Rocky Mountain Research Station
Missoula Fire Sciences Lab
2019-2020 Seminar Series

2019-20	Title/Presenter Click on the Title to view abstract	
Oct 17	Exploding targets / Mark Finney	View Recording
Oct 24	Teaching wildland fire science: the FireWorks Educational Program / Ilana Abrahamson	View Recording
Oct 31	An overview of Fire Modeling Institute (FMI) / Thomas Dzomba	View Recording
Nov 7	The Quiet 2019 North Rockies Geographical Area Fire Season – An Analysis/Discussion / Mike Richmond & Coleen Haskell	View Recording
Nov 14	URMA/RTMA updates and NWS support to ARAs / Chris Gibson and Ryan Leach	View Recording
Nov 21	Fire Intensity Research / Raquel Feltrin	View Recording
Dec 5	Mapping, Modeling and Connecting fuels, fire behavior and effects at the Sycan Marsh, Oregon / Russ Parsons	View Recording
Dec 12	Using big data to evaluate predictive models of fire-induced tree mortality: what we can learn from 40 datasets, 173,000 trees, and 420 fires occurring over 35 years / Alina Cansler	View Recording
Jan 16	Reintroducing wildland fire in the Wales Creek Wilderness Study Area / Michael Albritton	View Recording
Jan 23	A fast, inexpensive, and comprehensive method for predicting ecological shifts under changing climates for effective land management: bioclimatic modeling of potential vegetation types / Bob Keane & Lisa Holsinger	View Recording
Jan 30	Colonizing Cyberspace: Planting the flag for R&D /Bryce Nordgren	View Recording
Feb 6	What I've been doing with those sticks / Sara McAllister	View Recording

11:00 AM-12:00 PM
The Fire Science Lab , 5775 West U.S. HWY 10, Missoula, MT 59808.

2019-20	Title/Presenter
Feb 13	Lick Creek at 25 – effects of fuel and restoration treatments in a ponderosa pine forest / Sharon Hood (cancelled – reschedule date to be determined)
Feb 20	Engaging Yukon River region tribes in climate change research: A collaborative case study to assess changes in fire regimes / Theresa Hollingsworth View Recording
Mar 5	Chemistry of successful cutting edge management / Tim Benedict View Recording
Mar 26	Fire Planning in Isreal / Jen Hensiek (cancelled – reschedule date to be determined)
April 2	Global Warning: Australia Fire Season 2019-20 Discussion / Mike Richmond/Coleen Haskell (cancelled – reschedule date to be determined)
April 9	Perspectives on thermography in fires / Lloyd Queen (cancelled – reschedule date to be determined)
Apr 16	TBD / Alex and Libby Metcalf (cancelled – reschedule date to be determined)
Apr 23	TBD / Sharon Hood (cancelled – reschedule date to be determined)
Apr 30	TBD / Susan O'Neill (cancelled – reschedule date to be determined)
May 7	Enhancements to FLEXPART-WRF LPDM for Smoke Simulations / Bret Anderson (cancelled – reschedule date to be determined)
May 14	Surface fire as the foundation of ecology in the United States / Brice Hanberry (cancelled – reschedule date to be determined)

Seminar Series

Mark Finney,
USFS, RMRS

Date: October 17, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

FireLab

Seminar Series

Ilana Abrahamson,
USFS, RMRS

Date: October 24, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Teaching wildland fire science: the FireWorks Educational Program

Wildland fire captures the public's attention every summer, but public understanding of fire is limited. This lack of understanding may contribute to poor support of fire management activities, particularly those that use fire for resource benefit. The FireWorks Educational Program uses hands-on activities to increase the public's understanding of wildland fire. Although primarily designed for K-12 students, many of the activities are both suitable and fun for adults. FireWorks teaches students not only about wildland fire science, but also about how fire affects their local ecosystems.

Many FireWorks activities are derived from research produced at the Missoula Fire Sciences Laboratory. They cover the physical science of wildland fire, the wildland fire environment, fire effects on the environment, fire ecology, fire history and succession, and people's relationships with fire. This seminar will introduce the FireWorks program, share its latest developments around the U.S., and showcase some of the exciting activities.

Details about FireWorks curricula and associated hands-on materials are available at: https://www.frames.gov/fireworks/fireworks-home/.

Seminar Series

Thomas Dzomba,
USFS, RMRS

Date: October 31, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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FireLab

Seminar Series

The Quiet 2019 North Rockies Geographical Area Fire Season – An Analysis/Discussion

The 2019 wildfire season in the Northern Rockies Geographical Area was the least active since 2010, in terms of acreage, Preparedness Levels reached, and team deployments.
We will discuss the factors that were responsible, and examine the predictability that long-range outlooks provided at the beginning of the season.
In addition, we will contrast our relatively benign conditions this summer with other areas of the globe

Mike Richmond, Coleen Haskell
USDA USFS

Date: November 7, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Seminar Series

Chris Gibson/Ryan Leach,
NWS

Date: November 14, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

NOAA-NWS Analysis of Record (RTMA/URMA) update and NWS Support to Air Resource Advisors

The National Weather Service (NWS) Real-Time Mesoscale Analysis (RTMA) has been developed to provide a national standard Analysis of Record (AoR) for large scale verification and bias-correction efforts. The RTMA and related Un-Restricted mesoscale Analysis, or URMA has been operational since 2006 with frequent upgrades. The NWS AoR now includes many surface variables, for domains across the U.S., and will be expanded in coming years to a 3-D cube of atmospheric variables at the surface and aloft. The AoR has been a very challenging project, with issues such as steep slopes and extreme variability of weather in complex terrain, ocean/land interface complexity, choosing a quality first guess field, eliminating obviously erroneous observations, and other issues. Of particular note for the fire community, has been the challenge of generating an accurate relative humidity analysis in complex terrain. Changes are planned with coming updates to better analyse atmospheric moisture.

The role of Air Resource Advisors (ARAs) for wildland fire operations has been steadily increasing. As ARA dispatch activity has increased, interaction with local NWS offices has also increased, and familiarity is growing about ARAs, and air quality issues. In the SE CONUS a long history of impactful smoke issues has led to the development of specialized products, such as the Atmospheric Dispersion Index (ADI), or Low Visibility Occurrence Risk Index (LVORI), which the NWS can calculate and provide to the fire community. These efforts have largely focused on roadway safety issues due to reduced visibility, while in the western CONUS, Alaska, etc., the focus has been on health impacts of smoke to populations and communities. The NWS Missoula has led in the development of a more uniform approach to support for ARAs from NWS field offices.

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Seminar Series

Requel Feltrin,
University of Idaho

Date: November 21, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

The fire effects on *Pinus ponderosa* sapling physiology

Longer periods of drought and warmer global temperatures has favored the occurrence of wildfires in forest ecosystems. With predictions of increase in severity and extent of wildfires due to climate change, understanding how fire affects trees and the causes that lead to post-fire tree mortality are urgently needed. Previously, cambium, foliage, and bud damage due to fire have being studied. However, the physiological mechanisms that lead to tree death after a forest fire is not understood. In the last decade, xylem hydraulic failure has been proposed to be the main cause of post-fire tree mortality due to deformation of xylem conduits and increases in vapor pressure deficit (VPD) during forest fires. In this study, two separate experiments were conducted with well-watered *Pinus ponderosa* saplings exposed to fire. Xylem hydraulic conductivity was assessed one day and 21 months after fire exposure to better understand the effects of fire in the short- and long- term. In experiment 1, saplings were divided in two treatments: unburned and burned with a lethal fire intensity of 1.4 MJ m^{-2}. In experiment 2, plants were placed in three treatments: unburned and burned with 0.7 and 1.4 MJ m^{-2}. Native percentage loss of conductivity (nPLC), vulnerability to cavitation, and deformation of xylem tracheid were assessed. nPLC was not affected in either experiment. Plants evaluated one-day post fire did not show any evidence of being more vulnerable to xylem cavitation. However, we found that plants were more vulnerable to cavitation after 21 months. In neither experiment we did observe deformation of the xylem of plants exposed to the fire. We conclude that hydraulic failure was not the main cause of post-fire tree mortality and suggest that other physiological mechanisms such as depletion of carbohydrates could lead to tree mortality. We also did not find any evidence of conduit deformation that has been proposed as the consequence of hydraulic failure and vulnerability to cavitation in post-fire trees. However, saplings exposed to the fire are more vulnerable to cavitation after 21 months, thus we suggest that the irregularity of the newly grown xylem cells closer to the wound caused by the heat can contribute to plants that survive fires being more vulnerable to xylem embolism.

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Seminar Series

Russ Parsons,
USFS RMRS

Date: December 5, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Mapping, Modeling and Connecting fuels, fire behavior and effects at the Sycan Marsh, Oregon

Since 2017, a multidisciplinary fire research campaign incorporating diverse data sources and research themes has been carried out in the context of management prescribed burns at the Nature Conservancy's Sycan Marsh Preserve, located in south central Oregon featuring grasslands, dry ponderosa pine forests and unique wetland habitats. Now in its third year, with over 5,000 acres burned and substantial research data collected, this ongoing collaboration between the Forest Service, the Nature Conservancy, and numerous partners is gaining momentum. The primary objectives of this effort have been to test and develop new methods for fuels mapping and to develop integrated fuels, weather and fire datasets for model evaluation purposes. Data collection has included UAS, fixed wing thermal imagery, field fuels sampling, weather stations, and measurements of different aspects of fire behavior, fire effects and emissions. Model evaluation efforts focus primarily on physics based fire models but datasets should be comparable with other models as well. This presentation will provide an overview of different burns and data collected to date (2017-2019), highlight some of the interesting topics that have arisen so far, and discuss future directions. We hope that other researchers may be interested in joining this project as time goes on.

FireLab

Seminar Series

Alina Cansler,
USFS, RMRS

Date: December 12, 2019
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Using big data to evaluate predictive models of fire-induced tree mortality: what we can learn from 40 datasets, 173,000 trees, and 420 fires occurring over 35 years.

Presented by: C. Alina Cansler
Co-authors: Sharon Hood, J. Morgan Varner, Phillip van Mantgem.

Predictive models of tree mortality and survival are vital for management planning and understanding fire effects in forest communities and landscapes. Post-fire tree mortality has been traditionally modeled as an empirical function of tree defenses (e.g., bark thickness) and fire injury (e.g., crown scorch). We used a post-fire tree mortality dataset built from 40 contributed datasets from across the USA to formally evaluate the accuracy of fire-induced tree mortality models from the First Order Fire Effects Model (FOFEM) software system. The Fire-Induced Tree Mortality (FITM) database includes observations of fire injury and survival or mortality for 160 tree species and >173,000 trees, which were burned in 420 prescribed fires and wildfires occurring from 1981 to 2016. The basic model in FOFEM (FOFEM5) uses bark thickness and percent of the live crown volume (CVS) scorched to predict post-fire mortality, and can be applied to any species for which bark thickness can be calculated. FOFEM also includes 29 species-specific tree mortality models, with unique predictors and coefficients. We assessed accuracy of the FOFEM5 model for 45 tree species and assessed 24 species-specific models for 13 species. The FOFEM5 model consistently over-predicted mortality for angiosperms; 6 of 11 angiosperms had AUCs <0.7. For conifers, FOFEM5 over-predicted mortality for thick-barked species. It also under-predicted mortality at low levels of CVS for conifers with moderate bark thickness. The species-specific models had significantly higher AUCs than the FOFEM5 models for 15 of the 22 models. Approximately 75% of models tested had either excellent or good predictive ability. The models that performed poorly were primarily angiosperms or thin-barked conifers. This suggests that different approaches—such as different model forms, better estimates of bark thickness, and additional predictors—may be warranted for these taxa. Future data collection and research should target the data gaps and poorly performing models identified in this study.

Seminar Series

TBD,

USFS, RMRS

Date: January 9, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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FireLab

Seminar Series

Michael Albritton,

Fuels Specialist, BLM-Missoula

Date: January 16, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Reintroducing wildland fire in the Wales Creek Wilderness Study Area

Wales Creek is a tributary to the Blackfoot River south of Ovando and west of Helmville. The drainage makes up about half of the Wales Creek Wilderness Study Area. The area has not experienced any significant wildland fires that have affected the vegetation due to a full suppression policy since 1929. It is in a mixed and high severity fire regime and has experienced widespread mortality in the lodgepole pine due to mountain pine beetles. It is also occupied by several federally listed species. On September 5th of this year, the BLM ignited a prescribed fire to reintroduce wildland fire to this area. This talk will be a deep dive into the planning for and implementation of this burn. Topics to be covered: fire history, vegetation, mountain pine beetle, NEPA, lynx, grizzly bears, and helitorches.

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Seminar Series

Bob Keane & Lisa Holsinger,
USFS, RMRS

Date: January 23, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

A fast, inexpensive, and comprehensive method for predicting ecological shifts under changing climates for effective land management: bioclimatic modeling of potential vegetation types

Land managers need new tools for accounting for novel futures due to climate change. Species distribution modeling has been used extensively to predict future distributions of individual species under different climates, but the map products are too coarse for operational use and creating the suite of species projections needed for comprehensive land management is impossible due to lack of data and expertise. A new method for predicting ecosystem characteristics, which are germane to land management, into the future is detailed in this paper. Potential Vegetation Types (PVTs) were mapped using conventional statistical modeling techniques (Regression Forests) that use ecosystem process and climate variables as predictors. Then, future projections of climate are used to generate future PVT maps. All the vegetation attributes associated with categories in the PVT classification were then mapped using both the current and future PVT maps, and other ecological characteristics associated with the PVT categories were also mapped. Using this fast, inexpensive, and comprehensive alternative method, future maps of many ecological characteristics commonly used in land management can be easily created using the PVT associations.

Seminar Series

TBD,

USFS, RMRS

Date: January 30, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
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Seminar Series

What I've been doing with those sticks

Sara McAllister,
USFS, RMRS

Date: February 6, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Seminar Series

Lick Creek at 25 – effects of fuel and restoration treatments in a ponderosa pine forest

Sharon Hood,
USFS, RMRS

Date: February 13, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Seminar Series

Theresa Hollingsworth,

Research Ecologist and acting Program Manager for the Ecosystems Processes and Function program PNW Research Station

Date: February 20, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Engaging Yukon River region tribes in climate change research: A collaborative case study to assess changes in fire regimes

Interior Alaska's climate is changing as fast as any place on earth. The effects of climate-related changes include widespread drought, changes in net primary productivity, and shifts in disturbance regime such as permafrost, wildfire and insects/pathogens. Most of Alaska is inaccessible by roads, leaving rural communities reliant on seasonal travel networks on rivers and trails to access traditional hunting, fishing, and gathering areas. These seasonal travel networks are susceptible to shifts in disturbance regimes and can reduce access to the subsistence resources on which rural communities depend. Understanding these changes requires a collaborative effort, using many different forms of data and inference to tell a complete story. I present a case study from Holy Cross and Grayling, Alaska to demonstrate the importance of cross-discipline data integration for a subsistence-based community. Local subsistence users documented GPS coordinates of encountered sites of ecosystem disturbances influencing their access to subsistence areas. These knowledge holders provided the ethnographic, historical and experiential descriptions of the effects of these changes. Then, remote-sensing imagery allows us to look at how these sites change over time. Finally, we returned to collaborate with subsistence users to visit specific sites and quantify the biophysical mechanisms that describe these disturbances. In Holy Cross, we visited areas that recently burned and are undergoing rapid changes in vegetation. We describe the fire regime characteristics such as fire severity, age of site when it burned, pre-fire composition, and post-fire successional trajectory. In Grayling, we visited areas with drying water bodies and associated vegetation change. We describe the current vegetation structure and composition, looked at potential shifts in soil moisture and used repeat imagery to quantify change in water. Our case study exemplifies the power of participatory research, collaboration, and a cross-disciplinary methodology to expand our collective understanding of landscape-level climate-related changes in boreal Alaska. I provide recommendations for collaborative research in other regions to connect communities with agency research efforts. Engaging in co-production of science with tribes is critically important for local planning, adaptation, and mitigation.

Seminar Series

Chemistry of successful cutting edge management

Tim Benedict,

Date: March 5, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

FireLab

Seminar Series

TBD,
Kyra Wolf

Date: March 12, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Seminar Series

TBD,

Date: March 19, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Seminar Series

Fire Planning in Isreal

Jen Hensiek,

Date: March 26, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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FireLab

Seminar Series

Australia Fire Season 2019/20 Discussion

Mike Richmond and Coleen Haskell

Date: April 2, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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FireLab

Seminar Series

Lloyd Queen, University of Montana, College of Forestry

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Date: April 9, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

For more information, please contact missoula_firelab_seminars@fs.fed.us **or visit** www.firelab.org

Perspectives on Thermography in Fire

Since the 1960's wildland fire has had access to a wide variety of thermally capable remote sensors. Throughout the lifecycle of using and discarding alternatives we have seen significant changes and development in platforms—from fixed-wing/rotor wing platforms, to towers, balloons, satellites and Unmanned Aerial Systems. Conversely, revolution in sensor technology has been comparatively rare. This seminar takes a systems-level perspective on the evolutionary nature of thermal infrared remote sensing used to support fire science and management, and considers both the technological and institutional frameworks within which remote sensing has evolved.

Seminar Series

TBD,

Date: April 16, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Seminar Series

TBD,

Date: April 23, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
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Seminar Series

TBD,

Date: April 30, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
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FireLab

Seminar Series

Enhancements to FLEXPART-WRF LPDM for Smoke Simulations

Bret Anderson,

Date: May 7, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
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FireLab

Seminar Series

Brice Hanberry, Research Ecologist, USDA FS

Date: May 14, 2020
Time: 11:00 AM-12:00 PM
Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT 59808.

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Surface fire as the foundation of ecology in the United States

In this seminar, I present surface fires as the foundation of historical ecology in the United States. Historically, frequent surface fires occurred throughout most of the United States, where climate was not too dry to produce continuous fine fuels or too wet for ignition. Surface fires were a unique and important process that removed small trees, allowing growing space for herbaceous vegetation. Surface fires maintained open forests, characterized by simple internal stand structure consisting of a single layer of overstory trees and limited midstory, with a co-existing groundlayer. Most historical forests were open old growth forest ecosystems, not successional and not closed forests. Although grazing and browsing also have the potential to provide understory disturbance, I show that white-tailed deer (*Odocoileus virginianus*) populations at current densities do not appear to reduce tree numbers. Loss of widespread open forests likely results in decreases in associated plants and animals, including species that are considered early successional. Current forests contain greater tree densities, taking growing space from herbaceous plants. Current forests and disturbance regimes represent new normals that differ from historical forests and disturbance regimes. Based on historical ecosystems shaped by fire, I will propose a few alternatives to central tenets of modern ecology, such as limited importance of succession and tree diversity. Although modern ecology may suit the novel ecosystems that exist today, modern ecology has impeded developing the ecology of critical processes and components of historical ecosystems. Understanding historical forests and rangelands provides different perspectives for ecology and management.