

Rocky Mountain Research Station and Missoula Fire Sciences Lab

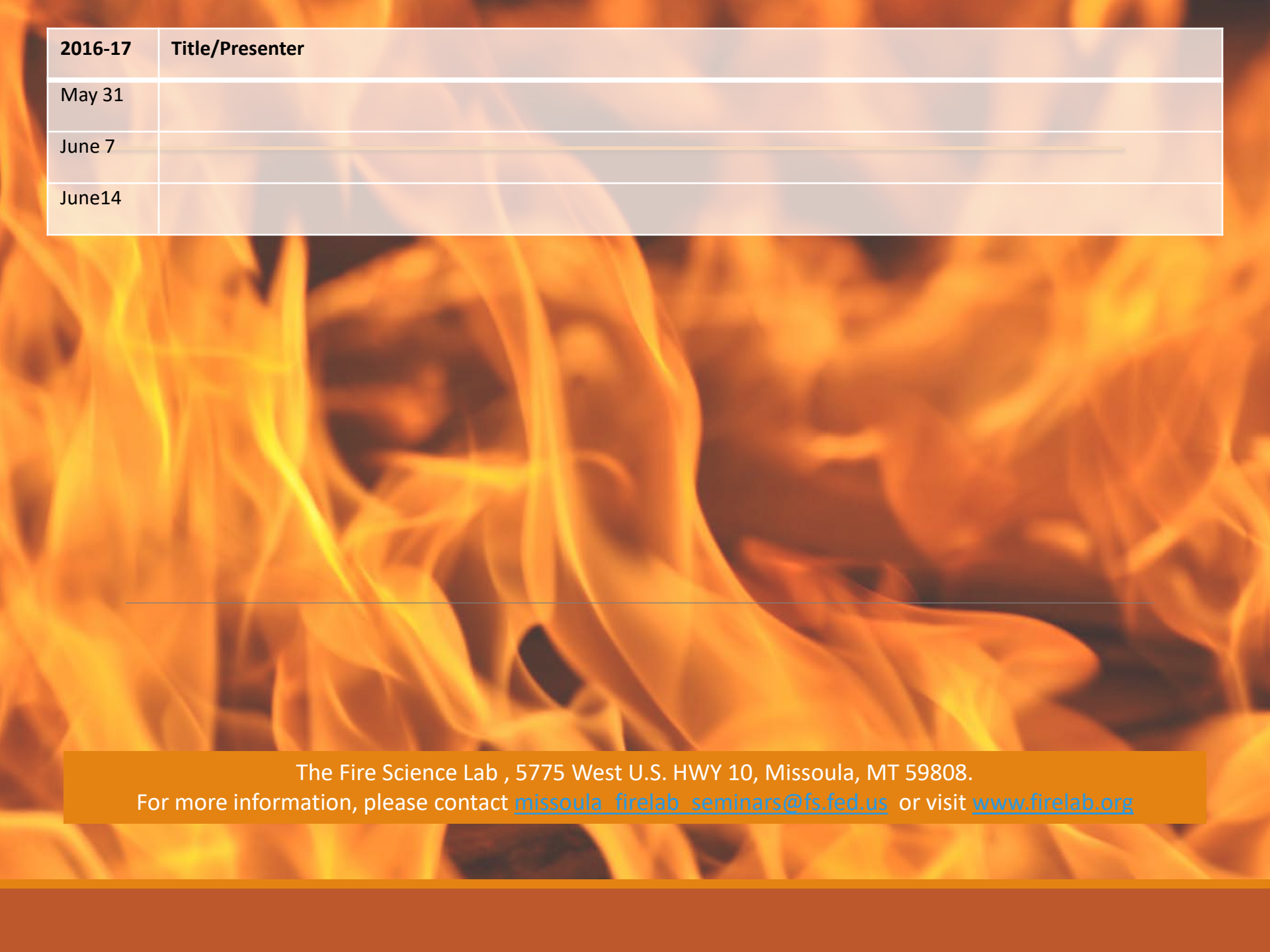
2017-2018 Seminar Series

2017-18	Title/Presenter Click on the Title to view abstract	
Oct 5	An overview of the USFS National Technology and Development Program / Mark Vosburgh	No Recording
Oct 12	High-Resolution Modeling of Environmental Transport Processes in Cities and Complex Terrain / Eric Pardyjak	View Recording
Oct 26	Fire behavior on slopes: flame and plume attachment / Torben Grumstrup	No Recording
Nov 2	How Cattle, Logging, Fire, and Climate Shaped the Mississippi Piney Woods Since ca. 1700 CE / Grant Harley	View Recording
Nov 9	Evaluating the Swiss SNOWPACK modeling system across the Northern Rocky Mountains / Chris Gibson	View Recording
Nov 16	Complex patterns of the Lolo Peak Fire from Carlton Ridge to Bass Creek / Steve Arno	View Recording
Dec 7	The Human Physiological effects of Wildland Fire Management / Joe Domitrovich	No Recording
Dec 14	Vulnerability and resilience of forest landscapes to changing fire regimes and altered post-fire recovery dynamics. / Alan Tepley	View Recording
Jan 11, 2018	Whitebark Pine / Molly Retzlaff and Sarah Flanary	View Recording
Jan 18	Integrating Fire and Forest Planning: A Review of National Forest Plan Revisions / Hailey Graf	View Recording
Jan 25	Changing cryosphere and alpine landscapes in Glacier National Park, MT / Erich Peitzsch	View Recording

11:00 AM-12:00 PM

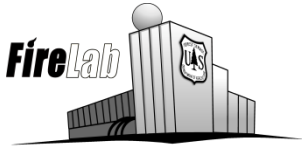
The Fire Science Lab , 5775 West U.S. HWY 10, Missoula, MT 59808.

2017-18	Title/Presenter	
Feb 1	Climatic controls on post-fire conifer regeneration in low-elevation forests of the western U.S. / Kim Taylor	View Recording
Feb 15	The Nature Conservancy: Two decades of forest land conservation in western Montana / Mike Schaedel and Chris Bryant	View Recording
Feb 22	Fire Center research / Lloyd Queen	View Recording
Mar 1	Managing wildland fire in the Chernobyl exclusion zone / Alan Ager	View Recording
Mar 15	The Forest Inventory and Analysis tree-ring data base: applications and opportunities/ Justin DeRose	View Recording
Mar 22	Quantifying Post-fire Recovery of Rangeland Productivity/ Matt Reeves	View Recording
Mar 29	Vegetation, fuel, and potential fire dynamics years after Montana's Fire and Fire Surrogate Study / Justin S. Crotteau	View Recording
Apr 12	Global fire induced tree loss and its biophysical effects on surface temperature / Zhihua Liu	View Recording
Apr 19	A synopsis of Mexican spotted owl research with the Mescalero Apache Tribe / Serra J. Hoagland	View Recording
Apr 26	Virtual Reality Tool Used for Training / Matt Gibson	
May 3	Fire Weather Alert System / Jason Forthofer	
May 10	Disturbance dynamics of severe and widespread bark beetle outbreaks in pine systems at various spatial scales over the past century / Joel Egan	
May 17	Methane emissions from the United States natural gas infrastructure: Field measurements and national emissions modeling results / Anthony Marchese	
May 24	No Seminar, Fire Continuum Conference	



2016-17	Title/Presenter
May 31	
June 7	
June 14	

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Seminar Series

Mark Vosburgh, USFS
**National Technology and
Development Program**
Host: Thomas Dzomba

Date: October 5, 2017

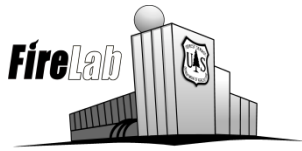
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An overview of the USFS National Technology and Development Program

In May of 2017 the Missoula, Montana and San Dimas, California Technology and Development Centers emerged from a multi year re-organization effort to form the National Technology and Development Program. Our new organization is guided by the following principles. **NTDP Mission:** The Forest Service National Technology and Development Program provides Forest Service employees and partners with practical, science-based solutions to resource management challenges. We evaluate, design, and develop new technologies, products, and systems to solve problems and deliver solutions. **NTDP Vision:** The Forest Service National Technology and Development program is recognized nationally for providing quality products and outstanding customer service. This presentation will provide an introductory overview for those unfamiliar with our organization. This discussion will include a high level overview of current program of work. For who have worked with us in the past, a summary of what is new and what has stayed the same in the reorganization will be provided.



Seminar Series

Eric Pardyjak,
University of Utah

Host: Natalie Wagenbrenner

Date: October 12, 2017

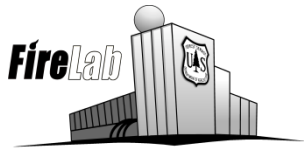
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High-Resolution Modeling of Environmental Transport Processes in Cities and Complex Terrain

Cities are diverse places with heterogeneous landscapes and are home to complex processes occurring over a wide range of length and time scales. Understanding and modeling these processes is critical to improved sustainability related to goals of improving urban microclimate, reducing energy and water usage, increasing clean energy production and mitigating pollution emissions. Due to difficulty in simulating the large disparity in length scales covering these processes, little is known about their impact. In this presentation, a description of our approach, which is designed to bridge these scales and improve our understanding of different processes occurring in urban environments at local (neighborhood), city, and meso-scales will be discussed. In particular, an overview of the fast-response QUIC EnvSim model will be presented along with recent model additions designed to resolve vegetation and mountainous terrain. QUIC EnvSim predicts winds, dispersion, radiation components, air temperatures and humidity at scales of 1-5 meters. A discussion will be presented on how this modeling system can be extended to other applications related to winds and microclimate in complex (e.g., mountainous) terrain such as fires at the wildland urban interface.



Seminar Series

Bryce Nordgren,
Missoula Fire Lab

Host: Thomas Dzomba

Date: October 19, 2017

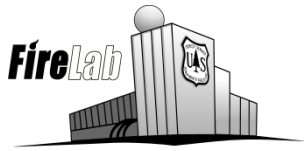
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Enterprise Research Computing at the Firelab

Fire Lab scientists press their computers into service in a variety of ways that government CIO professionals either strive to forbid or scramble to avoid supporting. The practice which causes the most discomfort is R&D's agile collaboration with external cooperators. Official mechanisms for coping with R&D's needs focus on documenting individual exceptions to the "office computer/office software" standard, explicitly treating each request as unrelated from all others. This talk focuses on common requirements which support multiple scientific inquiries, as embodied in our computing environment here at the Firelab. We will cover all three sides of the computing triangle: processing power, bandwidth, and storage. The goal of this talk is to show that although substantive professional IT support for these common R&D needs is not forthcoming, it is not necessary for each end user to separately re-invent all of their infrastructure from scratch, or self-support it indefinitely.



Seminar Series

Torben Grumstrup,
Missoula Fire Lab

Host: Natalie Wagenbrenner

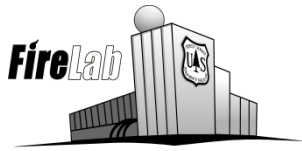
Date: October 26, 2017

Time: 11:00 AM-12:00 PM

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Fire behavior on slopes: flame and plume attachment



Seminar Series

Grant Harley,
University of Idaho

Host: Alina Cansler

Date: Nov. 2, 2017

Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
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How Cattle, Logging, Fire, and Climate Shaped the Mississippi Piney Woods Since ca. 1700 CE

Fire is a common occurrence in the longleaf pine (*Pinus palustris*) forests of the Southeast United States. Prescribed fire is used to manage these threatened ecosystems, but information regarding historical fire activity is unknown. My goals were to determine the historical fire regimes in De Soto National Forest (DSNF), southern Mississippi, and determine the influence of climate and land use history on fire activity at two study sites: Fern Gulley Ridge (FGR) and Death Scar Valley (DSV). The composite mean fire interval during the prescribed burning period (1980–2013) was 3.4 years. During settlements periods, fire intervals at FGR and DSV were as frequent as 1.7 years and 1.9 years, respectively. Hence, the historical fire regime was more frequent than the current schedule of prescribed fire designed to emulate past fire activity. Evidence of biannual burning was found at both sites, indicating up to three fires burned in a 12–15 month period likely caused by land use practices (i.e. logging, cattle herding). A significant ($p < 0.05$) albeit weak association between broad-scale Pacific and Atlantic Ocean oscillations were found, which suggests fire-climate interactions were masked by heavy anthropogenic land use over the past several centuries. Based on fire regime information gleaned in this study, burning the forest at a 2–3 year interval would be the first step towards simulating historical landscape conditions and fire activity.



Seminar Series

Chris Gibson,
NOAA

Host: Natalie Wagenbrenner

Date: Nov. 9, 2017

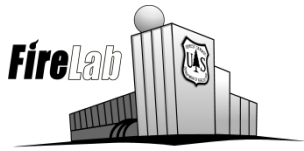
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Evaluating the Swiss SNOWPACK modeling system across the Northern Rocky Mountains

Since late 2015, a one dimensional model of snow pack structure, know as SNOWPACK, has been evaluated by the National Weather Service at Missoula, in collaboration with Montana State University. The model is driven by point-based output from a high-resolution numerical model (WRF-ARW). Hourly forecasts of incoming radiation, temperature, precipitation, etc., drive the SNOWPACK model, which simulates snow accumulation, structure of the snow pack and melting processes. Designed to assist with avalanche hazard evaluation and forecasting, the SNOWPACK model allows the meteorologists within the NWS to evaluate the impact of storm cycles, cold and clear periods, rainfall, etc., on snow pack structure. By simulating the snow pack near remote SNOTEL gauges, accuracy can be somewhat verified with observed snow depth readings, as well as occasional snow pits and avalanche center evaluations. WRF and SNOWPACK simulations and verification will be presented, for points across western Montana, for two winter seasons.



Seminar Series

Steve Arno (Retired),
Missoula Fire Lab

Host: Bob Keane

Date: Nov. 16, 2017

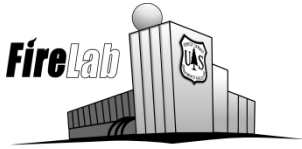
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Complex Patterns of the Lolo Peak Fire from Carlton Ridge to Bass Creek

The recent Lolo Peak Fire and associated burnouts and backburns resulted in both expected and unexpected burn patterns related to differences in forest structure, topography, and weather. It also illustrates the "perfect storm" of stifling constraints the Forest Service faces in attempting to implement ecologically-based management of the West's fire-dependent forests.



Seminar Series

Joe Domitrovich

National Technology &
Development Center

Host: Thomas Dzomba

Date: Dec. 7, 2017

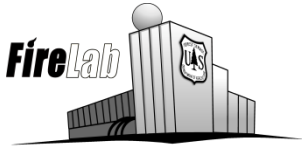
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The Human Physiological effects of Wildland Fire Management

Wildland firefighters expend large quantities of energy, are exposed to extreme environmental conditions, and often alter their dietary patterns while managing fires. Our work at the National Technology and Development Program (NTDP) has been to quantify the physiological demand placed on these wildland firefighters. Our work includes fitness, nutrition, exposure assessment, and PPE. This presentation will give an overview of our findings from our latest studies and direction for the future.



Seminar Series

Alan Tepley
University of Montana

Host: Alina Cansler

Date: Dec. 14, 2017

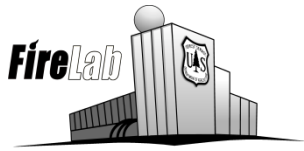
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Vulnerability and resilience of forest landscapes to changing fire regimes and altered post-fire recovery dynamics

As the climate continues to warm, forest landscapes face increasing risk of conversion to non-forest vegetation through alteration of their fire regimes and their post-fire environments. Despite the intuitive relationship between warmer, drier weather and larger, more severe fires, the degree to which climatic warming and other global change pressures transform landscapes may depend on more complex interactions and feedbacks between fire and vegetation. To better understand the factors conferring vulnerability and resilience of forest landscapes to changing fire regimes and altered-post-fire environments, I studied vegetation dynamics following high-severity fire in one landscape that has undergone extensive transformation in response to alterations of its fire regime in the recent past (the loss of *Nothofagus* forests of New Zealand soon after initial human colonization in the 13th century) and another landscape that may face increasing risk of transformation from forest to shrub-dominated ecosystems in the near future as the warming trend continues (mixed-conifer and mixed-evergreen forests of the Klamath Mountains of northern California and southwestern Oregon). Insight from the empirical studies was incorporated into a mathematical model to help generalize understanding of how fire–vegetation feedbacks and the time to forest recovery following high-severity fire interact to affect the extent and stability of forest cover across landscapes facing altered fire regimes and post-fire environments. The model provides testable predictions regarding trajectories and rates of future landscape change, which can help prioritize future empirical work, and the interpretations can be further tested by comparison to more complex simulation models.



Seminar Series

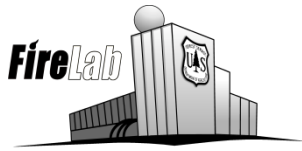
**Molly Retzlaff and
Sarah Flanary,**
Missoula Fire Lab
Host:

Date: Jan. 11, 2017

Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
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Seminar Series

Hailey Graf

Host: Alina Cansler

Date: Jan. 18, 2017

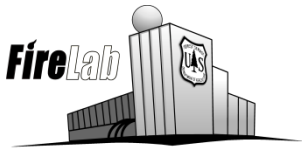
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Integrating Fire and Forest Planning: A Review of National Forest Plan Revisions

Wildland fire is a disturbance process integral to system functioning across many National Forests. Historically, however, fire management in the U.S. focused on suppression efforts that over time lead to changes in the vegetation and fuel characteristics. Only recently have planning regulations in the U.S. Forests Service (USFS) begun to recognize the importance of wildland fire and its relationship to sustaining ecosystems. It is also now recognized that landscape-scale land management efforts must include fire planning and management. Successfully integrating wildland fire management and forest plan revisions could aid managers in landscape-scale planning, project prioritization, and even restoration of fire-adapted ecosystems. However, it is not yet clear how the USFS will approach integrating wildland fire and forest plan revisions, pursuant to recent changes in the planning regulations. To determine how fire and forest planning are being integrated, a policy review, forest plan evaluations, and supplemental interviews were conducted. This research shows that the planning regulations provide the necessary flexibility for all National Forests, despite unique ecological characterizes, to integrate fire and forest planning. However, several challenges revealed by this research include developing adaptable plan components, specific desired conditions, monitoring strategies, and fire-specific area designations. Understanding the approaches used by National Forests can provide learning opportunities for future forest plan revision efforts. Recommendations for overcoming these challenges include the increased use of objectives, the inclusion of option plan content such as goals and management approaches, and a more explicate incorporation of the Cohesive Strategy into plan components.



Seminar Series

Erich Peitzsch,
USGS, West Glacier, MT

Host: Alina Cansler

Date: Jan. 25, 2017

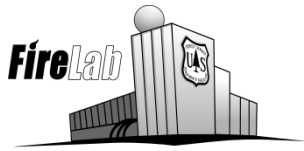
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Changing cryosphere and alpine landscapes in Glacier National Park, MT

Mountain ecosystems in the western U.S. and the Northern Rockies in particular are highly sensitive to climate change. These same ecosystems provide up to 75% of the water humans depend on as well as a host of other ecosystem services such as snow-based recreation, timber, unique flora and fauna, and critical habitat for rare and endangered species such as bull trout and grizzly bear. The USGS Northern Rocky Mountain Science Center has been monitoring, conducting research, and modeling ecosystem responses to climatic variability since 1991, first at Glacier National Park, but eventually throughout the western U.S. and worldwide in collaboration with other scientists. Erich will present a broad overview of their research group's projects, and then provide an in-depth look at two of their current projects: glacier mass balance and avalanche/snowpack mapping using remote sensing capabilities. CCME staff are monitoring many of the park's glaciers to determine the causes of change, assess their ecological and hydrological effects, and predict future changes and effects. Intensive research to determine the mass balance of Sperry Glacier will determine whether small cirque glaciers like Sperry can serve as reliable indicators of current climate variability. Analysis of aerial photography, repeat photography, and glacier margin surveys document the rapid retreat of these mid-latitude glaciers as increasing temperatures influence mountain ecosystems world wide. These data have contributed to regional climate change and hydrologic models. Snowpack characteristics have also been evaluated in relation to avalanche forecasting and plowing of GNP's Going to the Sun Road efforts. Studies of natural snow avalanches reveal connections with large-scale climate patterns as well as the influence on the creation of characteristic habitat vulnerable to climate change.



Seminar Series

Kim Taylor,
University of Montana

Host: Alina Cansler

Date: Feb. 1, 2017

Time: 11:00 AM-12:00 PM

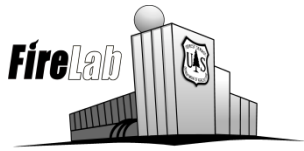
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Climatic controls on post-fire conifer regeneration in low-elevation forests of the western U.S.

An increase in the frequency of large, high-severity wildfires is raising concerns over the possibility of post-fire conifer regeneration failure and subsequent shifts to non-forest states. Conifer seedlings are especially sensitive to climate conditions, and thus climate may play an important role in limiting post-fire conifer regeneration. Here we ask: 1) how do high severity fires alter the microclimate at the ground level where seedlings are recruiting; and 2) how do annual climate conditions affect post-fire conifer recruitment?

We found that forest canopies can dramatically buffer extremes of maximum temperature and vapor pressure deficit (VPD) during the growing season, with biologically meaningful effect sizes. For example, the buffering effect near the ground surface was as high as 16 °C and 5.0 kPa at daily time scales, and, where canopy cover was at least 50%, maximum temperature and VPD were on average 5.3°C and 1.1 kPa lower, respectively, compared to areas without canopy. Therefore, high severity fires that dramatically reduce canopy cover have the potential to significantly alter the microclimate experienced by tree seedlings. Furthermore, we found that annual recruitment density of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) in forests across the western US depended on these same climate variables: maximum temperature at the ground surface and/or average VPD during the growing season were consistently important in explaining recruitment density after accounting for time since fire. Other climate variables related to annual moisture conditions such as climatic water deficit, growing season precipitation, and/or soil moisture were also important in explaining annual recruitment density. The relative importance of different climate variables in explaining recruitment success varied by species and across the Southwest, Colorado, Northern Rockies, and Northern California regions.



Seminar Series

Scott Copeland,
Colorado State University

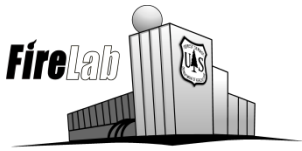
Host: Thomas Dzomba

Date: Feb. 8, 2017

Time: 11:00 AM-12:00 PM

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Seminar Series

**Speakers: Chris Bryant & Mike
Schaedel, Western Montana
Nature Conservancy**

Host: Alina Cansler

Date: Feb. 15, 2017

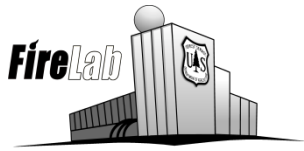
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The Nature Conservancy: Two decades of forest land conservation in western Montana: lessons learned and exciting opportunities for science of applied forest restoration, fire and adaptive management.

Join The Nature Conservancy (TNC) in discussing new and exciting research and forest restoration opportunities across the Blackfoot watershed. Over the last two decades TNC has been involved in conserving over 525,000 acres of former industrial timberlands across western Montana. A majority of these lands have been transferred into public ownership, much of it now managed by the US Forest Service. In the process of finding permanent conservation outcomes we have built a strong network of partners to protect these important landscapes. While we search for permanent conservation ownership outcomes on our current ownership—located primarily in the lower Blackfoot Watershed—we have an opportunity to engage in restoration now and initiate projects that could continue beyond our ownership. With a history of extensive timber harvest and recent large wildfires, this landscape is dominated by dense young forests in need of restoration to invest in their future resilience. We see an opportunity for the scientific community and management practitioners to partner with us and help identify opportunities to set up landscape-scale applied experiments to inform our collective understanding of the interactions of forest dynamics, climate adaptation, fire, and wildlife across the region.



Seminar Series

Lloyd Queen,
University of Montana

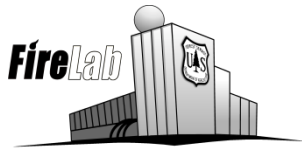
Host: Natalie Wagenbrenner

Date: Feb. 22, 2017

Time: 11:00 AM-12:00 PM

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Seminar Series

Alan Ager,
Missoula Fire Lab

Host: Alina Cansler

Date: March 1, 2017

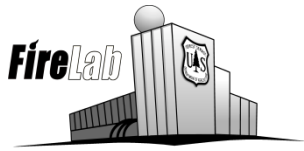
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Managing wildland fire in the Chernobyl exclusion zone

On April 26, 1986, a routine test of reactor #4 at the Chernobyl Nuclear Power Plant led to an explosion and 5-day fire that spewed radioactive debris over an estimated area of 100,000 km² in the surrounding forests and fields in central Europe. About 70% of the radioactive fallout from the reactor fire landed in Belarus, heavily contaminating one-fourth of the country, one-fifth of its agricultural land and affecting at least 7 million people. More than 2,000 towns and villages were evacuated, and about a half-million people were relocated. Health effects include numerous diseases and maladies associated with exposure to radioisotopes deposited by smoke and debris. Two exclusion zones were created around the reactor one in Ukraine (Chernobyl exclusion zone, CEZ 260,000 ha) and the other in Belarus (Polesie State Radiation Ecological Reserve (PSRER, 240,000 ha). Human access is heavily restricted to both CEZ and PSRER. A growing concern with the long term management of the exclusion zones is the potential health effects of wildfires that burn through contaminated areas in and around the zones. The adverse effect of these fires are twofold in that radionuclides are re-suspended and transported in smoke, and firefighters engaged in fire suppression actions are exposed to radionuclides through direct contact and smoke inhalation. Smoke particles that transport radionuclides are potentially damaging to human health themselves because they are small (0.1-0.3 μm in diameter), and inhaled into the lungs. In this work we used fine-scale mechanistic fire modeling to generate wildfire exposure metrics. We overlaid exposure and radionuclide deposition maps to identify areas where wildfires are most likely to occur and result in significant resuspension and transport by wildfire smoke. The results identify hotspots in terms of severe fire behavior and problematic ignition locations. We discuss the socio-ecological aspects of the problem of wildfire-caused emissions of radionuclides Belarus and Ukraine.



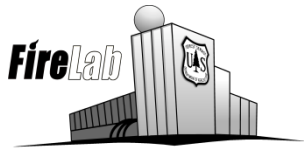
Seminar Series

Date: March 8, 2017

Time: 11:00 AM-12:00 PM

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Seminar Series

Justin DeRose

Forest Inventory and Analysis,
RMRS, USFS, Ogden, UT

Host: Alina Cansler

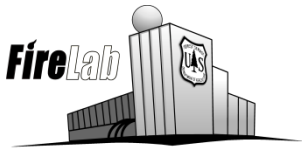
Date: March 15, 2017

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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The Forest Inventory and Analysis tree-ring data
base: applications and opportunities



Seminar Series

Speaker: Matt Reeves

Host: Thomas Dzomba

Date: March 22, 2017

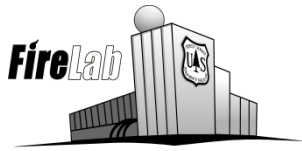
Time: 11:00 AM-12:00 PM

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59808.

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Rangeland Fuelcasting: A Predictive Service for Improving Suppression Readiness

Nationally available maps describing fuel conditions, such as those produced by LANDFIRE, often struggle to remain up-to-date because rangeland vegetation and fuels exhibit high inter-annual variability. In addition, while the predictive services offered by the various GACCs provide copious information and maps regarding fuel moisture, they lack quantitative, objective, spatially explicit information describing fuel quantity. This is a conundrum since, especially in arid and semi-arid rangelands, fire spread is often limited by lack of fuel but can become very significant during years exhibiting relatively high vegetation production. To help this situation, we have developed a system for projecting peak fuel loads, bi-weekly, throughout the growing season, to describe the timing and peak of vegetation (and therefore fuel) production. The machine learning approach processes up to 9 indicators of rangeland production including lag times specific for each vegetation type. The resulting data indicate the estimated date of peak fuel production, estimated total annual production of fuel, and a confidence interval that assists in determining reliability of using the projections to estimate future conditions.



Seminar Series

Justin S. Crotteau,
University of Montana

Host: Alina Cansler

Date: March 29, 2017

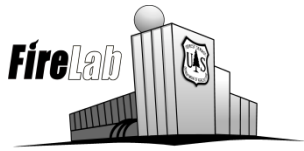
Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT
59808.

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missoula_firelab_seminars@fs.fed.us or
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Vegetation, fuel, and potential fire dynamics years after Montana's Fire and Fire Surrogate Study

Fuel reduction treatments have been widely implemented across the Western U.S. in recent decades for fire protection and restoration purposes. Although research has demonstrated that combined thinning and burning effectively restores early seral communities and reduces crown fire hazard in the few years immediately following treatment, very little research has identified the mid-term effectiveness of restorative thinning and burning treatments. Furthermore, it is also unclear how post-treatment disturbances in treated areas, such as widespread bark beetle outbreak, affect restoration effectiveness. We used an experiment to test the differences in vegetation, fuel load, and crown fire hazard dynamics between fuel reduction treatments (no-action Control, Burn-only, Thin-only, Thin+Burn) that were affected by mountain pine beetle outbreak approximately five years after implementation. Stand vegetation and fuels were measured in 2002 (immediately following fuel treatment), 2004/2005 (only vegetation), and 2016 (14 years after treatments and at least 4 years following beetle outbreak). Univariate analyses demonstrated distinct changes in forest community structure, composition, and diversity over time. Multivariate analyses indicated forest communities were starkly different after treatment but became more similar over time, though key attributes still segregate Control and Thin+Burn treatments. We found that thinned treatments (Thin-only and Thin+Burn) had overall less fuel and lower crown fire hazard than corresponding unthinned treatments. The effects of burning (Burn-only and Thin+Burn) were initially milder than those of thinning, but burning still reduced crown fire hazard over unburned stands 14 years after treatment. Using mediation analysis, we identified that beetle kill inflated differences between Controls and thinned units for surface fuel loads and probability of torching, but diminished differences between these treatments for canopy fuel loads, bulk density, and crowning index. Amid the many changes, the Thin+Burn treatment best retained the early-seral community attributes and low crown fire hazard that the restoration treatments aimed to cultivate.



Seminar Series

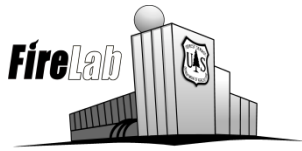
Host:

Date: April 5, 2017

Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT
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Seminar Series

Zhihua Liu

Date: April 12, 2017

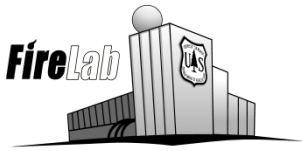
Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT
59808.

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Global fire induced tree loss and its biophysical effects on surface temperature

Although fire is ubiquitous in forest ecosystems, its role in driving forest cover change and climate feedbacks remains unclear at the global scale. Here we present an observation-driven assessment of fire-induced forest cover loss and its biophysical climate feedback. Our results show that fire-induced forest cover accounts for 14.8% of global forest cover loss, mostly in northern high latitudes. Forest fire increases mean annual land surface temperature by 0.153K (0.120-0.186K), with distinct seasonal and latitudinal patterns due primarily to reduced evapotranspiration and to a lesser extent decreased albedo. The positive climate-fire feedback is stronger in colder biomes, and controlled more by fire severity than burned area. Globally, mean forest fire-induced surface warming is equivalent to 62% of warming due to fire-related CO₂ emissions. Our results show that positive climate feedbacks associated with forest loss due to fire may be more enhanced than those associated with forest loss due to human activity because of different biophysical controls, and underscore the necessity of separating human vs natural-disturbance to better understanding the biophysical response of forests to changing climate.



Seminar Series

Serra J. Hoagland,
Missoula Fire Lab

Host: Alina Cansler

Date: April 19, 2017

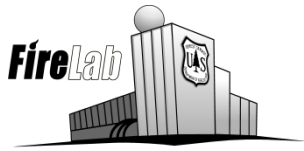
Time: 11:00 AM-12:00 PM

Where: The Fire Science Lab
5775 West U.S. HWY 10, Missoula, MT
59808.

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A synopsis of Mexican spotted owl research with the Mescalero Apache Tribe

In the southwest, large stand-replacing wildfire is the primary threat to forested Mexican spotted owl (*Strix occidentalis lucida*) nesting and roosting habitat. This presentation will summarize Mexican spotted owl habitat on tribal lands, where sustained-yield timber management is practiced outside of owl core habitat. Using novel geospatial analysis with 13 years of remotely sensed MODIS images, we characterized and compared tribal and non-tribal Mexican spotted owl nesting locations in the Sacramento Mountains, New Mexico. Individual MODIS pixels (5.3ha) were clustered into phenoclasses, where each phenoclass shares an annual profile of Normalized Difference Vegetation Index (NDVI) that differs from other phenoclasses. The compositional mix of phenoclasses within a 1-km radius of known owl nest sites differed from the composition of phenoclasses around random points, indicating that owls select nesting sites that provide particular combinations of NDVI profiles. Field surveys showed these phenoclasses are dominated by Douglas-fir and white fir. Owl habitat selectivity was similar on tribal and non-tribal lands, but the phenoclasses available to owls differed between tribal and non-tribal lands in the Sacramento Mountain region. An index of owl occupancy and reproduction for 58 individual owl sites was compared to selectivity using a customized phenoclass dataset; no correlation between reproduction and owl selectivity was found at either Protected Activity or core scale. The customized phenoclasses enabled finer detection and greater interpretation of specific vegetative responses to forest treatments. Both phenoclass analyses showed that owls select evergreen forests with relatively high basal area. Forest treatments near owl sites on tribal lands had no apparent adverse impact on owl reproduction. Small sample sizes may hinder our ability to make significant inferences but this preliminary description can inform managers about the range of habitat conditions that the owl will occupy and provides additional insight into the effects of forest treatments on the owl. Use of MODIS imagery expands our understanding of forest conditions that are suitable for the owl, and can provide a rapid, cost effective habitat technique to assess wildlife habitat over large temporal and spatial scales.



Seminar Series

Matt Gibson

Host: Thomas Dzomba

Date: April 26, 2017

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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visit www.firelab.org

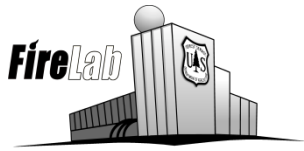
Virtual Reality Tool Used for Training

Prevalence of commercially available Virtual Reality systems and platforms has triggered a serious assessment for use in the training environment. This interactive presentation is intended to demonstrate how Virtual Reality can be used in training to reduce exposure to hazards, communicate concepts in an immersive digital environment and discuss the potential of Virtual Reality in the future.

Public and privately hosted development VR products will be experienced.

Topics covered:

- Tree Sizeup VR (Site public, next generation VR is private for now)
 - <https://sites.google.com/a/firenet.gov/nrtc-vr-tree-sizeup/>
 - Library of 360 photo-spheres to view and perform tree sizeup without the exposure of standing under the hazard. Users can play and compare answers.
 - Plan in place to collect content in 2018 from the field.
 - Working on Gaze/Fuse based cursor to hit target audience on phones
- “Saw Parks” (Public)
 - Test concept of Virtual Reality “interpretive trails/scenes” to immerse student in the language of trees, cutting, hazards, and eventually, the mechanics of felling.
 - 3D Models are used instead of film/photos, and can be animated with sounds without exposing the student to risk
 - 3D content can be embedded in websites, and product managed for delivery via mobile device
 - Basic Language Saw Park
 - <https://sketchfab.com/models/67b931e6f6c44db2bc86a98f937fa17a>
 - Demonstration and proof of concept
 - Crandall Felling Accident Recreation
 - <https://sketchfab.com/models/ab635b200d734fdf8483573bd59e673c>
 - Animated model of a felling accident from 2010
- Pump Setup Simulation (Private)
 - *Incomplete* Demonstration proof of concept to utilize most recognized functionality of VR in one scene.
 - Embedded video, 360 photo/video spheres, Movement in scene, Sound, Object interaction
- Standfire models (Private)
 - Output model of point cloud converted to mesh to open a discussion of the future possibilities.



Seminar Series

Jason Forthofer

Host: Natalie Wagenbrenner

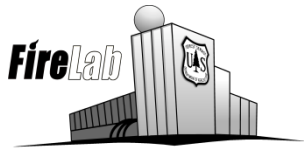
Date: May 3, 2017

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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Fire Weather Alert System



Seminar Series

Joel Egan

Host:

Date: May 10, 2017

Time: 11:00 AM-12:00 PM

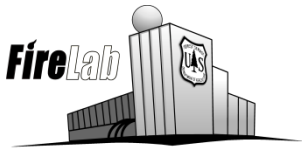
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Disturbance dynamics of severe and widespread bark beetle outbreaks in pine systems at various spatial scales over the past century

Presentation includes discussion on:

- 1) reconstructions of Northern Region mountain pine beetle outbreaks from 1915-2015;
- 2) relative comparisons of pine host resistance;
- 3) meta-analysis of yellow pine resistance to *Dendroctonus* spp.- attack across western U.S.



Seminar Series

Anthony Marchese

Host: Toben Gumstrup

Date: May 17, 2017

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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Methane Emissions from the United States Natural Gas Infrastructure: Field Measurements and National Emissions Modeling Results

To realize immediate net climate benefits from the substitution of coal, diesel or gasoline with natural gas, the rate of methane loss from the entire natural gas supply chain must be less than a few percent. Since the natural gas supply chain consists of a vast network of infrastructure with countless emission sources, quantifying the total methane emissions from the U.S. natural gas supply chain represents a major challenge. In this study, facility-level methane emissions measurements were conducted using a new dual tracer gas technique at 130 natural gas gathering facilities and processing plants in 13 U.S. states. The results from the field campaign were combined with state and national facility databases in a Monte Carlo simulation to estimate methane emissions from U.S. natural gas gathering and processing operations. Total annual methane emissions of 2,421 (+245/-237) Gg were estimated for all U.S. gathering and processing operations, representing a methane loss rate of 0.47% ($\pm 0.05\%$) when normalized by annual methane production. The largest source of methane emissions from gathering and processing operations were attributed to normal operation of gathering facilities (1,697 +189/-185 Gg) and these emissions were eight times that of previous EPA Greenhouse Gas Inventory (GHGI) estimates. The methane emissions from processing plants (506 +55/-52 Gg) were 40% lower than previous GHGI estimates but a factor of three higher than that reported under the EPA Greenhouse Gas Reporting Program (GHGRP). In April 2016, the EPA GHGI was updated based directly on the results of this study, which effectively added over 1500 Gg of annual methane emissions to the inventory. With these updates to the EPA GHGI, gathering operations are now estimated to account for 27% of all methane emissions from natural gas supply chain.