these effects stems from the absence of reliable pre-fire baseline datasets for bird communities and climate variables at a fine scale. This study quantifies the shifts in bird species richness, abundance, and community composition before and after the 2023 Lookout Fire in the H.J. Andrews (HJA) Experimental Forest. The change in spring occurrence of birds from pre- to post-fire is serving as a response variable, while vegetation attributes, climate parameters, and burn severity (measured using the Relativized Differenced Normalized Burn Ratio; RdNBR) are being used as predictors to analyze post-fire changes in bird communities across a historically infrequently burned landscape in mesic temperate forests within the HJA. It is expected that bird community structure will shift postfire, favoring species adapted to open habitats (warm-adapted species) and disadvantaging those that prefer cooler environments. As the first part of a three-part master's thesis, this research aims to visualize post-fire patterns to inform the modeling of the effect of fire on bird communities. The findings will outline critical thresholds for conservation that can be employed to mitigate avian decline in warming forests.
	Alex Vandendries	9	Intraspecific variability in vulnerability to cavitation in Thuja plicata	Drought induces high tension in the water column of trees, causing cavitation and the formation of embolized conduits. Extensive cavitation will prevent xylem water transport and can lead to desiccation and eventual mortality. Due to the projected rapid increases in the frequency and severity of droughts in the Pacific Northwest, the persistence of our trees will rely heavily on the acclimation of xylem vulnerability to cavitation. However, the plasticity of xylem vulnerability has been shown to vary considerably between species. Recently, substantial canopy dieback and mortality has been observed in Thuja plicata (western redcedar)—an economically, culturally, and ecologically significant tree of the Pacific Northwest—which has been attributed to the warming and drying climate. How well T. plicata can acclimate its xylem vulnerability is thus crucial to our understanding of its future in a changing climate. Using a steep climatic gradient created by the Portland Urban Heat-Island effect, we constructed xylem vulnerability curves for T. plicata stems from two contrasting sites to determine their P50 (the xylem water potential at which 50% of conductivity is lost). We found that stems from the warmer site (-5.87 MPa) were considerably more resistant than those from the cooler site (-4.02 MPa). Previous vulnerability curves collected at the same sites in 2019 showed the opposite trend, suggesting that xylem vulnerability is a plastic trait in T. plicata. Nonetheless, it is not clear whether the rate of acclimation will keep pace with the rate of climate change.
	Julianna Paulsen	10	Digitizing the EWU Herbarium for Data Accessibility and Student Success	The Eastern Washington University Herbarium currently houses more than 10,000 natural history collections, of which approximately 3,000 are lichens, 1,500 are macrofungi, and 1,000 are bryophytes, none of which had been imaged. Our goal was to image all fungal collections. Further, we aimed to provide meaningful professional development to students by involving them in the digitization process. We created a low cost imaging station using easily acquirable materials and developed a simple procedure for imaging specimens that enables students of any experience level to digitize collections. To date, 15 students, both graduate and undergraduate, have been directly involved in curating, databasing, and imaging specimens. We also established the Friends of the Herbarium at EWU student organization, which has allowed many students to participate in outreach activities bringing awareness of collections based research to the broader campus community. We have now processed a backlog of approximately 1,500 specimens, including transfering specimens to archival quality packets and creating detailed labels. We have imaged 450 lichen specimens, which are publicly available on the Consortium of Lichen Herbaria. The development of the EWU Herbarium digital resources will support student research, faculty curriculum development, and global access to our fungal collection. It will have continuing positive impacts on student learning and our understanding of biodiversity in Eastern Washington.
	Alexander Brau	11	Forest Management, Wildfire, and Lichen Resilience in the Klamath Basin	Epiphytic lichens provide important ecological functions in forests by bringing energy and nutrients into the ecosystem and regulating temperature and humidity. Little is known, however, about post-wildfire lichen recovery. This project investigated the resilience of epiphytic lichen communities after fire events and the impact that forest management strategies might have on the resilience of lichen communities. Our study sites were in the ponderosa pine dominated forest of the Sycan Marsh Preserve, located in the Klamath Basin of Eastern Oregon. Between 2001 and 2018, the Nature Conservancy and the US Forest Service collaborated on the Big Coyote Fuel Reduction Project to implement selective thinning and prescribed fire on areas of forest in the Upper Sycan River Watershed. In the summer of 2024, we conducted surveys on lichen coverage in sections of forest that were in the 2021 Bootleg fire perimeter and sections that had not, and in both of those categories we looked at sites which had thinning and prescribed burn treatments and control sites which had no fuel reduction treatments. Our results indicated that thinning and prescribed burn treatments did not decrease lichen coverage significantly compared to control sites, and that thinning and prescribed burn treatments lowered the fire severity of the Bootleg wildfire enough to prevent significant damage to lichen coverage in treated areas.
	Devlin Mee	12	The Influence of Recreation, Temperature, and Land Use on Macroinvertebrate Diversity in Tributaries of the Pend Oreille River	Macroinvertebrate diversity and composition serve as bioindicators of water quality. Macroinvertebrates are also a key food source for Westslope Cutthroat Trout (Oncorhynchus clarkii lewisi), a species of ecological and cultural importance, particularly to the Kalispel Tribe. We hypothesize that water temperature, land use, and recreation intensity influence macroinvertebrate diversity in the Pend Oreille River Basin. We predict that higher temperatures, greater non-forest land use, and increased recreational activity will lead to lower diversity, reduced Ephemeroptera, Plecoptera, and Trichoptera proportions, smaller organisms, and a higher proportion of multivoltine taxa. We sampled macroinvertebrates from tributaries in the Priest, Pack, and Lightning River watersheds. We sampled 13 tributaries in 2024 and 7 in 2023. Six Surber samples were collected per tributary in 2024 and 3 Surber samples were collected per tributary in 2023., Invertebrates are being identified to the lowest practical taxonomic level, typically genus. Response metrics include taxa richness, Shannon diversity, EPT ratio, proportion of multivoltine taxa, and organism size. Temperature data were collected with loggers during summers 2023–2024, using 7-day maximums (maximum 7-DADMax) to assess thermal conditions. Land use (forest, agricultural, exurban, urban) will be analyzed via GIS, while recreation intensity will be inferred from road proximity, trails, and campgrounds. These findings will contribute to conservation strategies in the Pend Oreille River Basin, helping to protect aquatic biodiversity and sustain native trout populations. Preliminary results show a diverse macroinvertebrate community, spanning at least six orders, 10 families, and 15 genera.
	August Grossman	13	Canopy Fuel or Fire Buffer? The Role of Epiphytes in Douglas-fir Crown Flammability	Climate change and prolonged fire suppression have increased fuel loads, leading to more intense and frequent wildfires. Pseudotsuga menziesii is the dominant canopy species in Western Cascade forests and is an ecologically and economically important species. Mature P. menziesii forests support diverse communities of epiphytic macrolichens and bryophytes, yet the roles of epiphytes in canopy flammability remain poorly understood. To explore this relationship, single-rope climbing techniques were used to collect lichen-bearing shoots from three 60m-tall P. menziesii. Moisture levels of both branches and lichens were experimentally manipulated to simulate seasonal conditions. We hypothesized that dry lichens would increase flammability and that branch hydration would have a larger effect on flammability than lichen hydration. Samples were burned using a gas grill, and flammability traits–including burn duration, burned biomass, flame height, maximum temperature, and time to ignition–were recorded. Lichens burned at lower temperatures than foliage but were easily ignited. Overall, lichen hydration had a greater effect on shoot flammability than branch hydration and wet lichens reduced fuel consumption. Architectural traits such as volume and mass were also significantly correlated with flammability. Future research should verify seasonal hydration patterns of lichens and branches in P. menziesii canopies and test whether epiphytes can reach heat release rates sufficient to ignite foliage. This study aims to increase interest in lichen conservation under a changing climate and examine the potential roles of epiphytes in canopy flammability.
	Kaitlin Abell	14	Urbanization Impacts on Invertebrate Traits in the Spokane River Watershed	Urbanization has impacted stream systems by modifying discharge, substrate diversity and morphology of streams. The Spokane Tribe of Indians is beginning the process to reintroduce extirpated salmonid species into the Spokane River watershed. The first step of this rehabilitation is to perform habitat studies, to inform allocation of restoration efforts. As part of this effort, we performed benthic macroinvertebrate surveys throughout the watershed. These invertebrate communities are examined for taxonomic and trait composition. Traits will include habit, trophic relations, voltinism, ventilation mechanism and egg-laying behavior. Trait composition is increasingly being used as a bioassessment tool, as traits are directly impacted by specific factors within waterways. We hypothesize that urbanization will reduce invertebrate diversity and abundance, as well as favor species with more generalist trait profiles. In the summer of 2024, 32 of 60 planned stream reaches were sampled. The remaining stream reaches will be sampled in the summer of 2025. In each reach, 4 subsamples, each comprising 0.19 squared meters, were collected from the riffles, using a 500 µm mesh D-frame net. Subsamples were then combined for each sample location. Preliminary data shows a strong difference in taxonomic composition between tributaries, with several streams dominated by Diptera populations. When complete, our data should provide insight into the factors impacting invertebrate communities in our region's waterways and support the habitat restoration efforts for native salmonids.
	Emma Knepp	15	Late Holocene Climate Variability through Dendrochronology in the Trinity Alps, Northern California	The primary goal of this research is to investigate the relationship between tree growth and climate trends during the late Holocene period in the Trinity Alps Wilderness of northern California. Tree-ring data from four conifer species – mountain hemlock (Tsuga mertensiana), Brewer's spruce (Picea breweriana), western white pine (Pinus monticola), and Shasta red fir (Abies magnifica var. shastensis) are evaluated for growth response and reconstructing historical climate conditions. Tree cores were collected from two sites, including glacial moraines and striated bedrock, both containing living and dead trees with some trees exceeding 600 years in age. From the Grizzly Lake site, 39 trees were sampled in 2012, with 27 cores from two species (Pinus monticola and Tsuga mertensiana) analyzed in this study. In 2024, 99 cores were collected from 53 trees above Emerald and Sapphire Lakes, including six cores from the youngest and highest-elevation moraine (M2), 24 cores from 14 trees on the mid-elevation moraine (M), 15 cores from seven trees on the westernmost moraine (M1), and 54 cores from 26 trees on striated bedrock. One living Brewer's spruce extends back 738 years. Preliminary analysis of the tree-ring chronologies suggests strong potential for reconstructing climate patterns spanning several centuries. Understanding varying historical climate trends can inform future climate modeling, prediction, and further our knowledge of localized glacial dynamics and regional water resources.

Emmery Parker	16	Factors Influencing Life-History Variation of Larval Rough-skinned Newts in Coastal California	Rough-skinned newts (Taricha granulosa) occur from the central California coast to southwestern Alaska at elevations from sea level to 2,800 meters. It is thought that newt larvae hatch in the spring, spend summer in breeding ponds, and transform into terrestrial juveniles in the fall, with variation in timing based on elevation. However, using minnow-trap and dip net surveys at nine ponds in northern Humboldt County, California, we observed marked differences in larval period, even within a small geographic range. All of the sites that we sampled are lentic, yet there were differences in water temperature, hydroperiod, and elevation. Larval period varied among sites and, in certain cases, within sites. We detected overwintering larvae at five (56%) of the sites, but there was variation among those sites as to what proportion of the larval population overwintered. At two sites, all larvae hatched in August and have yet to transform, while at two other sites, most larvae hatched in June and transformed by October, leaving < 4% of the larval population at those sites to overwinter. At a fifth site, eggs were observed in May and larvae persisted through December showing no signs of transformation. At four sites, larvae began transforming at snout-to-vent lengths of 21-23 millimeters, whereas at other sites larvae did not start transforming until they had reached 30 millimeters snout-to-vent. We have yet to find an association between environmental factors and larval period or overwintering, suggesting these aspects of larval biology are plastic and influenced by multiple environmental cues.
Holly Reynolds	17	Building a geodatabase of historical Indigenous fire practices in the Pacific Northwest	Indigenous communities across the Pacific Northwest of North America (PNW) historically used fire as a land management tool, promoting ecosystem resilience through regular low-intensity burns. These practices reduced surface fuel accumulation, improved habitat, and mitigated wildfire severity. However, historical fire suppression policies, including the prohibition of Indigenous burning and extinction of lightning fires, have increased fire frequency, severity, and burned area over recent decades. Here we attempt to systematically document historical Indigenous fire practices and develop a geodatabase that synthesizes this information spatially in a common descriptive framework. Through a literature review, we collected attributes of Indigenous fire practices, including Indigenous group, period of record, geographical location, seasonality, frequency, purpose, intensity, post-burn vegetation response, environment, burned area, fuel type, cultural practices, and uncertainty. Using GIS, we linked each fire practice observation to polygons of traditional Indigenous territories using the Native Land Digital database. The geodatabase currently contains 32 observations linked to 32 polygons within the PNW, showing that Indigenous burning was widespread, commonly occurred during summer and fall seasons, and was primarily prescribed for resource enhancement, hunting, and fire management. Our research provides insight into historic anthropogenic fire, supporting efforts to integrate traditional ecological knowledge (TEK) into wildfire management in the face of climate change. Understanding how Indigenous peoples used fire in the past to support ecosystem resilience provides a foundation for future sustainable fire management policies. It will offer valuable insights for policymakers, land managers, and Indigenous nations, and will serve as a resource for simulation modeling.
Cecile Szollas	18	Fire in Sycan Marsh Preserve: The Impact of Fire Management on Plant Hydraulics and Ladder Fuel accumulation in a Pinus ponderosa Dominated Forest	Fire suppression and climate change have contributed to changes in Westside forests, altering forest structure and increasing the severity of wildfires. Ponderosa Pine (Pinus ponderosa) dominant forests have had historically low intensity fire regimes, due to the extensive history of cultural burn practices of Indigenous people. Forest management practices to reduce fuel loads include selective thinning and controlled burns. Yet, how management practices affect mature tree hydraulics in Ponderosa pine forests has not been well documented. To assess this we measured ladder fuels and tree hydraulics in managed and unmanaged sites in the Sycan Marsh Preserve, located in Eastern Oregon. Managed sites were thinned and regularly culturally burned on a 5 year basis and unmanaged sites had no human intervention. We measured ladder fuel structure and water potential Ψ of mature trees along transects. Additionally, we used flammability trials to measure the relationship between hydraulics and flammability. We hypothesized that reduced competition within managed forests would decrease fire intensity by reducing hydraulic stress and eliminating ladder fuels. Managed forests had significantly less ladder fuels between their understory and overstory, and increased horizontal distance between tree crowns. Water potential values did not vary with treatment, but we did observe that managed forests had significantly taller trees and wider crowns, indicating benefits of reduced competition. Additionally, this work supports the return of cultural burns to support healthy robust forests in the Sycan Marsh. Future studies should examine the relationship between tree height and wildfire resistance to explore the benefits of reduced competition.
Isabel Dean	19	IUCN Global Red List Assessments for Kaernefeltia californica ((Tuck.) Thell & Goward)	Lichens are critical components of ecosystems worldwide, where they contribute biodiversity, nutrient cycling and food webs. Because lichens lack roots and a protective cuticle, they are also sensitive indicators of environmental change. Few protections exist for the conservation of lichens, despite their sensitivity and diverse ecological roles. Kaernefeltia californica ((Tuck.) Thell & Goward), the Coastal Thornbush Lichen, is a rare, epiphytic macrolichen endemic to the Pacific Northwest coast of North America. Based on recent State-level assessments there is evidence of significant population threats and declines due to habitat loss in coastal areas in Washington. This prompted us to complete an IUCN Global Red List Assessment for the species. We searched all available herbarium records and iNaturalist observations and verified 199 occurrences across the species range. Of these occurrences, 137 were observed more than 40 years ago and 30 more than 100 years ago. When filtered by sites within 1 km of each other, K. californica occurred at only 100 sites in Alaska (5), BC (25), Washington (11), Oregon (26) and California (33). In Washington, only two of 11 occurrences were recorded after 1975 and in recent surveys to three historical sites, K. californica was not recovered. Our study highlights the need for regular monitoring of rare lichen populations. Habitat loss and rising sea levels are the primary threats to this species. Surveys of historical sites as well as targeted searches in coastal habitats are needed to assess the current population status of this rare lichen across its range.
Lauren Walker	20	Simulating Oregon ash replacement as Emerald Ash Borer spreads in the West	Oregon ash (Fraxinus latifolia) is the only native species of ash on the West Coast and an important tree in riparian and urban areas. This tree species is now under threat due to a recent pest introduction, Emerald Ash Borer (Agrilus planipennis; EAB), that causes extremely high levels of mortality in ash. EAB is a beetle native to Asia and was first introduced to the United States in Michigan in 2002. Since then, it has decimated ash populations in the Eastern United States. EAB was recently observed on the West Coast of the United States for the first time in 2022 near Portland, OR. We plan to use LANDIS-II, a widely-used forest landscape model, to project the future spread of EAB in Oregon and its effects on Oregon ash stands and overall forest biomass and succession. Additionally, we will model alternative species for replanting in place of Oregon ash and determine which species are best able to retain the ecosystem services that ash currently provides, particularly leaf area index and carbon storage. Our projections of the rate of EAB spread in Oregon will help strategic planning efforts of local land managers and owners as they prepare for high levels of ash mortality and develop new plans for restoration.
Ben Vierra	21	2021 Heat Dome Event and Aftermath Through the Lens of the National Ecological Observatory Network	June 2021 saw prolonged, record-breaking air temperatures in the Pacific Northwest. Four sites in Washington and Oregon, monitored by the U.S. National Science Foundation's National Ecological Observatory Network (NEON), recorded temperature and other climatic data throughout this "heat dome" or heat wave event. NEON monitors populations of select taxonomic groups across all of these sites, along with productivity-related data at a subset of the sites. Early analyses of NEON data related to this event have focused on air temperatures, CO2 flux, canopy greenness, and litterfall. However, with over 180 data products, the NEON field sites may still have more insights to provide to say about what Pacific Northwest forests experienced during this event, and their longer-term response. This poster suggests additional NEON data sets where more in-depth analysis may be fruitful and highlights the breadth of NEON data openly available to researchers and students.
Niamh Houston	22	Assessing Post-fire Fuels and Vegetation Following Reburns in the Western Cascade Range of Oregon	We examined how disturbed landscapes shape fire hazards. In Oregon's Western Cascade Range, high intensity fires, sometimes as reburns, have shaped vegetation dynamics and fuel loads, highlighting ecosystem resilience and vulnerability in reburned areas. We measured plant communities, fuel loads, and site characteristics across landscapes along the region's bioclimatic gradient, at 31 sites on once, twice, and three-times burned areas in the last 7 years, using FIA-like forest plots and Brown's fuel transects. Flammability in drought-prone environments has become a critical focus in wildfire ecology, particularly as the impacts of anthropogenic climate change compound with decades of fire suppression. We seek to determine how living and dead fuels influence flammability and explore the interplay between vegetation regrowth, fire history, and environmental variables. After preliminary data analysis of one of two planned field seasons, we found that fuel loads increased with time since fire, with the highest fuel accumulation observed at sites that burned only once. These single-burn scars are characterized by dense regrowth and significant woody debris, creating fuel conditions prone to intense fire behavior. In contrast, areas that have burned three times exhibit the smallest fuel loads, suggesting that repeated burning could act as a natural fuel reduction mechanism. Frequent fires may disrupt vegetation succession, limiting the buildup of fuels and altering species composition to favor plants that reduce fire risk. These findings highlight the importance of fire history in shaping fuel dynamics and highlights the role of repeated fires in mitigating future fire hazards.

	Regina OKelley	23	Reforest rivers, right away: Evaluating the climate mitigation benefit of riparian reforestation in western Oregon	Riparian reforestation is a proposed nature-based climate solution in which trees and shrubs are planted in riparian areas to restore riparian forest ecosystem functions. Riparian reforestation may also bolster carbon storage, yet few studies have empirically assessed its climate mitigation benefit or investigated factors modulating carbon accumulation rates. To address this gap, we conducted a chronosequence-based regional study assessing carbon storage in woody vegetation and soil in reforested riparian floodplains planted between 5 and 30 years ago in western Oregon. We aimed to 1) Quantify the rate of change for C storage in reforested floodplains 2) Evaluate the influence of climate, soil properties, restoration management techniques and vegetation biodiversity on the rate of carbon accumulation in sites. Generalized linear mixed models indicated that woody and soil C stocks increase with planting age by approximately 19% and 1% per year on average, for an estimated gain of 34 and 18 Mg carbon per hectare over the first 20 years after planting. We observed stronger carbon accumulation in sites with higher annual precipitation, tree and understory stem density, and fine soil. Woody C was mainly controlled by planting age and stand characteristics, while soil C was primarily controlled by inherent site characteristics. Taken together, our results indicate that accounting for site climatic, geomorphic and edaphic properties can improve estimates of C sequestration potential. Given the gradual C accumulation we observed, to realize the best climate mitigation benefits from riparian reforestation, projects should be implemented soon.
	Eleonore Jacobson	24	Spatial Analysis of Airborne Contaminants: Moss as a Tool for Environmental Assessment	Solid waste incineration (SWI) releases various air pollutants, yet their geographic reach is not routinely monitored. Our study evaluated native epiphytic moss (Orthotrichum s.l.) as a biomonitoring tool to assess SWI emissions, which may originate from both stack and fugitive dust sources, while also addressing community concerns about an aging incinerator in rural Oregon. We trained volunteers and collected 36 moss samples along a 32-km transect. 40 elements, including 14 rare earth elements, were measured via inductively coupled plasma mass spectrometry (ICP-MS). Nonparametric regression revealed that farther-dispersing elements, including mercury (Hg) and cadmium (Cd) had strong spatial patterns, with deposition concentrated within 5–10 km (xR^2 = 0.65 and 0.62, respectively). Elements linked to soil and fugitive dust, such as arsenic (As) and chromium (Cr), peaked within 0.2 km (xR^2 = 0.14–0.3). Cesium (Cs), europium (Eu), and gadolinium (Gd) emerged as novel SWI atmospheric tracers, with Gd - a contrast reagent used in magnetic resonance imaging - potentially indicating medical waste incineration. Moss biomonitoring was an effective method to spatially assess SWI emissions and inform regulatory responses. A related study examined land use impacts on elemental deposition near a regional landfill in Oregon's Willamette Valley. We analyzed 160 moss samples, using nonparametric multiplicative regression to model elemental content of metals and rare earth elements in relation to spatial coordinates and land use. The findings highlight the complexity of elemental deposition in rural landscapes, its relationship to land use patterns, and reinforce the role of moss biomonitoring in environmental assessment.
	Wesley Rancher	25	Estimating recent shifts in aboveground carbon and species composition in interior Alaska using Landsat imagery and random forests	Boreal forests are one of earth's largest terrestrial biomes, with one-third of terrestrial carbon stored cumulatively in aboveground vegetation and frozen belowground in permafrost soils. However, the intensified effects of climate change experienced at high northern latitudes due to arctic amplification puts this carbon storehouse at increased risk. Additionally, a shift from primarily coniferous to deciduous tree cover is occurring, particularly in interior Alaska, which has cascading implications for carbon dynamics, permafrost thaw, and wildfire. Our study aims to answer questions about the long-term trajectories of carbon storage and species composition in Alaska by integrating remote sensing and machine learning. Using Landsat imagery and random forest algorithms (generalized and spatial), we created spatially complete biomass maps of five dominant tree species in interior Alaska for the years 2000-2024. These maps were used to conduct change detection and trend analysis in the region over the last 25 years. Preliminary results suggest that deciduous species such as Alaskan birch and quaking aspen have seen slight increases in biomass on average from 2000 to present, while conifers like black spruce have seen a slight decrease. We found high inter-annual variability in landscape-level estimates of aboveground carbon These estimates align spatially with large fire perimeters and highlight the interplay between climate, wildfire, and species compositional shifts.

Wednesday, March 19

Opening Session - 8:30am - Redwood Ballroom

Plenary 3 - Redwood Ballroom

Plenary 3	Presenter	Start time	Title	Abstract
	Jerry Franklin	9:00	Reflections on Forest Science and Policy in the Past and Future	--

Break - 10:00 - 10:15

Northwest Lichenology, Part 1 - Redwood Ballroom

g Session 1	Presenter	Start time	Title	Abstract
	Roger Rosentreter	10:15	Fire Effects on Lichen Biodiversity on a Longleaf Pine Site, Two years post-fire.	Lichen diversity exceeds the vascular plant diversity in many mature longleaf pine habitats. Yet, information and studies on the impacts of prescribed fire on lichen species in these habitats are limited. Lichens in these sites promote more moisture capture and retention and encourage canopy insects. Ground lichens may limit some vascular plant germination and growth, promoting a more open and healthy pine community. Lichen diversity and abundance were recorded before and after a prescribed groundfire in a longleaf pine/wiregrass habitat near Ocala, Florida. We found greater lichen abundance and diversity on hardwoods such as oaks than on the pines. One year post-fire, the canopy lichen diversity and abundance changed little; however, the ground lichen species were eliminated. However, in year two, post-fire, the abundance of canopy lichens significantly decreased. This decline in abundance was not expected. Given the overall decrease in the canopy density, we expected the lichens to thrive since they were receiving more light and moisture with the decrease in the canopy density. Two years post-fire most of the larger oak trees died or blew over in the wind. Since most of the canopy lichens occur on the oaks there was a drastic decline in lichen abundance.
	Julianna Paulsen	10:30	Mobile Genetic Elements in Rare, Threatened, and Range-Restricted Lichenized Fungi	Mobile Genetic Elements (MGEs) are sequence features whose movement within a genome modulates gene expression and generates novel genetic diversity. They can have both positive and negative effects on host organisms. We hypothesize that population dynamics and environmental stressors in species with small, declining populations impact defense mechanisms developed by Eukaryotes to curb the proliferation of deleterious MGEs. We used comparative genomics to contrast the MGE content in rare, threatened, and range-restricted species of lichenized fungi with species that have large, stable populations. Twenty-four new reference genomes were generated and six previously published long-read genomes were gathered from online data repositories. New genomes were generated with standard laboratory workflows and MGEs were annotated using RepeatModeler2. MGEs accounted for 3.47–68.85% of the genome content in the species sampled, with a range of 966–103,790 elements recovered in a given genome. Retrotransposons were the most abundant type of MGE, averaging 15.61% (±13.68) of the genome content in rare species and 12.16% (±7.58) in common species. Total MGE content followed a similar pattern, with means of 24.602% (±21.4) and 18.35% (±9.7) recovered for rare and common species, respectively. The disproportionate distribution of MGEs, particularly retrotransposons, in rare, threatened, and range-restricted species may disrupt genomic stability, yet also create novel genetic diversity in isolated populations with limited gene flow. Investigation of associations between increased extinction risks and MGE expansions is essential to understand the potential implications that these genes have for species conservation.
	John Villella	10:45	Visitor use reduces lichen and bryophyte diversity and the occurrence of rare species in Mount Rainier National Park	Increasing recreational use of natural areas may pose a threat to biodiversity, especially for small statured species. Lichens and bryophytes contribute substantially to biodiversity in almost all terrestrial ecosystems of the Pacific Northwest but their response to trampling disturbance from recreational visitor uses is understudied. We inventoried these communities and analyzed impacts of visitor use disturbance and environmental variables at four study areas in Mount Rainier National Park. The study compares low-elevation wet temperate forests and alpine ecosystems. Both areas yielded occurrences of rare species with little overlap in overall species composition between communities. We found that lichen and bryophyte richness increased with increasing distance from trails across all study sites, even as far as 75 m from trails. Negative effects of recreational visitor use on rare species was particularly pronounced in alpine areas where occurrences are associated with less trampled sites that are wetter, and rockier. In lower elevation forested areas, we did not identify any drivers of rare species occurrences. Our results highlight that ecological impacts of recreational use differ among local ecosystems within Mount Rainier National Park, and extend great distances from trails and other heavily used areas. Additional efforts by land managers to prevent visitors from walking off-trail in sensitive areas in heavily visited areas could help conserve lichen and bryophyte diversity.

Morning	Jesse Miller	11:00	If a lichen falls in a forest: Population trends and threat analysis for Washington rare plants and lichens	Preventing the extinction of imperiled organisms is central to the contemporary conservation movement. While the Endangered Species Act (ESA) has prevented extinctions, only about 2% of its funding is directed towards plants and lichens. Most rare plants and lichens in the Pacific Northwest have not yet been listed under the ESA, leaving them vulnerable to extinction. Here, we seek to determine whether current conservation efforts are effective for preventing declines of rare plant and lichen taxa in Washington, USA. To this end, we performed field monitoring of rare plant and lichen populations and analyzed population trends using mixed models. Finally, we used this information to update the State Species of Concern lists. Our findings highlight that many plant and lichen taxa in Washington face considerable threats, and that extinction may be eminent for some of our most imperiled taxa. The single-site endemic Umtanum desert buckwheat (Eriogonum codium) has declined from 3016 plants in 2019 to 2354 plants in 2023. Cryptic paw lichen (Nephroma occultum), an old growth forest associate, was not found at six historical sites that we revisited, suggesting that it may be declining rapidly. Across the taxa we monitored, climate change and competition from invasive species are some of the most prevalent threats, potentially affecting over 80% of the taxa in question. We added 17 vascular plants and approximately 24 lichens to the Washington State Species of Concern lists; many of these should be considered for listing under the ESA as well.
	Elise Grage	11:15	Lichens of Marbled Murrelet Nests	The Marbled Murrelet (Brachyramphus marmoratus) is a threatened seabird facing essential nesting habitat loss along the Pacific Northwest coast of North America. Indicators of this habitat include complex old-growth forests that support thick epiphyte development. We had the rare opportunity to study the epiphyte composition of 73 Marbled Murrelet nests collected between 1991-2002 from Washington, Oregon and California. Tree species included western hemlock (Tsuga heterophylla), Sitka spruce (Picea sitchensis), Douglas fir (Pseudotsuga menziesii), and western red cedar (Thuja plicata).We identified 237 lichen fragments which resulted in 35 macrolichen and 6 crustose species. Indvidual nests contained between 0 and 12 different lichen taxa. The murrelet nest lichen communities described in this study show a close affinity with coastal old-growth forest lichen communities reported in previous research. Old-growth associates include species from the genera Alectoria, Bryoria, Usnea, as well as Lobaria. Coastal associates include Lobaria oregana and Loxosporopsis corallifera. The most frequently detected species in the nests studied were: Sphaerophorus tuckermanii(26), Alectoria sarmentosa (23), Sphaerophorus venerabilis (14), Platismatia glauca (14), Platismatia herrei (14), andLobaria oregana (14). To our knowledge, this is the first comprehensive study to report the lichen species composition of Marbled Murrelet nests from the PNW. We recommend forest managers use this species list as a potential indicator for Marbled Murrelet habitat throughout the species range. Young forest stands are the old growth of tomorrow and if managed correctly can improve the status of the Marbled Murrelet.
	Stephen Sharrett	11:30	Rare and common lichenized fungi adapt to light availability, anthropogenic landscape impacts, and climate	Rarity encompasses the complexities of a species' life-history traits and its environment. One aspect of rarity is distribution size. We used comparative population genomics to examine adaptation in closely related widespread and range-restricted lichenized fungi sampled throughout the Appalachian Mountains in eastern North America. We generated population genomic datasets for the widespread species Punctelia rudecta, Lepraria finkii, Usnea strigosa, and rare congeners Punctelia appalachensis, Lepraria lanata, and Usnea subfusca, totaling 924 individuals from 36 sites. Using long-read sequences, we assembled high-quality reference genomes for each species. Short-read whole-genome shotgun sequences (WGS) were aligned to reference genomes and intersected with coding and noncoding regions in the reference genomes. We used latent factor mixed models to identify coding loci with putative roles in adaptation to a suite of environmental categories of factors: light availability, landscape structure, stand maturity, and climate. The function of those genes was further investigated using gene ontology enrichment analyses which recovered unique enriched terms for each species, including peroxisomes, which mediate stress responses, and target rapamycin complex genes, which regulate growth and development.
	Bruce McCune	11:45	Geographic, genetic, and symbiont variation in forms of Stereocaulon spathuliferum in the Pacific Northwest	Stereocaulon spathuliferum grows on talus and outcrops in cool, moist environments from Oregon to Alaska and in Scandinavia. It is listed as rare, threatened, or endangered in Oregon and Washington, and is a survey-and-manage species for federal agencies. Four morphological forms—dissolutum, globuliferum, pygmaeum, and spathuliferum—have been named. Do these forms show phylogenetic structure in their DNA sequences and do they differ in distribution or symbionts? We analyzed DNA sequences from 27 specimens and morphotyped 57 specimens from North America. Each form was found in Alaska, Oregon, and Washington, except for pygmaeum, which was not found in Alaska. Each form had a 2/3 chance of having Stigonema versus Nostoc as its cyanobiont, except f. dissolutum, which had a 85% chance of Stigonema. Internal transcribed spacer (ITS) and nuclear large subunit (nuLSU) sequences were nearly identical among specimens, except for two indels of 29 and 37 bases. Specimens missing both indels belonged to f. globuliferum and f. pygmaeum, while forms dissolutum and spathuliferum always had these indels. If either or both indels were present, the lichen almost always had Stigonema as its cyanobiont. If either indel was missing, the lichen had about a 50/50 chance of having Nostoc. Samples from Oregon were more likely to lack indel1 compared to those from Alaska. We conclude that the four forms differ some in geography, phylogeny, and cyanobiont association. However, these differences are not significant enough to warrant taxonomic ranking as separate species, though several forms may deserve a higher level than form.

	Earth and Ecosystems - Lease Crutcher Room			
	Presenter	**Start time**	**Title**	**Abstract**
	Nina Ferrari	10:15	Building a multi-species classifier to identify bird vocalizations in bioacoustics data	Bioacoustics is growing as an application in avian ecology due to the increased capacity to collect large amounts of audio data through passive acoustic monitoring and to build machine learning-based audio classifiers. Most studies use bioacoustics data at coarse spatial resolutions to answer questions about population dynamics and site occupancy. Few have used bioacoustics at fine spatial resolutions to test ecological theory. Our research has roots in the fundamental ecological principle of niche partitioning, which allows organisms with similar resource requirements to coexist in the same space without directly competing. Aside from MacArthur (1959), scientific literature has seldom documented vertical niche partitioning, especially in forests of the Pacific Northwest, which contain some of the world's tallest and most structurally complex trees. This research answers fundamental ecological questions about species coexistence and niche partitioning through novel bioacoustics and machine learning applications. We deployed autonomous recording units at fine spatial resolution (10-meter vertical intervals) from the understory into the canopy in seven old-growth trees in the H.J. Andrews Experimental Forest, Oregon. As a necessary step to processing our large bioacoustics dataset, we then trained a convolutional neural network to classify multiple bird species in the recordings. From our classifier outputs we can identify species within the 25,000+ hours of field recordings and estimate their vertical height in trees through localization based on their relative decibel level in the recordings. These results can improve our understanding of how forest songbird species partition vertical space.
	Allison Monroe	10:30	Initial insights into the recently established invasive Mediterranean Oak Borer (Xyleborus monographus) within Oregon white oak (Quercus garryana) in the Willamette Valley, Oregon	The Mediterranean Oak Borer (Xyleborus monographus), an exotic invasive ambrosia beetle, has emerged as a significant threat to oak ecosystems in the Pacific Northwest. Though currently limited to infestations in Oregon and California, X. monographus is associated with dieback and mortality in Quercus garryana (Oregon white oak) and Q. lobata (valley oak), ecologically and culturally significant species. Despite increasing evidence of its impact, X. monographus' behavior, population dynamics, and host interactions in its introduced range remain poorly understood. This research provides insights into the ecology of X. monographus in Q. garryana in Oregon and discusses potential management strategies.
	Christina Mitchell	10:45	Pollen limitation increases importance of pollinators for rare prairie plants	Global losses in biodiversity highlight the diverse, and often dependent connections between species. The conservation of endangered plants must also consider management of associated plant and arthropod communities, including pollinators. To better understand the role of pollinator communities for the conservation of rare plants, we conducted targeted studies on Willamette daisy (Erigeron decumbens), Kincaid's lupine (Lupinus oreganus), and golden paintbrush (Castilleja levisecta). These perennial, endemic forbs are listed (Willamette daisy, Kincaid's lupine) or previously listed (golden paintbrush) under the U.S. Endangered Species Act. Previous experiments suggest Willamette daisy is affected by inbreeding depression and that seed set, and therefore reproduction, may benefit from pollination services. To address whether Willamette Valley rare plants face limitations to effective pollination, we determined whether Willamette daisy, Kincaid's lupine, and golden paintbrush are pollen limited, if seed set varies with plant density, and how pollinator communities vary. We conducted pollen supplementation experiments, quantified seed set and flower density, and observed insect visitors to populations of these three species. Initial results suggest pollen supplementation increases seed set and seed set generally increases with increasing flower head density. The suite of insects visiting these rare plant species is diverse, and species have varied pollinator communities depending on flower morphology. Prairie pollinator communities and effective pollinator services have direct implications for threatened and endangered plant species; plant conservation depends on pollinator conservation, and both need scientifically-informed habitat conservation and management efforts.

Morning Session 2	Alex Bentley	11:00	Identifying the Drivers Behind the Decline and Dieback of Douglas-fir and True Fir Species in SW Oregon	Increased levels of Pseudotsuga menziesii (DF) and Abies species (TF) decline and dieback throughout dry forests in the Klamath Mountains and Western Cascades ecoregions have been recorded in recent years, with preliminary evidence suggesting that factors influenced by changing climatic conditions and conifer encroachment from fire suppression policies are primarily to blame. Yet, species-specific ecological and environmental mechanisms of drought-driven tree decline are poorly understood across biophysical and spatial gradients. Given the complex relations that drive decline, determining the degree of influence of specific drivers is difficult, creating unique challenges for modern forest management. To elucidate the most important factors driving DF and TF decline, we trained two species-specific machine-learning spatial models using a binary response variable generated from an annualized Landsat-based vegetation loss model (BugNet) and a variety of abiotic and biotic environmental predictor variables in SW Oregon. Both models performed strongly (AUCs > 0.8) and generalized well to the data, but failed to account for a significant portion of the observed deviance indicating the complexity of tree decline drivers. Across both species models, canopy height was the strongest predictor of tree decline estimates throughout the study area, showing a positive linear relationship with predicted decline. Canopy Height and predicted decline also showed linear and non-linear interactions with topo-climatic conditions and drought severity. These results indicate that modern management strategies throughout the region should account for variability in site-specific growing conditions when restoring these landscapes, and that additional research should be conducted to elucidate the effects of tree height on decline vulnerability.
	James Johnston	11:15	Significant mortality of old trees across a dry forest landscape, Oregon, USA	Old trees provide irreplaceable ecosystem services and are a high priority for conservation efforts, but there is little information about rates of mortality of old trees in dry forests. We revisited a network of 1,615 trees across randomly located sites in unlogged roadless areas in the Blue Mountains of eastern Oregon for which we have precise age and radial growth data. A third of trees 150 to 300 years of age and a quarter of trees ≥300 years of age died over a ten-year period. Annual rates of old tree mortality in our study area were significantly higher than any previous study of old tree demographics in the western US. We used a novel simulation model which demonstrated that succession of young trees is unlikely to replace recent losses of old trees. Our results indicate that passive management in dry forest protected areas is unlikely to achieve old tree conservation policy goals.
	Margaret Magee	11:30	Downed woody debris facilitated microsites to support black huckleberry regeneration	Black huckleberry (Vaccinium membranaceum) is an economically, culturally, and ecologically important species in the Pacific and Inland Northwest that has experienced declines in its range and productivity as a result of climate change, fire suppression, and other land use changes. There is therefore a need to supplement natural huckleberry habitat in its native range and support huckleberry cultivation efforts to ensure its continued survival. We tested downed woody debris (DWD) in creating favorable microsites for black huckleberry seedling establishment in unfavorable habitats. DWD has long been recognized as a substrate for regenerating plants, but more recent studies have highlighted DWD as a sheltering object that alters its surrounding abiotic environment. We planted black huckleberry seedlings adjacent to DWD (0 meters) and at greater distances on the north and south sides of E-W oriented DWD. Seedlings planted on the north side and adjacent to DWD exhibited the greatest survival and health compared to seedlings planted at farther distances and on the south side. These locations were also associated with the lowest soil surface temperatures and highest soil moisture, highlighting abiotic extremes that are ameliorated by DWD and that are important for black huckleberry regeneration. Our results highlight specific spatial and directional patterns of DWD microsites and identify DWD as an important natural restoration tool for black huckleberry regeneration. More research is needed to expand on these findings, including exploration of DWD microsite interactions with overstory forest cover and expanding the microsite benefit to other regenerating species.
	Max Ragozzino	11:45	Emerald Ash Borer Response in Oregon: Slowing Ash Mortality & eDNA Detection Methods	Emerald Ash Borer (EAB), Agrilus planipennis, is an invasive wood-boring beetle that has devastated North America ash trees since 2002. Ash trees are a dominant part of the urban canopy, and natural ecosystems in the Pacific Northwest. EAB was first detected west of the Rocky Mountains in 2022 in Forest Grove, Oregon. Since then, it has been detected in four counties through visual survey and trapping programs. In response to its initial detection, the Oregon Department of Agriculture lead efforts to limit the spread of EAB through Slow Ash Mortality (SLAM). This effort combined conventional insecticide treatments with artificially stressed girdled trap trees and biological control. In 2023, treated and trap trees were selected every quarter mile along the perimeter of the initial infestation area. Sentinel trap trees placed every ½-1 mile in a wider ring beyond the known infestation boundary. In 2024, the process was repeated, adding high density “sink” sites within the known infestation area to minimize the number of dispersing adults. Simultaneously, we partnered with Clean Water Services to pioneer a novel detection method using environmental DNA (eDNA). Here, we report the results of two years of SLAM, insights on EAB management, and preliminary results of eDNA survey.
	Lucy Kerhoulas	12:00	Foliar uptake of fog water in three tall conifer species of the Pacific Northwest	Foliar uptake of fog is an important water source for tall conifers in coastal temperate rainforests of the Pacific Northwest. Using hydrated cuttings and a fog chamber in the lab, we measured the foliar uptake capacity of fog water (mg H2O per cm2 shoot area) in three tall conifers that co-occur in coastal forests of northern California: redwood (Sequoia sempervirens), Douglas-fir (Pseudotsuga menziesii), and Sitka spruce (Picea sitchensis). Within each tree, we measured uptake capacity as it varied with height (range between 11 and 88 m) and between young and old leaves. We found that uptake capacity was greatest in Sitka spruce, followed by redwood and then Douglas-fir. In all three species, uptake capacity increased with height within tree crowns and was higher in old leaves compared to young leaves. Along the vertical gradient, the greatest increase in uptake capacity occurred in redwood, with treetop foliage having 1.5 times greater uptake capacity than crown base foliage. Between young and old leaves, the greatest difference occurred in redwood mid-crown foliage, where old leaves had nearly three times higher uptake rates than young leaves. These findings have important implications for tall trees in coastal temperate rainforests, as the future effects of climate change on fog patterns are uncertain. Further, these findings comparing young and old leaves along the vertical gradient in three conifer species offer new insights into the potential mechanisms and pathways related to foliar water uptake.

Business Lunch 12:20 - 13:45pm : Join us in the Crater Lake Room for a public discussion on the present and future of NWSA

NWL Workshop 14:00-17:00 - Klamath 5 Lab

	Northwest Lichenology, Part 2 - Redwood Ballroom			
	Presenter	**Start time**	**Title**	**Abstract**
Evening Session 1	Elisa Di Meglio	13:00	Lichenology in the age of Ecampus	Historically, few people have access to formal instruction in Lichenology. In the fall of 2019, the Botany and Plant Pathology Department at OSU launched their Ecampus B.S. Botany program. As part of this effort, I developed an Ecampus version of the existing in-person Lichenology class. With the help of Dr. McCune, I developed and began offering the new course in the spring of 2021. I have delivered this class twice a year and been surprised by its success despite being laboratory heavy. Students are sent kits and given guidance on how to build their own “at home lab”. Thanks to advances in technology, I have been able to help students identify lichens through screen sharing microscope tools. Similarly, through video recordings I deliver instruction on conducting chemical spot tests, walk through the identification process, and take virtual field trips throughout Oregon. As a term project, students can choose an identification heavy project where they mail in formally curated specimens for identification confirmation and feedback. I have been amazed at the breadth in audience reached through this modality. I have had students in 37 states, 5 international locations, and on average 1-2 federal professionals per term. Students range from Botany majors to non-degree seeking federally employed professionals seeking credit for future promotion. Some students have even donated specimens of notable species that are lacking in the OSC herbarium or are range extensions. In summary, I believe that the field of lichenology is benefiting from the expanded accessibility that this modality offers.
	David Wagner	13:15	Traditional herbarium taxonomy meets digital technology.	Bryophytes are prominent elements of the landscape of the Pacific Northwest. Of the three divisions of bryophytes (mosses, liverworts and hornworts), the diversity of liverworts is most poorly known due to their small size, difficulty in species identification and preference for special habitats. Liverworts are the oldest direct descendants of the first land plants, a lineage over 400 million years old. Their vintage reflects evolutionary patterns different from mosses or hornworts. Some are thalloid like hornworts; some are leafy like mosses. Almost all have sporangia with distinctive, spirally thickened sterile cells, called elaters, mixed among their spores. Most leafy liverworts have distinctive, diagnostic oil bodies in living cells. For the past 45 years I have searched for liverworts in coastal forests, meadows and mountains from California to Alaska. I have performed detailed, landscape wide inventories of bryophyte communities in Oregon, mostly in the southwest. Likewise, as a contracted expert, I have examined hundreds of specimens which are candidates for conservation concern. These have provided me with the material to create a novel and highly effective document for identifying the liverworts of Oregon: Guide to Liverworts of Oregon. Its format is a totally self contained document written in HTML, with a database of hundreds of images for creating illustrated keys and species descriptions. The most striking feature has been development of color photomicrographs using stacking software. Guide to Liverworts of Oregon documents all 174 species of liverworts known to occur in Oregon as well as mentioning another 20 likely species occurrences.
	Alan Peterson	13:30	Practical issues associated with using Consortium of Lichen Herbaria (CLH) data.	The use of CLH data is discussed. Based on four years of experience developing the New England Lichen and Allied Fungi Checklist, this presentation examines common challenges in working with CLH data. Details of the nature of the dataset that can be misleading are presented. Some tools enabling error identification as well as techniques to increase the probability of accessing relevant data are discussed, with illustrative examples. The principles necessary for full data retrieval and error detection will be the emphasis. Specific methodological processes that are system, application, and platform dependent will not be a primary focus.

	Fire Ecology and Management - Lease Crutcher Room			
	Presenter	**Start time**	**Title**	**Abstract**

Evening Session 2	Gabby John	14:15	How do Douglas-fir and Western Hemlock Respond to Heat Waves in Western Oregon?	Anthropogenic climate change, namely heat waves, will likely increase in severity and frequency over time. It is important to understand how trees will respond because they are unmatched in their ability to provide carbon sequestration, habitat, recreation, food, and more. Many studies use models to predict Pacific Northwest forest responses to climate stress, but it is important to analyze live data to ensure model accuracy while identifying patterns in tree growth responses. For example, heat waves and drought are often co-occurring and are therefore rarely decoupled when analyzing specific drivers of climate stress in trees. The present ongoing study addresses this by asking, "What physiological changes occur among Douglas-fir and western hemlock trees in western Oregon before, during, and after a heat wave?" I have analyzed microclimate and dendrometer data at the HJ Andrews Research Forest to extrapolate stem growth, where up to 75% of a tree's biomass is stored. So far, microclimate trends reveal increasing occurrences of temperature and precipitation events that exceed stress thresholds for trees at the research site. Stem growth records are still in progress. I have concurrently collected tree cores to contextualize short-term growth with longer records of dendrochronology.
	Mark Kerstens	14:30	Importance of late-seral lodgepole pine for a post-fire "specialist" on the Oregon Pumice Plateau	Woodpeckers are often described as double keystone species because they increase food availability and create cavities used by other species. The Black-backed Woodpecker (Picoides arcticus) has been described as a high severity post fire obligate, and recently burned forests create ephemeral resource pulses for cavity nesters and other fire-associated bird species. However, burned areas can become unsuitable for breeding over relatively short timescales post-fire as succession progresses, and key habitat features are lost. Recent studies have found breeding pairs of Black-backed Woodpeckers in unburned green forest in the western portion of its range. Additionally, our previous research found that reproductive output and juvenile survival were similar in green and burned forests, but that breeding sites in green forests were almost exclusively restricted to stands dominated by late-seral lodgepole pine (Pinus contorta). In this study, we investigated the factors that influence habitat selection within green forests of south-central Oregon to understand how woodpeckers select habitat at landscape scales during breeding. To do this, we used vegetation data measured at nest sites (n = 35) in green forest and paired it with randomly selected plots at the landscape scale (n = 196) to quantify second-order habitat selection, and paired this with a 4th order assessment of nest-tree selection. Because green forests comprise the majority of the forested landscape in the western United States, our results will provide information needed by manages to maximize the conservation value of green forests within pyrodiverse landscapes containing burned and green forest.
	Jed Kaplan	14:45	Coupled human and natural systems modeling confirms the importance of anthropogenic burning in explaining the fire deficit in the Pacific Northwest	It is well understood that western North America has been in a situation of "wildfire deficit" since the early 20th century. Extirpation of Indigenous peoples and their fire-based land management, legislation discouraging the use of fire, and active fire suppression all led to reductions in both fire frequency and burned area that are well below estimates based on paleoecological reconstruction. Understanding the causes of the fire deficit is difficult to assess because wildfire is influenced by climate variability and change, and a complex of human activities that lead both to increased and decreased amounts of landscape fire. Here we used the LPJ-LMfire dynamic vegetation model in a range of simulations to quantify the impact that the suppression of Indigenous burning could have had on wildfire in the Pacific Northwest. We ran the model for 1800-2023 at 5km resolution over a spatial domain covering the Pacific Northwest from northern California to southeastern Alaska and from the Pacific to the western Great Plains. We performed simulations with no anthropogenic land use or burning, land use only, and land use and anthropogenic fire ignitions. We show that the fire deficit is best explained as a combination of both landscape fragmentation through land use from agriculture and ranching, and the suppression of Indigenous fire. Indigenous burning has a particularly large influence on fire in ecotonal settings. Our simulations demonstrate the potential for modeling to assess the changing fire regimes and can be used to support fire restoration activities in the context of climate change.
	Dalton Brantley	15:00	The impact of frequent wildfire on subalpine lodgepole forest understory communities	High-severity wildfires are increasing in frequency across western North America, threatening forests' resilience. As the intervals between wildfires shrink to a time period shorter than dominant tree species require for maturation, changes in fire regimes can interact with vegetation to determine postfire forest trajectories. Successive fires an order of magnitude shorter than the historic-return-interval can alter subalpine conifer forests capacity to regenerate by reducing tree regeneration and establishment. In altering the structure and composition of the overstory community, short-interval-fires (<30years) can also facilitate changes in understory plant community by decreasing litter and duff layers, increasing sunlight reaching the understory, and increasing below-ground resource availability. These changes can manifest in significantly different understory plant community compositions, richness, and evenness. Yet, few studies have examined the mechanisms underlying how increasingly short-interval fires affect understory plant recovery despite these communities' crucial role in ecosystem functioning and future fire activity. By assessing fuel loading, tree regeneration, and understory community composition across sites with variable time-since-fire (TSF) and fire-return-interval (FRI) we assessed how subalpine lodgepole forests understory communities respond to short-interval fires in Montana's Sapphire Mountain Range. We found species richness was highest at sites burned 13 years ago (TSF) and with 11 years between fires (FRI) relative to sites experiencing either shorter or longer TSF and FRI. Three species were primarily responsible for variation in our community composition data: Xerophyllum tenax (Beargrass), Carex geyeri (Elk Sedge), and Vaccinium scoparium (Whortleberry). We are further investigating the demographic response of these species to shortened fire regimes.
	Jeff Kane	15:15	Longevity of prescribed fire effectiveness in mixed-evergreen forests of the Klamath Mountains	Prescribed fire is a common management tool used across the western United States to restore and promote fire resilient ecosystems. While prescribed fire can be an effective treatment to reduce surface fuel loads, the duration of effectiveness is less well understood. Using a chronosequence approach, we surveyed 178 plots across a time-since-prescribed fire continuum from one to ten years. The objectives of this study were to examine: 1) short-term changes in fuel loading and composition, 2) long-term trends and relationships among fuel components and other factors, and 3) the longevity of treatment effectiveness in reducing fuel loading. Fine fuels exhibited notable short-term reductions, ranging from 34% for litter and 74% for fine woody fuels, and returned to pre-fire conditions within 5-8 years. Duff loading declined by 77% within 1-2 years post-fire, with treatments lasting as long as 16 years before returning to pre-fire conditions. Douglas-fir basal area was positively associated with 1-hour and duff fuel loading, with denser canopy cover and lower bole char height also contributing to higher duff loads. Prescribed fire is an effective treatment in reducing surface fuels and fire behavior. However, most fuels recover quickly in mixed-evergreen ecosystems, requiring follow up burning within about seven years to maintain effectiveness. Findings from this study can help inform management decisions to better allocate limited time and resources in addressing fuels reduction and forest restoration in the Klamath Mountains.
	Melissa Lucash	15:30	How will climate change alter the wildfire regime and carbon dynamics in the boreal forests of Alaska?	The rapid pace of changes in the climate and fire regime in northern latitudes has raised concerns about the ability of this region to continue to capture and store carbon. Over the past 60 years, Alaska has warmed ~50% faster than the lower 48 states while precipitation has remained relatively constant. In interior Alaska, annual area burned has increased by 50% over that same period. Given that fire-prone biomes like the boreal forest have little fuel constraints we expect continued warming will likely result in longer fire seasons, increases in ignitions and total area burned, and greater reburn frequency. Using LANDIS-II, a widely-used process model, we simulated wildfire, vegetation growth and regeneration, carbon cycling (DGS), hydrology (SHAW), and permafrost (GIPL 2.0) until 2100 under historic climate and two climate change scenarios across a 8.7 million-hectare landscape in interior Alaska at a 0.2 x 0.2 km (4 ha) resolution.The fire season was longer under both climate change scenarios with the peak in area burned shifting from July to June and greater area burned in April-June and in October. We found that the median number of ignitions was unaffected by warming, but annual area burned, mean and maximum fire size, and the rate of reburning were higher under climate change. Also, this landscape transitioned from a net sink to a net source of carbon around mid-century under climate change. These findings highlight the potential for climate change to significantly alter the wildfire regime and C sequestration in North American boreal forests, with profound implications for positive feedbacks to the climate.

Thursday, March 20

NWL Coastal Field Trip 08:00 - Best Western Hotel Parking Lot

NWSA Field Trip to HJ Andrews and Finn Rock Restoration Site

9:00 - 17:00

Meet at parking lot outside Condon Hall

Bring lunch. Dress for the weather: layers, raincoat, hat, gloves, sturdy shoes/boots. If you are interested in wading, please bring your own chest waders. We will have some waders on hand but no guarantee that they won't leak so bring extra dry clothes if you will borrowing these.

Sign-up link:
https://docs.google.com/forms/d/e/1FAIpQLSepYNY739LiiyK4Fe-sGKyK1O2ORIObPffyeY-lnethernklA/viewform?usp=header