Seminar Series

2015-16	Title/Presenter	
Oct 15	Ponderosa: People, Fire, and the West's most Iconic Tree / Steve Arno	View Recording
Oct 22	Delivering Fire Science Creatively - Alternative Career for an English Teacher / Jane Smith	View Recording
Oct 29	Arctic Deposition of Black Carbon from Biomass Burning in Northern Eurasia from 2002 to 2013 / Wei Min Hao	View Recording
Nov 5	Burning rate of porous fuel beds with and without wind / Sara McAllister	View Recording
Nov 12	Multi-scale analysis of Fire Effects in Alpine Treeline Ecotones / Alina Cansler	View Recording
Nov 19	Fire management in forest landscape planning from the perspective of the economy / Francisco Rodriguez y Silva, visiting Professor from Spain	View Recording
Dec 3	What I learned on my fire assignments that will help me at the fire lab / Fire Assignment Panel: Heinsch, Dillon, McHugh, Hollingsworth, Forthofer, and Bertram	View Recording
Dec 10	Overview of fire regimes, fire history and forest conditions in the boreal forests of northeastern China / Zhiwei Wu, visiting scientist from China	No Recording
Jan 14	Energy transport in Wildland Fire: Implications for Firefighter Safety/ Bret Butler	View Recording
Jan 21	National and Global Fire Danger Rating Systems: Development, Applications and Improvements / Matt Jolly	View Recording
Jan 28	Fuel Particle Heat Exchange / Jack Cohen	View Recording
Feb 4	Seeing the forest for the trees: modified random forests imputation of forest plot data for landscape-level wildfire analyses / Karin Riley	View Recording
Feb 11	Progress in Wilderness Fire Science: Embracing Complexity for the 21st century / Carol Miller	View Recording

Date '16	Title/Presenter	
Feb 18	Korean Forest Service: how they handle wildfire / Forrest Lim	View Recording
Feb 25	The effects of seed source health on whitebark pine (Pinus albicaulis) regeneration density after wildfire/ Signe Leirfallom	View Recording
Mar 3	How do historical fire regimes influence avian distributions in dry coniferous forests? / Vicki Saab	View Recording
Mar 10	Combining dendrochronology and aerial photography to reconstruct spatiotemporal patterns of fire severity in mixed-severity fire regimes of the northern Rockies / Cameron Naficy	View Recording
Mar 17	A research model of flame spread / Jason Forthofer	View Recording
Mar 24	Recent forest research on the Flathead Indian Reservation: It's not just for driving through any more…/ Rick Everett	View Recording
Mar 31	No seminar	
Apr 7	Wildland Fire Science in the U.S. Forest Service: Life in the Washington Office / Matt Rollins	View Recording
Apr 14	No seminar, IAWF Conference	
Apr 21	Exploring fine-grained variability using three-dimensional synthetic fuelbeds / Erik Rowell	View Recording
Apr 28	Vegetation recovery since the 2003 wildfires in western Montana / Andy Hudak	View Recording
May 5	Sustainability and Wildland Fire – The Origins of Wildland Fire Research in the Forest Service / Diane Smith	View Recording
May 12	Representing landscape-scale heterogeneity in plant traits and feedbacks with fire impacts/ Kristen Emmett	View Recording
May 26	Projected impacts of climate change on vegetation and fire in the Huachuca Mountains of Arizona / Kit O'Connor	View Recording
June 2	Resin duct defenses in ponderosa pine after a mountain pine beetle: genetic effects and relationships with growth / Sean Pinnell	View Recording

FireLab

Seminar Series

Steve Arno, Retired
Carl Fiedler, Retired UM professor

Host: Bob Keane

Date: October 15, 2015
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**

Ponderosa: People, Fire, and the West's most Iconic Tree

Carl E. Fiedler and Stephen F. Arno

The West's vast ponderosa pine forest has been home to people for thousands of years. Ponderosas from distant mountains provided timbers for ancient southwestern pueblos, and nomadic Indians often wintered among the pines and peeled their bark for food in spring. Pioneers on horseback marveled as they rode through yesterday's forest of giant pines and grassy glades. Ponderosa timber built Gold Rush–era flumes and sluice boxes, frontier towns, and ties and trestles for the transcontinental railroad.

That forest is mostly gone now. Heavy early logging and successful fire suppression have transformed it into a forest overgrown with small trees, shredded by bark beetles, and ravaged by wildfires. But the new forest is at great risk, and that is the story of this book. Authors Carl E. Fiedler and Stephen F. Arno recount the history of humans among the ponderosa pines, the historical role of fire, how and why the forest has changed, and what people can do to restore the forest to its former glory. Part II of the book features a richly illustrated guide to 64 special ponderosa places scattered across the West.

FireLab

Seminar Series

Jane Smith,

Host: Colin Hardy

Date: October 22, 2015
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**

Delivering Fire Science Creatively - Alternative Career for an English Teacher

What do scientists need to know about getting their science used?
Show how it meets your audience's needs.
Make it appealing to your audience.
Make it easy to find.
Three examples from my career demonstrate these principles:

I recently completed a report on producing syntheses for managers in fire and related natural resources. The report demonstrates how syntheses mine our legacy of fire research to create new knowledge. It highlights common obstacles to making syntheses useful for managers and explores the three principles above in detail.

The Fire Effects Information System (FEIS) has provided syntheses to managers, scientists, students, and the public for nearly 30 years. A new user interface makes FEIS geographically searchable and provides extensive information on historical fire regimes and current changes in fire regimes. More than half a million "visitors" use FEIS in a given year; the majority are from the United States, but they come from more than 100 countries.

The FireWorks program gives educators a curriculum and laboratory materials for teaching about the science of wildland fire. The program appeals to students, since flames, fire-scarred trees, and the Pikunii people's Fire Carrier are hard to resist. Teachers use the program to help students understand chemistry, physics, biology, and modeling, and to improve students' skills in reading, writing, and mathematics. A new adaptation of FireWorks will focus on ecosystems of the northern Sierra Nevada and the history of recent wildfires there.

FireLab

Seminar Series

Arctic Deposition of Black Carbon from Biomass Burning in Northern Eurasia from 2002 to 2013

Wei Min Hao, Supervisory Research Chemist, RMRS Missoula Fire Lab

Host: Mark Finney

Date: October 29, 2015
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

Sara McAllister, RMRS Research Mechanical Engineer

Host: Mark Finney

Date: November 5, 2015
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**

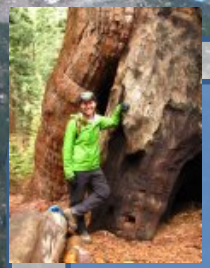
Burning rate of porous fuel beds with and without wind

Sara McAllister, Mark Finney, and Sophia Vernholm

The burning rate of wildland fuel structures, whether the needle layer on the ground or trees and shrubs themselves, is not addressed in any operational fire model and no simple model exists. Wood cribs are often used as ignition sources for room fire tests and the well characterized burning rates may also have applications to wildland fires. Several relations exist in the literature for the burning rate of wood cribs, but the cribs used to generate them were built with fairly limited geometries. This work explores the burning rate of cribs with a wide variety of geometries and aspect ratios to evaluate the rigor of several correlations from the literature. As wildland fuel beds occur both directly on the ground and suspended in the air, the effect of the vertical gap between the ground and crib base was also examined and shown to be larger than previously thought. The effect of wind on the burning rate is also being explored and preliminary results will be presented.

FireLab

Seminar Series



Alina Cansler, University of Washington

Host: Bob Keane

Date: November 12, 2015
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**

Multi-scale analysis of Fire Effects in Alpine Treeline Ecotones

Although direct effects of climate change have been studied though observational and experimental methods in alpine treeline ecotones (ATEs), indirect effects due to shifts in disturbance regimes have received less attention, despite evidence that the frequency and extent of large disturbances are increasing in many other ecosystems. At a regional scale, I analyzed wildfires occurring over a 29-year period (1984-2012) in ATEs in eight mountainous ecoregions of the Pacific Northwest and Northern Rocky Mountains. At a local scale, I examined variability in fire severity and changes in plant structure, using data from >500 plots within four alpine treeline ecotones sites in the Cascade Range and Northern Rocky Mountains, which had burned 18-27 years prior. Non-forested areas were less likely to burn and fire increased the proportion of non-forested area. Greater fire severity decreased the abundance of larger, relative to smaller, overstory trees; the latter suffered greater mortality. Of the four common high-elevation tree species observed in burned plots, Abies lasiocarpa had the highest rates of mortality (60%), *Larix lyallii* had the lowest rate (11%), with intermediate levels in *Pinus albicaulis* (52%) and *Picea engelmannii* (37%).

FireLab

Seminar Series

Dr. Fco. Rodriguez y Silva,
Professor Universidad de Cordoba

Host: Matt Thompson

Date: November 19, 2015
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 management in forest landscape planning from the perspective of the economy.

The presentation includes a review of the latest research and results for the integration of fire management and planning of the forest landscape against forest fires.
It will be presented briefly the fire situation in Spain.

The experiences in monitoring fires in relation to data collection provides extraordinary opportunities for the development of research in econometric modeling. The results help define strategies with better knowledge in fire suppression operations under different scenarios.

The use of "difficulty index of extinction" and "Area contraction factor,", offers good opportunities to study and define the structure and combination of different extinguishing media when previous form has been analyzed the landscape and have been certain different priority levels for the prevention and supressión of potential fires.

The Visual-Seveif, model developed by the Forest Fire Laboratory (LABIF) of University of Cordoba (Spain) is a tool to aid decision making, its usefulness is directed to diagnostic studies of the landscape, as well as the evaluation of economic losses in the market value and non market value natural resources.

Also a brief mention of the recent projects developed by the Forest Fire Laboratory of the University of Cordoba, in collaboration with other partners, will be presented.

FireLab

Seminar Series

Faith Ann Heinsch, Greg Dillon, Chuck McHugh, LaWen Hollingsworth, Jason Forthofer, and Penny Bertram
Host: Colin Hardy

Date: December 3, 2015
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**

What I learned on my fire assignments that will help me at the fire lab

Several Missoula RMRS employees participated in management of wildfires during the summer of 2015. In this seminar, Penny Bertram, Greg Dillon, Jason Forthofer, LaWen Hollingsworth, and Chuck McHugh will each share stories about their varied experiences working on fires. With incident management positions including Public Information Officer, Geographic Information Systems Specialist, Strike Team Leader, and Long Term Fire Behavior Analyst our presenters will address the following topics:
Roles and responsibilities of their primary fire position(s);
Unique skills or perspectives that they bring to incident management coming from R&D;
Value added to their regular jobs or research as a result of working on fire assignments.

FireLab

Seminar Series

Overview of fire regimes, fire history and forest conditions in the boreal forests of northeastern China

Fire is a dominant disturbance in Chinese boreal forest landscapes (Great Xing'an Mountains), which has significantly affected the species composition, structure, and ecological processes of these forests. Historically, fires in this region were primarily ignited by lightning. The fire regimes were characterized by frequent and low intensity surface fires, with a fire return interval ranged from 30 years to 120 years. However, human activities (e.g., fire suppression and timber harvesting) have significantly changed natural fire regimes in this region. For example, fire suppression in this region has been carried out for over a half century, which has lengthened the fire cycle with the fire return interval of longer than 500 years. Currently, fires regimes are characterized by infrequent and more intensity fires and ignited by both human and lightning. In this presentation, I will review: 1) forest conditions across the Chinese boreal forests; 2) spatial-temporal patterns of fire regimes in the region; 3) effects of fire on forest recovery and carbon storage.

Zhiwei Wu,

Host: Bob Keane

Date: December 10, 2015
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

Bret Butler, Research Mechanical Engineer

Host: Mark Finney

Date: January 14, 2015
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**

Energy transport in fires and how it relates to firefighter safety zones

All wildland firefighters are required to identify a location to which they can retreat in the event that fire conditions threaten their safety. These areas termed safety zones. However it was not until the work by Butler and Cohen in 1995 that any quantitative information existed for actually gauging the efficacy of a safety zone. Butler has continued that work with collaboration from others such as Russ Parsons. The most recent work has resulted in the development of a new guideline for safety zone identification. This presentation will outline the fundamental logic behind that work.

FireLab

Seminar Series

Matt Jolly
Ecologist, *RMRS*

Host: Mark Finney

Date: January 21, 2015
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**

National and Global Fire Danger Rating Systems: Development, Applications and Improvements

Wildland fire potential is best described as a combination of available fuels, suitable weather conditions and sources of ignitions and weather is the most spatially and temporally variable of these three components. Weather variables such as temperature, relative humidity, precipitation and wind speed independently influence wildland fire spread rates and intensities, and the alignment of multiple weather extremes, such as the co-occurrence of hot, dry and windy conditions leads to the most severe fires. Many systems have been developed to integrate these critical weather variations into predictions of wildland fire potential. These 'fire danger rating systems' are used worldwide to prepare for and respond to wildland fires. Here we briefly introduce some common fire danger rating systems in use throughout the world and we show how these systems can be used to examine historical changes in wildland fire potential. We detail the development of generalized metrics of fire weather season length and we explore their global spatial and temporal variations. We show how these metrics can account for much of burned area variations recorded across North America and Europe and we show that fire weather seasons are lengthening globally and have increased by nearly 20% from 1979-2013. Most of these fire danger rating systems have remained static for decades despite scientific advances that could lead to major improvements in fire potential assessment. Therefore, we close by introducing the next-generation of the US National Fire Danger Rating System, NFDRS2016, and we detail how these improvements will lead to a more robust and user-friendly system that can improve our ability to plan for and respond to wildland fires and ensure the safety of wildland fire personnel nationwide.

FireLab

Seminar Series

Jack Cohen,
Research Physical Scientist

Host: Mark Finney

Date: January 28, 2015
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

Fuel Particle Heat Exchange

FireLab

Seminar Series

Karin Riley,

Host: Mark Finney

Date: February 4, 2015
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**

Seeing the forest for the trees: modified random forests imputation of forest plot data for landscape-level wildfire analyses

Authors: Karin Riley, Isaac Grenfell, and Mark Finney

Maps of the number, size, and species of trees in forests across the western United States have utility for a number of research endeavors, ranging from estimation of terrestrial carbon resources to tree mortality following wildfires. For example, for landscape fire and forest simulations that use the Forest Vegetation Simulator (FVS), a tree-level dataset, or "tree list", is a necessity. FVS is widely used at the stand level for simulating fire effects on tree mortality, carbon, and biomass, but uses at the landscape level are limited by availability of forest inventory data for large contiguous areas. Detailed mapping of trees for large areas is not feasible with current technologies, but statistical methods for matching forest plot data with biophysical characteristics of the landscape offers a practical means to populate landscapes with a limited set of forest plot inventory data. We used a modified random forests approach with LANDFIRE vegetation and biophysical predictors to impute plot data collected by the U.S. Forest Service's Forest Inventory Analysis (FIA) to the landscape at 30m grid resolution. This method imputes the plot with the best statistical match, according to a "forest" of decision trees, to each pixel of gridded landscape data. LANDFIRE data was used in this project because it is publicly available, offers seamless coverage of variables needed for fire models, and is consistent with other datasets, including burn probabilities and flame length probabilities generated for the continental U.S. We used the imputed inventory data to generate maps of forest cover, forest height, and existing vegetation group at 30-meter resolution for all forested pixels in the western U.S. The results showed good correspondence between the target LANDFIRE data and the imputed plot data, with an overall within-class agreement of 79% for forest cover, 96% for forest height, and 92% for existing vegetation group.

FireLab

Seminar Series

Carol Miller, RMRS

Host: Bob Keane

Date: February 11, 2015
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**

Progress in wilderness fire science: embracing complexity for the 21st century

Wilderness has played an invaluable role in the development of wildland fire science. In the last fifteen years, since the last state-of-knowledge review, tremendous progress has been made in the development of models and data, in understanding the complexity of wildland fire as a landscape process, and in appreciating the social factors that influence the use of wilderness fire. Regardless of all we have learned, though, the reality is that fire remains an extraordinarily complex process with variable effects that create essential heterogeneity in ecosystems. While some may view this variability as a management impediment, for others it provides a path forward. As research has shown, embracing fire in all its complexity and expanding its use can help reduce fuels, restore resilient landscapes, and contain costs. Wilderness fire science will continue to play an important role in understanding opportunities for using fire, its role in ecosystems, risks and benefits, and the influence of risk perception on decision-making.
In this presentation, I will review recent progress in wilderness fire science and then look to the future to chart a direction for fire management and research that capitalizes on the lessons learned from the first fifty years of wilderness fire science.

FireLab

Seminar Series

Korean Forest Service: how they handle wildfire

Wildland fires commonly have been a big challenge all over the w orld. But, it seems like that each country has its own way of deali ng with wildland fires. South Korea, where forestlands are covere d with 65% of total lands, also have developed its own attitudes and policies on wildland fires along with the characteristics of lan dscapes, history and cultures. We will run through these topics to understand what wildland fires of South Korea look like.

Forrest Lim,

Host: Alan Watson

Date: February 18, 2015
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

Signe Leirfallom

Host: Bob Keane

Date: February 25, 2015
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 effects of seed source health on whitebark pine (Pinus albicaulis) regeneration density after wildfire

Whitebark pine (*Pinus albicaulis* Engelm.) populations are declining nearly rangewide from a combination of factors, including mountain pine beetle (*Dendroctonus ponderosae* Hopkins, 1902) outbreaks, the exotic pathogen *Cronartium ribicola* J.C. Fisch. 1872, which causes the disease white pine blister rust, and successional replacement due to historical fire exclusion practices.

With high mortality in cone-bearing whitebark pine, seed production may not be sufficient to support natural regeneration after disturbance such as wildfire. Our objective was to examine the relationship between whitebark pine seed source health and whitebark pine regeneration density in adjacent burns. We sampled regeneration and seed source health in 15 burns within six national forests and three Wilderness Areas in Montana, ranging from 5 to 23 years old. We found a significant, positive relationship between seed source health and seedling density in adjacent burns. Natural regeneration was sparse when the proportion of damaged or dead whitebark pine in the seed source exceeded 50%. Factors that influenced the presence of whitebark pine regeneration within a burn included both vegetation cover and potential solar radiation. Sites closer to seed sources had higher probabilities of seedling occurrence, but seedlings were present throughout most burns. Our results suggest that managers can prioritize restoration plantings of whitebark pine seedlings after wildfire based on the health status of the nearest seed sources.

FireLab

Seminar Series

Vicki Saab, RMRS

Host: Bob Keane

Date: March 3, 2015
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**

How do historical fire regimes influence avian distributions in dry coniferous forests?

Historical fire regimes have influenced vegetation structure, landscape patchiness, and animal distributions in dry coniferous forests of the Interior West. An Understanding how avian species and community responses vary with historical fire regimes is needed to effectively manage dry forests for maintaining biodiversity. We compared avian relationships with fire among 7 dry forest locations across the Interior West. We predicted different avian responses with fire among locations due to regional differences in historical fire regimes. We conducted surveys for occupancy of songbirds and for nests of woodpeckers before and after prescribed fire and up to 12 years following wildfire. We used multispecies hierarchical models to analyze relationships of bird occupancy with burn severity. Consistent with our prediction for mixed-severity fire regimes, we observed proportionately more positive species occupancy relationships and, consequently, a positive species richness relationship with burn severity. We also observed the opposite pattern in low severity fire regimes, which was congruent with our prediction. Cavity nesters and aerial insectivores occupied more severely burned sites following wildfire, corresponding with predicted increases in nesting substrate and foraging opportunities for these species. In contrast, canopy-nesting foliage gleaners and pine-seed consumers exhibited negative relationships with burn severity. Our results were consistent with predictions based on species life histories and with patterns from the literature, suggesting generality of observed relationships and locational differences in relationships with fire. We suggest that optimal management strategies for maintaining avian diversity could differ regionally. Specifically, intensive fuels management may be ecologically less appropriate for promoting biodiversity in the interior Northwest (e.g., Idaho and Washington), where mixed-severity wildfires and dense forest stands were historically more common than the interior Southwest (Arizona and New Mexico).

FireLab

Seminar Series

Combining dendrochronology and aerial photography to reconstruct spatiotemporal patterns of fire severity in mixed-severity fire regimes of the northern Rockies

Cameron Naficy,

Host: Bob Keane

Date: March 10, 2015
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

Jason Forthofer,
Mechanical Engineer RMRS

Host: Mark Finney

Date: March 17, 2015
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 research model of flame spread

Current operational models of fire spread rely on several constraining assumptions that would ideally be relaxed. A promising method to do this is to develop a more physically based model rather than the mostly empirical basis for the current models. This seminar gives a preliminary look at one such model in development at the Missoula Fire Sciences Laboratory. The model is physically based including heat transfer and fuel particle heating, yet is formulated in a computationally efficient way so as to make it operationally feasible. At this point in development, the model shows qualitatively realistic behaviors and insight into the complex coupled system that is fire spread.

FireLab

Seminar Series

Rick Everett,

Host: Emily Heyerdahl

Date: March 24, 2015
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**

Recent forest research on the Flathead Indian Reservation: It's not just for driving through any more...

The Flathead Indian Reservation spreads over 1.3 million acres of western Montana valleys and mountains; over 780000 acres of these lands are managed as forest resources by the Confederated Salish and Kootenai Tribes (CSKT). Tribal Forestry has been, especially since the 1999-2000 Forest Management Plan, and Fire Management Plan, addressing managing the forest reserves as essentially seral clusters, which address both the need to foster ecologically sound forest management, and meet the desire of tribal members to entrain stable, long-term management goals for tribal lands. The establishment and growth of 4-year forestry degree programs at Salish Kootenai College has prompted the development of targeted forest research on tribal lands as one method of research capacity building. Ongoing research projects include cooperative efforts between CSKT, SKC, Montana State University, the United States Geological Survey and the Rocky Mountain Research Station Missoula Fire Sciences Laboratory; these research efforts include reconstructing long-term fire histories in mixed conifer forests, and fire history-climate reconstructions in differing Whitebark Pine fire regimes.

FireLab

Seminar Series

Seminar cancelled

Date: March 31, 2015
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

Wildland Fire Science in the U.S. Forest Service: Life in the Washington Office

Matt Rollins,

Host: Colin Hardy

Date: April 7, 2015
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**

No seminar, IAWF Conference

Date: April 14, 2015
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

Erik Rowell, University of Montana

Host: Bob Keane

Date: April 21, 2015
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**

Exploring fine-grained variability using three-dimensional synthetic fuelbeds

Understanding fine-scale variability in understory fuels is increasingly important as physics-based fire behavior models are driving needs for higher resolution data. Describing fuelbeds three dimensionally is critical in determining vertical and horizontal distributions of fuel elements and the mass, especially in frequently burned pine ecosystems, where fine-scale fuels arrangement drives fire intensity and resulting fire effects. Here we describe research involving the use of highly resolved three-dimensional models. We create synthetic fuelbeds based on field measurements using models of individual grasses, leaves, and pine cones. Fuel elements are distributed throughout the fuelbed using rectified nadir photography taken for each plot. Synthetic fuelbeds are converted into voxel arrays and biomass is estimated from surface areas between mesh vertices within each voxel. Using the estimated occupied volume from the voxel data, bulk density values are calculated. We compare field-based fuel depth metrics with synthetic fuelbed depth metrics and analyze fine-scale spatial heterogeneity of fuel mass. There is potential to use ray trace modelling techniques to produce synthetic laser point clouds to begin describing energy and matter interactions that allow for discretizing terrestrial laser clouds and attribution with biophysical metrics.

FireLab

Seminar Series

Andy Hudak,

Host: Bob Keane

Date: April 28, 2015
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**

Vegetation recovery since the 2003 wildfires in western Montana

Various metrics of vegetation recovery following wildfire are useful measures of ecosystem resilience, yet few studies have quantified vegetation recovery ten or more years post-fire. Conventional wisdom is that recovery time to pre-fire condition will be slower as a function of burn severity but will also vary between forest types. Extensive and severe wildfires in 2003 burned through all western Montana forest types. As part of a rapid response project, we collected field and remotely sensed data immediately post fire, as well as one year later, on the Cooney Ridge, Black Mountain 2, Robert, and Wedge Canyon fires. A decade later, we revisited most field sites to collect repeat measures of vegetation cover and species richness. We also tracked recovery annually using vegetation indices derived from Landsat time series. The LandTrendr approach was applied to reduce Landsat time series indices to measures of the date and magnitude of burn severity as well as the magnitude and duration of vegetation change since disturbance. We found that vegetation ten years later still had not reached pre-fire conditions, but comes closest to doing so in areas of low severity, has farther to go in areas burned at moderate severity, and has farthest to go in high burn severity areas. Thus, the rate of vegetation recovery differs little between severity classes, but the magnitude and duration of vegetation recovery are in proportion to the initial burn severity, which is consistent with a “dose-response” type of relationship. LandTrendr appears to provide a consistent and powerful approach to quantifying disturbance and recovery trajectories over the long term. We conclude that it may be feasible to project recovery rates forward, to predict when sites are expected to be restored to their pre-fire condition, as a function of initial burn severity, topography, climate, and vegetation type.

FireLab

Seminar Series

Sustainability and Wildland Fire – The Origins of Wildland Fire Research in the Forest Service

On June 1, 2015, the Forest Service celebrated the 100th anniversary of the Branch of Research. To commemorate that event, research historian Diane Smith has been writing a monograph on the history of wildland fire research. This presentation focuses on her research and discoveries to date.

Diane Smith,

Host: Colin Hardy

Date: May 5, 2015
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

Kristen Emmett,

Host: Bob Keane

Date: May 12, 2015
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**

Representing landscape-scale heterogeneity in plant traits and feedbacks with fire impacts

Emmett, K. D., Renwick, K. M., Poulter, B.

Effectively modeling landscape-scale heterogeneity and its feedbacks on vegetation and fire dynamics is a persistent and timely challenge in a rapidly changing climate . Towards addressing this challenge, my doctoral research focuses on predicting climate-fire-vegetation interactions under projected climate scenarios for the Greater Yellowstone Ecosystem. In this presentation I will share results from improving representations of species distributions, post-fire regeneration, and mechanistic fire processes in the dynamic vegetation model LPJ-GUESS. These advancements pose to improve model robustness and realism in representing heterogeneity. I will also provide a brief overview of developments in using flexible plant traits in ecological and fire impact modeling and newly available plant trait databases.

Turner, M. G. & Gardner, R. H. *Landscape Ecology in Theory and Practice: Pattern and Process*. (Springer New York, 2015).
Prentice, I. C., Liang, X., Medlyn, B. E. & Wang, Y.-P. Reliable, robust and realistic: the three R's of next-generation land-surface modelling. *Atmospheric Chemistry and Physics* **15,** 5987–6005 (2015).

FireLab

Seminar Series

Sean Pinnell,

Host: Bob Keane

Date: May 19, 2015
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**

Resin duct defenses in ponderosa pine after a mountain pine beetle attack: genetic effects and relationships with growth

Bark beetles are critical natural agents of tree mortality and ecosystem disturbance in coniferous forests. Despite formidable defenses, including resin produced in resin ducts, bark beetles have recently caused extensive outbreaks in western North America. Defenses, however, are costly to produce and trade-offs with growth are predicted. Tree breeding programs aimed at increasing growth rates could therefore have negative consequences on tree defenses. I took advantage of a 40-year-old ponderosa pine genetic trial where a recent mountain pine beetle outbreak killed 36% of trees. I examined phenotypic and genetic variation in resin ducts, their consequences on survival during the outbreak, and potential growth-defense tradeoffs. Trees that survived the outbreak had greater resin duct defenses during, but not before the outbreak. Resin duct numbers, but not size, was under strong genetic control. High mortality families had lower resin duct defenses relative to low mortality families. There was no evidence of a resin duct defense-growth tradeoff. Rather faster growing families had higher resin duct defenses. Yet no differences in mortality between fast and slow growing families were detected, suggesting induced defenses may have offset the positive effect of growth on resin duct defenses. Breeding for fast growth increases resin duct defenses and survival, but other factors appear to ultimately offset this effect during an outbreak.

FireLab

Seminar Series

Kit O'Connor,

Host: Bob Keane

Date: May 26, 2015
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**

Projected impacts of climate change on vegetation and fire in the Huachuca Mountains of Arizona

The American Southwest is expected to experience temperature increases and reductions in winter precipitation over the next several decades. These rapid climatic changes will influence forest species distributions and fire activity; with implications for human safety and sustainability of ecosystems. To assess the influence of projected climate on vegetation and fire dynamics in this sensitive region, we conducted a landscape simulation of the Huachuca Mountains of Southeastern Arizona. We used a regionally downscaled ensemble of three Global Climate Models to drive simulations of vegetation and fire dynamics in the forest process model FireBGCv2. Results suggest a significant reduction in plant biomass and includes the loss of large old pine, Douglas- fir, and aspen forests from much of the upper elevation ecosystem. Smaller diameter Madrean oak woodland and shrubland species are likely to expand into formerly conifer-dominated forests.