Rocky Mountain Research Station and Missoula Fire Sciences Lab

2016-2017 Seminar Series

2016-17	Title/Presenter Click on the Title to view abstract	
Oct 13	Accessing environmental data through the MesoWest/SynopticLabs APIs / Joe Young	View Recording
Oct 20	Long-term studies in post-fire Ponderosa Pine Mortality: Twenty years of field study following the Bridger-Knoll Wildfire in Norther Arizona / Chuck McHugh	View Recording
Oct 27	Rethinking Performance Measurement in US Federal Wildland Fire Management: Putting Initial Attack Success in Its Place / Karen Short	View Recording
Nov 3	Nitrogen Chemistry in Wildfire Emissions / Jim Roberts	View Recording
Nov 10	Spatiotemporal dynamics of terrestrial ecosystem carbon flux and its influencing factor in US from 2000 to 2014 / Zhihua Liu	View Recording
Nov 17	Can fuel treatments save money on suppression costs in the future? / Karin Riley	View Recording
Dec 8	STANDFIRE: a prototype 3-D fuels and fire modeling platform for fuel treatment analysis / Russ Parsons	View Recording
Dec 15	Suppression resource response to fire occurrence: more than a simple problem of supply and demand / Crystal Stonesifer	View Recording
Jan 12	Who's to blame? Fire management in mixed-ownership landscapes / Chris Dunn	View Recording
Jan 19	Burn Severity: Where, Why and So What? Penny Morgan	View Recording
Jan 26	Evaluating effectiveness of multi-purpose fuel treatments in western mixed-conifer forests / Terrie Jain	View Recording
Feb 2	Why fire scar formation differs among tree species and why it matters / Elaine Sutherland	View Recording

2016-17	Title/Presenter	
Feb 9	Can plants keep pace with climate change? Climatic connectivity in a warming world. Solomon Dobrowski	View Recording
Feb 23	The viability of evolutionary rescue in natural populations / Shawn McKinney	View Recording
Mar 2	Risk, resilience, and the fire management system / Matt Thompson	View Recording
Mar 9	A topographically resolved wildfire danger and drought monitoring system for the conterminous United States Zack Holden	View Recording
Mar 16	Surface fuel changes after severe disturbance in Rocky Mountain Ecosystems / Chris Stalling	View Recording
Mar 30	From decades to millennia: long-term perspectives on the causes and consequences of wildfire / Phil Higuera	View Recording
Apr 6	Development of a Fully Integrated Meteorological/Fire Behavior/Smoke Modeling Bret Anderson	View Recording
Apr 13	Student Research projects in the Forests of the Flathead Indian Reservation Nick Zeibig-Kichas and Matt Weingart	View Recording
Apr 20	Temporal Dynamics of Wildfire Risk Assessments / Jessica Haas	View Recording
Apr 27	Short- and long-term responses of fire regimes to a changing climate. / Sean Parks	View Recording
May 4	Fire Ecology 2.0 / Leda Kobziar	View Recording
May 11	Global and Western US Smoke Chemistry and Impacts: Recent Progress / Bob Yokelson	View Recording
May 18	Predicting Burn Severity Patterns in Yosemite National Park and the Douglas Complex Fires in Oregon / Van Kane	View Recording

2016-17	Title/Presenter	
May 25	Wilderness stewardship in response to ecosystem change / Beth Hahn	View Recording
June 1	Fire and Lightning from Space: Using the new GOES-16 Satellite for Fire and Total Lightning Detection / Lance VandeBoogart	View Recording
June 8	Rapidly-updating numerical weather prediction for fire weather situational awareness and forecasting: The High-Resolution Rapid Refresh model / Eric James, NOAA Earth System Research Laboratory/Global Systems Division Boulder, Colorado	View Recording

FireLab

Seminar Series

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

Accessing environmental data through the MesoWest/SynopticLabs APIs

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.

FireLab

Seminar Series

Chuck McHugh

Host: Colin Hardy

Date: October 20, 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

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.

FireLab

Seminar Series

Karen Short

Host: Dave Calkin

Date: October 27, 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

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.

FireLab

Seminar Series

Jim Roberts

Host: Thomas Dzomba

Date: November 3, 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

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.

FireLab

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
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

Karin Riley

Host: Dave Calkin

Date: November 17, 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

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.

FireLab

Seminar Series

Crystal Stonesifer

Host: Dave Calkin

Date: December 1, 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

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.

FireLab

Seminar Series

Russ Parsons

Host: Colin Hardy

Date: December 8, 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

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.

FireLab

Seminar Series

Chris Dunn

Host: Dave Calkin

Date: January 12, 2017
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

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.

FireLab

Seminar Series

Penny Morgan

Professor and AFE Certified Senior Fire Ecologist, Dept. of Forest, Rangeland, and Fire Sciences, University of Idaho

Host: Bob Keane

Date: January 19, 2017
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

Burn Severity: Where, Why and So What?

Do large fire "runs" consistently result in high severity fires? What are the trends in proportion burned severely? Do climate, vegetation and topography influence burn severity in the same way that they affect area burned? How do severe fire disturbances influence vegetation response? I draw on recent and ongoing work to address these questions using burn severity inferred from satellite imagery and historical aerial photographs, and with field data on vegetation response. Compared to area burned, burn severity is more influenced by local topography, vegetation and fuels, whether analyzed for four ecoregions in western US, or for 2697 daily areas burned on 42 fires in forests of the US northern Rockies. Proportion burned severely was weakly correlated with area burned in a day. Median proportion burned with high severity was 13% and 49% for daily areas burned less than and more than 108 ha, respectively. Long temporal records are useful. The proportion of area burned with high severity did not increase over the last 133 years in the Selway-Bitterroot Wilderness where more area burned severely early and late compared to the middle 1900s. High severity burns in the early 1900's limited the extent and severity of subsequent fires with implications for management of future large fires. Tree seedling density establishing post fire was nil for the 25% of area burned in 21 large fires that was more than 95 m from surviving trees for warm-dry forests in the US northern Rockies. There is a legacy of past disturbances, though the effects on subsequent tree seedling density of severe fire are more pronounced than severe bark beetle or both. As we learn more about the spatial variability in burn severity, we are understanding broad implications for how fire affects vegetation, and implications for both current and future fire management that hinge on the relative importance of climate and fuels for future high severity fires.

FireLab

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
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

Elaine Sutherland

Host: Bob Keane

Date: February 2, 2017
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

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

FireLab

Seminar Series

Solomon Dobrowski

Host: Bob Keane

Date: February 9, 2017
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

Can plants keep pace with climate change? Climatic connectivity in a warming world

A longstanding question in biogeography is how long-lived plants such as trees kept pace with climate changes of the past. The question is also relevant today as climate change accelerates and habitats become fragmented. To help address this question, scientists have studied two facets of the problem: 1) How fast can plants disperse and 2) How fast are climates being displaced across landscapes? Here I review both facets of the problem. I will focus particularly on new approaches to quantifying the rate of climate change that account for climatic connectivity – the ability of landscapes to promote or hinder species movement in response to a changing climate.

FireLab

Seminar Series

Shawn McKinney

Host: Bob Keane

Date: February 23, 2017
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 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

Matt Thompson

Host: Dave Calkin

Date: March 2, 2017
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

Risk, resilience, and the fire management system

The future of wildland fire management in the US entails increasing complexity, risk, and scrutiny, and it is clear that business-as-usual is unsustainable. New paradigms recognize a need to deemphasize fire exclusion, expand application of prescribed and managed natural fire, and foster resilience and adaptation to fire. Therefore how fires are managed—not just how landscapes are managed and communities respond before and after fires occur—is a key determinant of long-term socioecological resiliency and the ability to “live with fire.” In this presentation I will describe application of systems thinking principles to contemporary wildfire management issues in the U.S. and identify how their adoption could help improve performance of the fire management system. Key research questions include: (1) how can we better understand what characteristics of system structure drive behavior, and how can we redesign this system so that behavior better aligns with intended purpose; (2) how can we measure and improve the appropriate type of resilience of the fire management system; and (3) how can concepts and tools from risk and decision analysis help us get there. Ideally this line of research will yield insights that can lead to meaningful systemic change and improved fire management outcomes.

FireLab

Seminar Series

Zack Holden

Host: Matt Jolly

Date: March 9, 2017
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 topographically resolved wildfire danger and drought monitoring system for the conterminous United States

Patterns of energy and available moisture vary over small distances in mountainous regions and available climate data are too coarse to resolve these terrain-mediated effects. This seminar will broadly focus on efforts to improve the physical template we use to analyze vegetation patterns and post-fire ecological effects, including what we've learned from massive networks of low-cost temperature and humidity sensors distributed across the Pacific Northwest. These intensified weather observations have been used to develop more finely resolved historical temperature, humidity, radiation snow and soil water balance data for the conterminous United States. To assist wildfire and water resource managers, these models are being integrated into Topofire, a drought and wildfire danger monitoring and forecasting system. I will discuss the status of Topofire and present results on the accuracy of the snow and hydrology models developed by our project team.

FireLab

Seminar Series

Chris Stalling

Host: Bob Keane

Date: March 16, 2017
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

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.

FireLab

Seminar Series

Phil Higuera

Host: Bob Keane

Date: March 30, 2017
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

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

Studying the causes and ecosystem consequences of wildfire and shifting fire regimes is challenging, because of the slowly varying (centennial-scale) processes involved. This is particularly true in stand-replacing fire regimes, where mean return intervals exceed 100 years. Advances in paleoecology continue to improve our understanding of the patterns and drivers of wildfire regimes, highlighting the overarching role of climate in shaping fire from decadal to millennial time scales. The inferred mechanisms involve direct links between climate and fuel moisture, and indirect links whereby climate influences fire regimes by altering vegetation and landscape flammability. This presentation highlights these themes by drawing on recent paleoecological studies from Alaskan arctic and boreal ecosystems, and the Rocky Mountains subalpine forests. In parallel to the development of fire history records, paleoecologists are increasingly studying the impacts of forest disturbances on biogeochemical processes. Fire effects on ecosystem pools and fluxes can be inferred across a range of time scales, including short-term impacts and potential feedbacks among disturbance, vegetation change, and key ecosystem properties (e.g., C and N cycling). The second part of the presentation highlights recent and ongoing work investigating the biogeochemical impacts of wildfires and fire-regime variability, utilizing paleoecological proxies in combination with ecosystem modeling. Work from Rocky Mountain subalpine forest highlights the relevance of centennial- and millennial-scale variability in fire activity for understanding modern and constraining future ecosystem C and N stocks. The paleo record further suggests that incorporating this fire-regime variability into ecosystem models is critical for accurately projecting ecosystem impacts of future fire activity.

FireLab

Seminar Series

Bret Anderson

Host: Thomas Dzomba

Date: April 6, 2017
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

Development of a Fully Integrated Meteorological/Fire Behavior/Smoke Modeling

An modeling/science team of the US Forest Service Washington Office, Rocky Mountain Research Station, and Pacific Northwest Research Station is conducting a proof-of-concept study integrating meteorological, fire behavior, fuels, and air quality models to improve the accuracy of smoke model dispersion forecasts. The atmospheric modeling team is testing the coupling the numerical weather model WRF-Fire within the BlueSky framework's fuels and smoke dispersion components to develop a fully integrated meteorological, fire behavior, and air quality modeling system. Due to technical limitations of traditional approaches to smoke modeling, certain assumptions must be made which limit the temporal and spatial representativeness of the evolution of fires and smoke dispersion. With this approach, we hope to provide for improved accuracy in smoke dispersion through meteorological model/fire behavior model interaction, and an improved approach for dynamic characterization of fires on the landscape.

FireLab

Seminar Series

Nick Zeibig-Kichas and Matt Weingart

Date: April 13, 2017
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

Student Research projects in the Forests of the Flathead Indian Reservation

FireLab

Seminar Series

Jessica Haas

Host: Dave Calkin

Date: April 20, 2017
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

Temporal Dynamics of Wildfire Risk Assessments: Assessing tradeoffs and asking the hard questions.

Recent advances in integrating wildfire planning and strategic wildfire response can create more tangible fire outcomes that are better aligned the national cohesive strategy goals of living sustainably with wildfire. By integrating both in-situ and transboundary wildfire risk assessments with potential operations delineations, we can now begin to track the feedbacks between fuels management, wildfire response and wildfire risk. I will demonstrate this integration and feedbacks on different landscapes which experienced various disturbances in the recent past, ranging from urban growth to large scale vegetation disturbances to extended drought. The ability to track wildfire risk across time is essential to understanding the primary drivers of wildfire risk on a given landscape. This information can then be used to aid in predictions of future wildfire risk, and may highlight areas where managers and community planners can mitigate risks before they increase. I will discuss the tradeoffs that are inherent between mitigating current in-situ risk versus mitigating future or transboundary risks. These tradeoffs will provoke the hard questions that society will have to address in order to move towards more resilient, fire adapted landscapes with safe and effective wildfire response.

FireLab

Seminar Series

Sean Parks

Host: Bob Keane

Date: April 27, 2017
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

Short- and long-term responses of fire regimes to a changing climate

Fire regimes will undoubtedly respond to a changing climate. Longer fires seasons and more frequent and extreme drought are expected, likely resulting in increased fire frequency and severity in the near-term. Over longer timeframes, however, climate change will alter species distributions and rates of biomass accumulation (i.e. productivity). Such changes strongly suggest that “more frequent and more severe fire” is a generalization that is unlikely to play out in many regions. For example, ecosystems that historically experienced infrequent, stand-replacing fire (e.g. lodgepole pine forests) may exhibit increased fire frequency but *decreased fire severity* as species establish that are that are more suited to the emerging climate (and the increased fire frequency). Also, some ecosystems that historically experienced frequent surface fires (e.g. dry pine forests near the forest/shrub ecotone) may exhibit a *decrease in fire frequency* due to reduced productivity and the disturbance regimes associated with encroaching shrub communities.

FireLab

Seminar Series

Leda Kobziar

Host: Bob Keane

Date: May 4, 2017
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

Fire Ecology 2.0

FireLab

Seminar Series

Bob Yokelson

Host: Shawn Urbanski

Date: May 11, 2017
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

Global and Western US Smoke Chemistry and Impacts: Recent Progress

FireLab

Seminar Series

Van Kane

Host: Bob Keane

Date: May 18, 2017
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

Predicting Burn Severity Patterns in Yosemite National Park and the Douglas Complex Fires in Oregon

Mountainous topography creates fine-scale environmental mosaics that vary in precipitation, temperature, insolation, and slope position. This mosaic in turn influences fuel accumulation, moisture, and forest structure that in turn influence patterns of burn severity. We studied the effects of varying environmental conditions on burn severity across a largely wilderness area in Yosemite National Park from 1984 to 2013. We were also fortunate to have pre-fire lidar data for a portion of the 2013 Rim fire in Yosemite and for three fires collectively known as the Douglas Complex fires that burned in 2013 in a managed landscape in southwestern Oregon. This allowed us to assess the relative influence of the biophysical pattern and pre-fire forest structure on patterns of burn severity. We also have examined the patterns of forest structures and openings that result from fires in both Yosemite and the Douglas Complex.

FireLab

Seminar Series

Eric James

Host: Bob Keane

Date: May 25, 2017
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

Wilderness stewardship in response to ecosystem change

FireLab

Seminar Series

Lance VandenBoogart, National Weather Service

Host: Bob Keane

Date: June 1, 2017
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

Fire and Lightning from Space: Using the new GOES-16 Satellite for Fire and Total Lightning Detection

GOES-16 is NOAA's latest earth-observing geostationary satellite, launched Nov 19, 2016. The GOES-16 platform hosts many improved earth- and sun-looking instruments, of which the Advanced Baseline Imager (ABI) and the Geostationary Lightning Mapper (GLM) are the primary earth-pointing instruments. Both instruments take current capabilities to the next level, with the ABI producing 60x the data of previous imagers, and the GLM paving the way as the first lightning-sensing instrument flown from geostationary orbit. This presentation gives an overview of this exiting new satellite, highlights many features of these two instruments, and showcases potential applications for those in the fire community.

FireLab

Seminar Series

NOAA Earth System Research Laboratory/Global Systems Division
Boulder, Colorado
Host: Bob Keane

Date: June 8, 2017
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

Rapidly-updating numerical weather prediction for fire weather situational awareness and forecasting: The High-Resolution Rapid Refresh model

The 3-km High-Resolution Rapid Refresh (HRRR) numerical weather prediction model, developed at the NOAA Earth System Research Laboratory and operational since September 2014, is a tool for situational weather awareness and short-range forecasting for a variety of end-user applications, ranging from severe weather prediction to renewable energy generation forecasting. This talk describes the unique design features of the HRRR and its 13-km "parent" (the Rapid Refresh or RAP), including radar reflectivity / lightning / satellite cloud-top cooling rate initialization, a cloud analysis, conventional data assimilation, and model physics within the community-supported WRF-ARW model. We will also describe recent development work focused on improving low-level wind forecasts in complex land and a more accurate representation of the diurnal cycle of low-level winds and overall planetary boundary-layer structure. We will end with a description of a novel capability developed within the HRRR framework, referred to as "HRRR-smoke", wherein satellite-observed wildfires are initialized with parameterized smoke plume rise within the HRRR.

Eric James, Joe Olson, and Jaymes Kenyon
University of Colorado, Cooperative Institute for Research in Environmental Sciences

Curtis Alexander, Stan Benjamin, and Steve Weygandt
NOAA Earth System Research Laboratory / Global Systems Division
Boulder, Colorado