Rocky Mountain Research Station and Missoula Fire Sciences Lab

# Announce the 2016-2017 Seminar Series

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FireLab

# Seminar Series

Accessing environmental data through the MesoWest/SynopticLabs APIs


## Joe Young

Host: Natalie Wagenbrenner


**Date: October 13, 2016**
**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

## Chuck McHugh

Host: Colin Hardy

**Date: October 20, 2016**
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## Long-term studies in post-fire Ponderosa Pine Mortality: Twenty years of field study following the Bridger-Knoll Wildfire in Northern Arizona

The Bridger-Knoll Wildfire was started by lightning in June 1996 in Grand Canyon National Park and quickly moved onto the North Kaibab Ranger District burning a total of 53,590 acres. At the time 1996 was a major fire year with numerous large fires burning in Arizona and New Mexico. At this time the 1995 Timber Salvage Rider was still in effect but set to expire in December 1996. As part of the efforts by the Kaibab National Forest to salvage log the fire area a long-term monitoring plan on tree mortality in the fire area was established. The initial plan was that this would last for three-years. However the data from this initial work has been used in multiple studies regarding verification of Ponderosa pine mortality equations, snag longevity, and snag use in this area. During this seminar I will discuss the value of long-term ecological studies such as this, present results specific to the data collected on tree mortality, and discuss other studies that have used the data collected from this work.

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# Seminar Series

## Karen Short

Host: Dave Calkin

**Date: October 27, 2016**
**Time: 11:00 AM-12:00 PM**
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## Rethinking Performance Measurement in US Federal Wildland Fire Management: Putting Initial Attack Success in Its Place

Initial attack (IA) success has long been one of the primary performance measures used by agencies with wildland firefighting responsibility in the United States (US) and elsewhere. The US federal agencies currently state that (1) they credit an IA success when an 'unwanted' wildfire is suppressed before it expands beyond 100 acres of forest or 300 acres of grass or brush, and (2) the US Forest Service and Department of Interior strive to achieve 98 percent and 95 percent initial attack success rates, respectively. Achievement of these levels is often hailed as extraordinary success, but, as we explain here, environmental factors alone (e.g. weather, fuels, terrain) will tend to constrain the majority of wildfires to < 300 acres, regardless of suppression activities. Thus, a size-based IA success metric is a poor proxy for actual firefighting effectiveness. Moreover, none of the agencies' fire-reporting or decision-support systems have ever used the terms 'wanted' or 'unwanted' to classify individual fires, thereby engendering significant ambiguity surrounding perceptions of what effectiveness and success look like. Furthermore, an emphasis on high IA success rates may be counterproductive from long-term ecological and fire-management perspectives. The challenge is to develop alternative performance measures that are less ambiguous and that better align with risk management principles. We discuss risk-based performance measurement from the perspective of linking decisions to actions to outcomes, and offer recommendations for broad-scale, consistent metrics that can be aggregated at meaningful scales. A key insight is the necessity of upstream assessment and planning to both guide and establish an evaluative framework for downstream fire management decisions. Current federal policy recognizes that both fire control and fire use have a place in the fire-management paradigm, but fire use has been limited largely due to entrenched disincentives. Strategic objectives (e.g. protection, restoration, maintenance) set forth in spatial land- and fire-management plans and associated performance measures can provide the context within which the necessary incentive structure can develop.

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# Seminar Series

## Jim Roberts

**Host: Thomas Dzomba**

**Date: November 3, 2016**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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## Nitrogen Chemistry in Wildfire Emissions

Nitrogen compounds can have a large impact on atmospheric chemistry even though they are trace components of wild fire emissions. Oxidized nitrogen compounds are involved in the formation of photochemical ozone and the oxidation of organic compounds. Reduced nitrogen species are involved in the formation of secondary species such as brown carbon, and can have their own unique health effects. Over the years we have developed methods for measuring these compounds in the atmospheric and in wildfire emissions. This talk will discuss some of those methods, results, and implications. In addition, an introduction to the NOAA FIREX project will be given, and some of the current and future efforts associated with this project will be discussed.

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# Seminar Series

Spatiotemporal dynamics of terrestrial ecosystem carbon flux and its influencing factor in US from 2000 to 2014


## Zhihua Liu

**Host: Bob Keane**


**Date: November 10, 2016**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

## Karin Riley

Host: Dave Calkin

**Date: November 17, 2016**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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## Can fuel treatments save money on suppression costs in the future?

**How fire suppression forces respond to an ignition may be determined by a number of factors (including proximity to values at risk and potential to improve habitat), which in essence amount to fire management personnel evaluating the fire's potential to have a net positive or negative effect. When using managed fire, fire managers have not only the opportunity to use fire to restore the landscape, but they may also achieve cost savings in fire suppression. Cost savings may result from less aggressive suppression strategies or from feedbacks over time: where more fires are allowed to burn, the landscape becomes less prone to large fires, through both restoration of forest structure and a mosaic of nonburnable areas. Here, we evaluate the potential for alternative fire suppression policies to simultaneously achieve both a net benefit to the landscape and fire suppression cost savings. The Large Fire Simulator (FSim) was used to simulate burn probabilities, fire behavior, and fire perimeters for the Sierra National Forest, California, USA. Fire costs were estimated using the Spatial Stratified Cost Index. Scenario planning was used to estimate landscape effects of fire policy over a 5-year time frame to address uncertainties in fire location, number, and extent.**

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# Seminar Series

## Crystal Stonesifer

Host: Dave Calkin

**Date: December 1, 2016**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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Missoula, MT 59808.

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## Suppression resource response to fire occurrence: more than a simple problem of supply and demand

Crystal Stonesifer, Dave Calkin, Michael Hand

A frequent prerequisite for meeting fire management objectives is the availability of key suppression resources, prepositioned for timely response. In the United States, multi-jurisdictional fire suppression demand is met by a national-scale pool of suppression resources that come from a variety of jurisdictions and provide a wide range of skills, experience, and associated mobility limitations and logistical needs. Clear dispatch protocols typically allocate resources within local or regional response areas when fire demand is at or below historical average. However, once demand exceeds the regional response capacity, the decision-making processes driving allocation of limited resources are not widely understood and are based largely on mental heuristics, particularly during periods of increased resource scarcity (i.e., elevated Preparedness Levels). Moreover, perceptions among operations personnel regarding the relative value and scarcity of specific resources and the nature of resource substitutions that typically occur, given limited availability, are poorly understood. We designed and implemented an online survey of U.S. Forest Service employees who hold direct or indirect responsibility for ordering suppression resources; our main research objective was to identify the field's perceptions of resource importance, scarcity, and substitutability. Importantly, we asked questions to help distinguish between resources that are high value, scarce, and without substitutes versus ones that are low value, readily available, and highly substitutable. We hypothesized that resource ordering patterns change with elevated resource scarcity and that, because of this, true resource demand and frequent resource associations and substitutions are not reflected in dispatch summary reports. In this seminar, we will present an overview of our survey results, including future research and analysis plans. Additionally, we will relate the discussion back to firefighter risk, exposure, and risk transfer themes. We will pay particular attention to the relationship between ground and aviation resources and, consequently, how our survey results may inform discussions regarding efficient and safe use of aviation in fire suppression.

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# Seminar Series

## Russ Parsons

Host: Colin Hardy

**Date: December 8, 2016**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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## STANDFIRE: a prototype 3-D fuels and fire modeling platform for fuel treatment analysis

Across the country, hundreds of millions of dollars have been spent, and tens of millions of acres of fuels have been treated with the intention of altering fire behavior, either to mitigate threats to firefighters and communities, or to maintain or restore healthy ecosystems. While some case studies have shown positive results, many questions remain about how effective fuel treatments are, how long they remain effective, and under what conditions they will work. Because real world fuel treatments are only actually tested when faced with a fire, modeling plays a key role in evaluating the potential effectiveness of fuel treatments. However, current systems used for this purpose use fairly simple fire modeling approaches that are poorly equipped to address either the natural heterogeneity found in wildland fuel environments or fuel changes that arise as a result of fuel treatments. This lack of detail in how fuels, and their interactions with fire, are represented, significantly limits our ability to robustly assess fuel treatments. Fixing this problem is not easy, as it requires substantial changes in numerous aspects of how we model fuels and fire. It also necessitates a change in perspective, stepping back from the broader landscape view that we commonly consider, and focusing more on the more fundamental question of how fuel changes in a treated stand change fire behavior in that location. With clear understanding of how fuel treatments affect treated stands, we will have a stronger basis for considering the effects of fuel treatments at landscape scales. In this talk, we describe one step towards a better understanding: a prototype research platform for fuel and fire modeling, called STANDFIRE. STANDFIRE extends the capabilities of a stand-scale forest model, FFE-FVS, linking it to dynamic 3D fire models to calculate both fire behavior and effects. This development provides, for the first time, a process by which fuel treatments can be examined in spatially explicit detail, opening the door to many new ways of thinking about fuels, fire and treatments. Although fully functional, STANDFIRE is not envisioned as a finished product, but rather, as the first step in a collaborative path towards a new paradigm in stand scale fuel and fire modeling. Toward that end, STANDFIRE has been built with a modular design that should permit the incorporation of new science knowledge as it becomes available, as well as for the inclusion of STANDFIRE within larger systems.

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# Seminar Series

The 'true' cost of doing business: a review of the economic and ecological impacts of our current fire management system.

## Dave Calkin

Host: Bob Keane

**Date: January 5, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

## Chris Dunn

Host: Dave Calkin

**Date: January 12, 2017**
**Time: 11:00 AM-12:00 PM**
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## Who's to blame? Fire management in mixed-ownership landscapes

Fuels are the only component of the fire triangle that forest and fire managers can alter to change fire behavior. There have been numerous studies examining how fuel reduction treatments and salvage logging alter fire behavior, severity, and its' ecological impacts. However, less attention has been paid to how different forest management objectives may influence fire severity in multi-owner landscapes, despite costly and politically contentious suppression of wildfires that do not acknowledge ownership boundaries. In 2013, the Douglas Complex burned over 20,000 ha of Oregon & California Railroad (O&C) lands in Southwestern Oregon, USA. The O&C lands are a geographic checkerboard of private industrial and federal forest land with fundamentally different management objectives, subsequent forest conditions, and perceived fire risks, providing a unique opportunity to quantify the effects of forest management practices on wildfire severity. We bring together geospatial data, on fire progression, fire weather, topography, pre-fire forest conditions derived from LiDAR, and past management activities to represent the different factors that influence fire behavior. Using ensemble machine learning and spatial autoregressive modelling techniques, we disentangled the relative importance of these factors on fire severity (relative differenced normalized burn ratio, RdNBR) as calculated from Landsat imagery. While daily fire weather strongly influenced fire extent (area burned), ownership was the most important driver of fire severity, with younger and structurally homogeneous stands on private industrial forests displaying higher fire severity compared to older and more structural complex forests on federal lands.

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# Seminar Series

Managing for surface fuel diversity in moist mixed conifer

## Penny Morgan

Host: Bob Keane

**Date: January 19, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Evaluating effectiveness of multi-purpose fuel treatments in western mixed-conifer forests


## Terrie Jain

Host: Bob Keane


**Date: January 26, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Why fire scar formation differs among tree species and why it matters

## Elaine Sutherland

Host: Bob Keane

**Date: February 2, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

Title

## Solomon Dobrowski

Host: Bob Keane

**Date: February 9, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Title

## Erin Law

Host: Thomas Dzomba

**Date: February 16, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Title

## Alan Agar

Host: Mark Finney

**Date: March 2, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

**Risk, resilience, and the fire management system**

## Matt Thompson

Host: Dave Calkin

**Date: February 23, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

A topographically resolved wildfire danger and drought monitoring system for the conterminous United States


## Zack Holden

Host: Matt Jolly


**Date: March 9, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

## Chris Stalling

Host: Bob Keane

**Date: March 16, 2017**
**Time: 11:00 AM-12:00 PM**
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## Surface fuel changes after severe disturbance in Rocky Mountain Ecosystems

It is generally assumed that severe disturbances predispose damaged forests to high fire hazard by creating heavy fuel loading conditions. Of special concern is the perception that surface fuel loadings become high as killed trees deposit foliage and woody material on the ground. These high fuel loadings may result in abnormally severe fires. This study evaluated effects of severe, exogenous disturbance events, namely fire and beetles, on future fuel conditions through biannual field collections. We measured surface fuel deposition and accumulation rates for a number of forest types after severe wildfires, Douglas-fir beetle outbreaks, and mountain pine beetle events to quantitatively describe fuel dynamics for up to 10 years after the disturbance. Fuel deposition was measured from semi-annual collections of fallen biomass sorted into six fuel components (fallen foliage, twigs, branches, large branches, logs, and all other material) from a network of seven, one meter square litter traps established on fifteen sites across the northern Rocky Mountains USA. We also measured fuel loadings of the same six fuel components on each plot every year until the end of the study. Results show that most foliage material fell within the first one to two years after disturbance and surface fuel loadings did not appear to increase substantially at any point in this study. Snags and woody debris larger than 75 mm diameter were found infrequently in the litter traps. There was no increase in fire hazard on the study sites sampled in this study.

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# Seminar Series

## Shawn McKinney

Host: Bob Keane

**Date: March 23, 2017**
**Time: 11:00 AM-12:00 PM**
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## The viability of evolutionary rescue in natural populations

Extinction under environmental change is a race between demography and adaptive evolution. Evolutionary rescue (ER) occurs when genetic adaptation allows a population to recover from near extinction following rapid environmental change, with evidence coming from laboratory experiments and simulation modeling. Is ER feasible in natural populations? We evaluated the effect of community context on the likelihood of ER by examining species interactions across a geographic gradient of stress-induced mortality in whitebark pine, a species experiencing severe population decline. As mortality increased, cone production declined, seed predation increased, and avian seed dispersal declined, reducing the likelihood of resistant types increasing over time; a key component of ER. Evolutionary Rescue is improbable in whitebark pine because the severity of stressors, coupled with higher-level trophic interactions, limits natural selection. Without management intervention it will be difficult to prevent extirpation of high-mortality whitebark pine populations, and possibly other species confronted with novel stressors and complex community interactions.

FireLab

# Seminar Series

From decades to millennia: long-term perspectives on the causes and consequences of wildfire

## Phil Higuera

Host: Bob Keane

**Date: March 30, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Title

## Bret Anderson

Host: Thomas Dzomba

**Date: April 6, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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FireLab

# Seminar Series

Fire history and climate

## Emily Heyerdahl

Host: Colin Hardy

**Date: April 13, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

How will climate change affect fire regimes in the western US?

## Sean Parks

Host: Bob Keane

**Date: April 20, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

Temporal Dynamics of Wildfire Risk Assessments

## Jessica Haas

Host: Dave Calkin

**Date: April 27, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

Fire Ecology 2.0

## Leda Kobziar

Host: Bob Keane

**Date: May 4, 2017**
**Time: 11:00 AM-12:00 PM**
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# Seminar Series

Global and Western US Smoke Chemistry and Impacts: Recent Progress


## Bob Yokelson

Host: Shawn Urbanski


**Date: May 11, 2017**
**Time: 11:00 AM-12:00 PM**
**Where:** The Fire Science Lab
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# Seminar Series

## Van Kane

Host: Bob Keane

**Date: May 18, 2017**
**Time: 11:00 AM-12:00 PM**
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## Predicting Burn Severity Patterns in Yosemite National Park

Software developers at the University of Utah have been partnering since 1997 with the National Weather Service and the fire weather community to collect and distribute environmental station observations throughout North America. Accessing, archiving, and display RAWS data has been a key component of MesoWest software since its inception (mesowest.utah.edu). Wildfire-specific software systems were developed initially as part of the ROMAN software suite and later extended to the Great Lakes (glffc.utah.edu) and most recently Alaska (akff.synopticlabs.org). Common to many web solutions developed over the years, adding capabilities to MesoWest-related software required University of Utah developers to complete code changes often involving modifications throughout the software chain from access, archival, to display. To provide end users with more flexibility to develop software to meet their own needs, the SynopticLabs API has been developed to allow users to request the data of interest to them based on numerous metadata (location, network, etc.) and data parameter (variables, time series, most recent values) options. Current capabilities developed to access fire-weather data will be reviewed including the use of the Canadian Forest Fire Danger Rating System in the Great Lakes and Alaska regions. The data resources available to end users will be summarized and how the API can be used to quickly access them for research and operational applications.

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# Seminar Series

TBD

## Beth Hahn

Host: Bob Keane

**Date: May 25, 2017**
**Time: 11:00 AM-12:00 PM**
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