14th Montana Plant Conservation Conference

Plants, Fire, and Conservation

April 14-15, 2026

University Center, University of Montana, Missoula

Fireweed *Chamerion angustifolium*

Illustration by Debbie McNiel

Proceedings

Fourteenth Montana Plant Conservation Conference

April 14-15, 2026

University of Montana, Missoula

The first day of this Plant Conservation Conference will inform attendees on many aspects of wildland and prescribed fire. Missoula is the Northern Rocky Mountains center for the study of fire. This seminar will provide up-to-date information on the history of fire and its effects on forests as well as sagebrush grasslands. Speakers will discuss how fire behavior is changing in a warming climate and how this will affect herbivory and insects, as well as forest management. We will also learn how prescribed fire affects forest ecosystems. The seminar will be followed by a panel on careers in conservation, aimed toward students and early-career professionals. The panel will include conservation and management professionals with diverse backgrounds who will answer students' questions regarding pursuing a career in forest management and conservation. Then in the evening MNPS will present a screening of *The Little Things that Run the World*, a new film on the importance of insects in our ecosystems created by local filmmakers Doug Hawes-Davis and Dru Carr.

The second day is for botanists, biologists, ecologists, and other specialists working for or retired from government agencies, Tribal Nations, NGOs, academia, and private industry. Through presentations and group discussions we'll review the state ranking process for rare plants, some state ranks and rank factors; how ranks inform the Species of Concern listing; and re-evaluate status using examples from other state heritage programs. Participants will provide direction on the MNPS threat rank process. Formats for collecting, submitting, and sharing plant observation data will be outlined, with guidance on their pros/cons, in order to create a better understanding of how to contribute data.

Montana Native Plant Society

The mission of the Montana Native Plant Society is to preserve, conserve, and study the native plants and plant communities of Montana, and to educate the public about the value of our native flora.

Montana Natural Heritage Program

The Mission of the Montana Natural Heritage Program is to be Montana's source for reliable, objective information and expertise to support stewardship of our native species and habitats, emphasizing those of conservation concern.

The University of Montana Division of Biological Sciences

The University of Montana Division of Biological Sciences is committed to fundamental research excellence, to training the next generation of scientists and leaders through innovative graduate and undergraduate programs, and to fostering biological literacy in our communities.

DNRC Conservation Seedling Nursery

The nursery produces native seed from wild-collected material and grows seedlings from wild-collected or source-identified seed. We support restoration and conservation efforts across Montana by providing regionally adapted, ecologically appropriate plant materials.

U.S. Forest Service Fire Sciences Lab

The Mission of the U.S. Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

Plants, Fire, and Conservation

Schedule

Tuesday April 14, University Center Theater

9:30-9:40	Introduction by **Teagan Hayes;** Moderator: **Robert Keane**
9:40-10:10	Learning from Millennia of Fire to Help Navigate Our Fiery Future. **Phillip Higuera** (UM College of Forestry)
10:10-10:40	The influence of burn severity and climate on post-fire regeneration. **Kimberly Davis** (Missoula Fire Sciences Lab)
10:40-11:00	Break
11:00-11:30	Ecological Silviculture and Climate Adaptation in Frequent Fire Ponderosa Pine and Dry Mixed-Conifer Forests **Andrew Larson** (UM College of Forestry)
11:30-12:00	Fire and Bark Beetle Interactions Under Climate Change. **Sharon Hood** (Missoula Fire Sciences Lab)
12:00-12:30	A lumpers viewpoint of prescription fire and managed herbivory. **Matt Reeves** (U.S. Forest Service, Missoula)
12:30-1:30	Lunch
1:30-2:00	Using the Fire Effects Information System to Understand the Effects of Fire on Plants, Animals, and Ecosystems. **Ilana Abrahamson** (Missoula Fire Sciences Lab)
2:00-2:30	Using Fire to Maintain Sagebrush Steppe in Southwest Montana. **Sean Claffey** (The Nature Conservancy)
2:30-3:00	Managing Whitebark Pine Ecosystems in the Face of Climate Change. **Robert Keane** (Fire Sciences Lab, emeritus)
3:00-3:20	Break
3:20-3:50	Vegetation sampling methods for monitoring fire effects. **Duncan Lutes** (Missoula Fire Sciences Lab)
3:50-4:20	Lessons learned from short-interval wildfires (reburns) offer insight to past and future fire regimes in dry conifer forests. **Sean Parks** (Affiliate UM College of Forestry)
4:45-6:00	MNPS will host a **Student-focused Conservation Careers Panel**
6:00-7:00	Dinner on your own
7:00-8:45	Screening of ***The Little Things That Run the World***—a beautiful and thought-provoking film highlighting the role of insects in our ecosystems.

Wednesday April 15, Rooms 330/331 University Center

8:00-8:15	Welcome & botany updates - **Elizabeth Bergstrom**, MNPS and **Andrea Pipp**, MTNHP Botanist
8:15-10:00	Revising vascular plant State Ranks - **Scott Mincemoyer**, former MTNHP Botanist
10:00-10:15	Break
10:15-10:40	Re-evaluating Species of Concern plants, process, and designations (with time for discussion) – **Andrea Pipp**
10:40-12:00	MNPS Threat Rank process - **Andrea Pipp** and **Scott Mincemoyer**
12:00-1:00	Lunch (on your own)
1:00-2:30	Understanding formats for collecting, submitting, & sharing plant observation data – **Andrea Pipp**
2:30-3:00	Final comments, action items, and wrap-up

Abstracts

Learning from Millennia of Fire to Help Navigate Our Fiery Future

Abstract Fire has shaped plant communities across Montana and the West for millennia, and understanding that deep history is foundational for conservation in an increasingly fiery world. Drawing primarily on paleoecological records from lake sediments, this talk highlights three lessons relevant to native plant conservation. First, plant communities have proven remarkably resilient to fire, including high-severity fire, over thousands of years. Fire cannot simply be framed as a disaster to avoid, even in a warming world; it is a critical ecological process integral to the communities we seek to conserve. Second, the past reveals important mechanisms linking climate, fire, humans, and vegetation, and is not a fixed blueprint or restoration target; non-stationarity is the rule, and conservation goals are better framed around sustaining ecological processes than static historical conditions. Third, future climate and fire activity will increasingly exceed the recent historical range of variability in many ecosystems, with direct consequences for fire behavior and post-fire plant community recovery. Montana and the Northern Rockies retain a meaningful window for proactive stewardship, but that window is narrowing, making thoughtful triage and prioritization a conservation imperative. Together, these lessons from paleoecology offer both grounding and guidance for work at the intersection of fire and native plant conservation.

Philip Higuera is a professor of fire ecology in the Department of Ecosystem and Conservation Sciences at the University of Montana. He directs the PaleoEcology and Fire Ecology Lab, funded largely by the National Science Foundation and Joint Fire Science Program; he teaches undergraduate and graduate courses in fire and disturbance ecology.

The Influence of Burn Severity and Climate on Post-fire Regeneration

Abstract Most western U.S. conifer forests are adapted to wildfire, and the tree species present have traits that allow them to persist in fire-prone ecosystems. However, climate change is impacting the ability of forests to recover following wildfire both directly, by creating warmer and drier post-fire conditions, and indirectly, by altering the way that wildfires burn and the subsequent fire effects. In this presentation, I will discuss the main drivers of post-fire conifer regeneration and highlight how the direct and indirect impacts of climate change influence post-fire forest recovery. The findings highlight declining regeneration capacity across the West over the past four decades for common conifer species.

Kimberly Davis is a Research Ecologist with the USDA Forest Service, Rocky Mountain Research Station at the Missoula Fire Sciences Laboratory. Her research focuses on the implications of changing fire regimes and climate for western conifer forest resilience and the implications for forest management. Recent projects include exploring how climate change may impact post-fire conifer forest recovery and assessing the effectiveness of climate-adaptive post-fire reforestation strategies.

Ecological Silviculture and Climate Adaptation in Frequent Fire Ponderosa Pine and Dry Mixed-Conifer Forests

Abstract Ecological silviculture offers a holistic management framework for long-term stewardship and climate adaptation of ponderosa pine and dry mixed-conifer forests in interior western North America. This forest type is increasingly vulnerable to high-severity wildfires and insect outbreaks due to legacies of past harvest and fire exclusion, combined with increasingly hotter and drier climate conditions. Ecologically based silviculture in this forest type seeks to move forests towards an open canopy, multiage, spatial mosaic that emulates the natural forest development cycle

perpetuated by frequent low-severity fires and maintain forests in this condition with multiage treatments. The management system combines mechanical treatments with broadcast burning as much as possible. We summarize how these treatments increase resistance and resilience to drought, wildfire, and bark beetles, and promote regeneration of climate-adapted species. We present practical guidelines for applying ecological silviculture to a range of initial conditions, including (i) dense stands arising from fire suppression and past harvest; (ii) sites recently burned in moderate- and high-severity fires; and (iii) stands developing after fuel reduction or shelterwood treatments that need maintenance. We also describe how this system can be used to adapt moist and cold forests to warmer, drier, and more fire-prone climatic conditions, as well as strategies to direct transitions to new species assemblages or vegetation types. By emulating natural models of forest development and aligning management with disturbance regimes and changing climate, ecological silviculture can increase resilience and adaptive capacity to these stressors while providing for an array of economic, ecological, and social objectives over time.

Andrew J. Larson is Professor in the UM Department of Forest Management and Director of the UM Wilderness Institute. His research emphasizes natural disturbances and development of forest ecosystems, application of ecological science to forest management practices and systems, and stewardship of wilderness and wildlands. He earned degrees in Forest Management (BS) and Ecosystem Analysis (PhD) from the University of Washington
Derek J. Churchill, Forest Resilience Division, Washington Department of Natural Resources, MS 47037, Olympia, WA.

Fire and Bark Beetle Interactions Under Climate Change

Abstract Wildland fire and bark beetle outbreaks are the largest disturbances in western North American. They are both strongly mediated by climate and have the potential to interact in many conifer forests. Fires can affect forest susceptibility to bark beetles and, conversely, bark beetle outbreaks can influence fire behavior. This talk will present research on different fire and bark beetle interactions and their effects on forests, with a focus on western Montana. How these interactions are changing with warming temperatures and drought will also be discussed.

Sharon Hood is a Research Ecologist at the USDA Forest Service, Rocky Mountain Research Station Fire Sciences Lab in Missoula, MT. She studies tree mortality from fire, fire and bark beetle interactions, pine defenses, and treatment effectiveness to improve forest resilience to disturbances and stress. She received a BS in Forestry from Mississippi State University, a MS in Forestry from Virginia Tech, and a PhD in Organismal Biology and Ecology from the University of Montana.

A Lumpers Viewpoint of Prescription Fire and Managed Herbivory

Abstract There are four pending legislations that could impact use of livestock for targeted grazing to influence fuels and or invasive species (fuel is forage and forage is fuel). At the core, we need to able to quantify potential fuel and fire behavior impacts using livestock or it is difficult to prioritize where, when, and how land treatments should be conducted. In the present work, I examine tools available to make sense of the landscape and create a strategic allocation of fuel treatments. Even if we create cost-effective treatment regimes to reduce negative fire outcomes, there can be administrative constraints that influence the ultimate treatment patterns in space and time.

Matt Reeves is a Rangeland Ecologist with the Forest Service in Missoula, and the RPA Rangeland Assessment leader. There he specializes in applying remote sensing and modeling to characterize ecological dynamics of rangelands in a manner relevant to managers. He received his BS in Range Management (1995), MS in Environmental Resources (1999) and his PhD in Remote Sensing and ecological modeling of rangeland and agricultural environments (2004).

Using the Fire Effects Information System to Understand How Plants, Animals, and Ecosystems are Affected by Fire

Abstract The Fire Effects Information System (FEIS, https://research.fs.usda.gov/feis) is a publicly available, searchable website with over 1,400 comprehensive literature syntheses on individual species and ecosystems and their relationships with fire. FEIS currently has three main publication types. "Species Reviews" cover plant and animal species' distribution, biology, and habitats, and how they may be affected by wildland fire and management. "Fire Regime Syntheses" cover specific ecosystems and how wildland fire and other disturbances affect them. They describe fire characteristics such as how large, how often, and how severely fires historically burned in specific ecosystems and how these ecosystems may have changed from historical conditions. "Fire Studies" provide information on fire research projects and include information about conditions before, during, and after fire. This presentation will demonstrate how to use the Fire Effects Information System to find ecological and fire information about local species and ecosystems.

Ilana Abrahamson is a supervisory ecologist at the U.S. Forest Service at the Missoula Fire Sciences Laboratory. Ilana leads a team of ecologists who write syntheses about fire ecology and fire regimes for publication in the Fire Effects Information System. Ilana also leads the FireWorks Educational Program, an educational program about the science of wildland fire, designed for students in grades K-12. It provides students with interactive, hands-on activities to study wildland fire and consists of curricula and trunks of materials.

Using Fire to Maintain Sagebrush Steppe in Southwest Montana

Abstract Southwest Montana has some of the most intact and resilient sagebrush steppes remaining within the west. But it is not immune to the systematic threats that are impacting the entire biome, like conifer expansion or invasive annual grasses. Since 2017, the Montana Sagebrush Partnership has treated over 60,000 acres of conifer expansion to maintain and improve our steppe. The use of fire is a necessary strategy to effectively restore the ecological processes that maintain our sagebrush grasslands. However, it is not appropriate everywhere. The goal will be to share where and why the partnership is applying prescribed fire in sagebrush to maintain diversity within this habitat type.

Sean Claffey works for The Nature Conservancy and is the Conservation Coordinator for the Southwest Montana Sagebrush Partnership based in Dillon, MT. The partnership has made huge strides accelerating the pace and scale of restoration work in the region. Sean now has 18 years of experience managing various restoration projects across public and private lands, including time with the USFS, the BLM, the private sector, and now bridging these efforts through TNC.

Managing Whitebark Pine (*Pinus albicaulis*) Ecosystems in the Face of Climate Change

Abstract: The combined effects of mountain pine beetle (*Dendroctonus ponderosae*) outbreaks and exotic disease white pine blister rust (caused by the pathogen *Cronartium ribicola*) infections has caused a severe decline in high elevation whitebark pine (*Pinus albicaulis*) forests across western North America. Predicted changes in climate may exacerbate this decline by (1) accelerating succession to more shade tolerant conifers, (2) creating environments unsuitable for whitebark pine, (3) increasing the frequency and severity of mountain pine beetle outbreaks, rust, and wildland fire events. In this presentation, we will discuss the ecology of this valuable species, emphasizing its resilience to climate change, to provide a context for restoration. Then, we will explore what it would take to restore the species with the funding available. Using information from the literature and ecosystem modeling, we will present a set of best management practices to restore the iconic whitebark pine forests to the high elevation areas of North America in the face of climate change. The presentation will outline a general guide to be used with the range wide strategy for planning,

designing, implementing, and evaluating fine-scale restoration activities for whitebark pine by public land management agencies by addressing climate change impacts.

Robert E. Keane is an Emeritus Research Ecologist with the USDA Forest Service, Rocky Mountain Research Station at the Missoula Fire Sciences Laboratory and worked there since 1986. He has over 260 peer-reviewed publications, two books, and numerous professional awards on whitebark pine restoration, wildland fuels, fire ecology, and ecological modeling. He serves on the board of two non-profit organizations – Association for Fire Ecology (AFE) and the White-bark Pine Ecosystem Foundation (WPEF).

Vegetation sampling methods for monitoring fire effects

Abstract: Resource managers have the responsibility to complete treatment effects monitoring. The monitoring plan should address clearly articulated management objectives and data should only be collected to address those objectives. This presentation will briefly review monitoring guidance, discuss the sample design and sampling methods for overstory and understory vegetation.

Duncan Lutes is a Fire Ecologist at the U. S. Forest Service, Missoula Fire Sciences Laboratory. He helps manage simulation applications used by resource managers including the First Order Fire Effects Model (FOFEM), SpatialFOFEM and FuelCalc. Duncan led development of FIREMON fire effects monitoring system and he currently helps guide development and maintenance of FFI, which is an interagency application for the entry, storage and analysis of monitoring information.

Mary Manning is the retired regional vegetation ecologist for the Northern Region of the U.S. Forest Service.

Lessons Learned from Short-interval Wildfires (Reburns) Offer Insight to Past and Future Fire Regimes in Dry Conifer Forests

Abstract Most dry conifer forests in Montana and elsewhere historically experienced frequent, low-severity fire. These frequent fires consumed fuel, promoted the establishment and persistence of fire-tolerant tree species, and prevented the establishment of dense, fire-intolerant tree species. As such these frequent fires historically served as a stabilizing mechanism because they perpetuated conditions that promoted low-severity fire and forest persistence. However, many dry conifer forests have experienced 100+ years of fire exclusion resulting from the cessation of Native American burning, industrial livestock grazing that removed fine fuels (e.g. grasses) that carry fire, and the direct suppression of human- and lightning-ignited fires. As a result of this fire exclusion, many contemporary dry conifer forests have substantially departed from their historical conditions. These forests now have substantially more fuel, higher tree density, and a higher prevalence of fire-intolerant tree species. When fire-excluded dry conifer forests are inevitably impacted by wildfire, they often burn at high-severity, and when they burn again (reburn), the impacts are highly inconsistent with their historical counterpart, often resulting in the complete loss of forest. In this presentation, I will discuss how the lessons learned from historical and contemporary short-interval wildfires (reburns) can inform science-based management of dry conifer forests in an era of unprecedented change.

Sean Parks is an affiliate faculty at the University of Montana. He is a research scientist who studies wildfire and global change using ecological data, remote sensing data, machine learning, gridded climate datasets, geospatial models, statistical models, and more. His research focuses on fire-climate relationships, extreme wildfire events, changing fire regimes, drivers and consequences of high-severity fire, and post-fire ecological trajectories. Sean also conducts studies pertaining to changing vegetation patterns under climate change, climate-induced plant and animal range shifts, and species distribution models.