

### **Fire enhances the complexity of forest structure in alpine treeline ecotones**

[www.nrfirescience.org/resource/16637](http://www.nrfirescience.org/resource/16637)

Alpine treelines are expected to move upward in a warming climate, but downward in response to increases in wildfire. We studied the effects of fire on vegetation structure and composition across four alpine treeline ecotones extending from *Abies lasiocarpa*/*Picea engelmannii* forests at lower elevations, through *Pinus albicaulis*/...

Author(s): C. Alina Cansler, Donald McKenzie, Charles B. Halpern

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Wildland Fire Smoke Health Effects on Wildland Firefighters and the Public - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/17009](http://www.nrfirescience.org/resource/17009)

Wildland fire smoke is a complex mixture of air contaminants that have the potential cause adverse health effects. Individuals can be exposed occupationally if they work as wildland firefighters or public exposure from ambient air that is contaminated with smoke from a nearby or distant wildland fire.

Previous studies of public...

Author(s): Joe Domitrovich, George Broyles, Roger D. Ottmar, Timothy E. Reinhardt, Luke P. Naeher, Michael T. Kleinman, Kathleen M. Navarro, Christopher E. Mackay, Olorunfemi Adetona

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Phase dynamics of wildland fire smoke emissions and their secondary organic aerosols**

[www.nrfirescience.org/resource/15581](http://www.nrfirescience.org/resource/15581)

Biomass burning is an important source to the atmosphere of carbonaceous particulate matter that impacts air quality, climate, and human health. The semivolatile nature of directly emitted organic particulate matter can result in particle evaporation as smoke plumes dilute. Further, oxidation of emitted and volatilized precursors can...

Author(s): Sonia M. Kreidenweis, Jeffrey R. Pierce

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Comparison of heat transfer and soil impacts of air curtain burner burning and slash pile burning**

[www.nrfirescience.org/resource/16559](http://www.nrfirescience.org/resource/16559)

We measured soil heating and subsequent changes in soil properties between two forest residue disposal methods: slash pile burning (SPB) and air curtain burner (ACB). The ACB consumes fuels more efficiently and safely via blowing air into a burning container. Five burning trials with different fuel sizes were implemented in northern...

Author(s): Woongsoon Jang, Deborah S. Page-Dumroese, Han-Sup Han

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Does the presence of large down wood at the time of a forest fire impact soil recovery?**

[www.nrfirescience.org/resource/15068](http://www.nrfirescience.org/resource/15068)

Fire may remove or create dead wood aboveground, but it is less clear how high severity burning of soils affects belowground microbial communities and soil processes, and for how long. In this study, we

investigated soil fungal and bacterial communities and biogeochemical responses of severely burned “red” soil and less severely...

Author(s): Jane E. Smith, Laurel A. Kluber, Tara N. Jennings, Donaraye McKay, Greg Brenner, Elizabeth W. Sulzman

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Airborne measurements of western U.S. wildfire emissions: Comparison with prescribed burning and air quality implications**

[www.nrfirescience.org/resource/15367](http://www.nrfirescience.org/resource/15367)

Wildfires emit significant amounts of pollutants that degrade air quality. Plumes from three wildfires in the western U.S. were measured from aircraft during the Studies of Emissions and Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC4RS) and the Biomass Burning Observation Project (BBOP), both in...

Author(s): Xiaoxi Liu, L. Gregory Huey, Robert J. Yokelson, Vanessa Selimovic, Isobel J. Simpson, Markus Muller, Jose L. Jimenez, Pedro Campuzano-Jost, Andreas J. Beyersdorf, Donald R. Blake, Zachary Butterfield, Yonghoon Choi, John D. Crouse, Douglas A. Day, Glenn S. Diskin, Manvendra K. Dubey, Edward Fortner, Thomas F. Hanisco, Weiwei Hu, Laura E. King, Lawrence Kleinman, Simone Meinardi, Tomas Mikoviny, Timothy B. Onasch, Brett B. Palm, Jeff Peischl, Ilana B. Pollack, Thomas B. Ryerson, Glen W. Sachse, Arthur J. Sedlacek, John E. Shilling, Stephen Springston, Jason M. St. Clair, David J. Tanner, Alexander P. Teng, Paul O. Wennberg, Armin Wisthaler, Glenn M. Wolfe

Year Published: 2017

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Book or Chapter or Journal Article

### **Surface fuel characteristics, temporal dynamics, and fire behavior of masticated mixed-conifer fuelbeds of the U.S. Southeast and Rocky Mountains**

[www.nrfirescience.org/resource/15582](http://www.nrfirescience.org/resource/15582)

Mastication is a wildland fuel treatment technique that is rapidly becoming popular with fire managers for fire hazard reduction projects, especially in areas where reducing fuels with prescribed fire is particularly challenging. Mastication is the process of mechanically modifying the live and dead surface and canopy biomass by...

Author(s): Robert E. Keane, Pamela G. Sikkink, Theresa B. Jain, James J. Reardon

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Estimating the Effects of Changing Climate on Fires and Consequences for U.S. Air Quality, Using a Set of Global and Regional Climate Models - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/16995](http://www.nrfirescience.org/resource/16995)

Emissions of aerosols and gases from fires have been shown to adversely affect US air quality at local to regional scales as well as downwind regions far away from the source. In addition, smoke from fires negatively affects humans, ecosystems, and climate. Recent observations have shown an upward trend of area burned over western...

Author(s): Jeffrey R. Pierce, Maria Val Martin, Colette L. Heald

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Interacting effects of fire severity, time since fire and topography on vegetation structure after wildfire**

[www.nrfirescience.org/resource/16674](http://www.nrfirescience.org/resource/16674)

Fire is an important disturbance in forest ecosystems globally. Many of the effects of fire on forest processes are mediated through effects on vegetation structure. Understanding how fire properties, fire regimes and environmental variation interact to affect structure is required in the face of predictions of increasing size and...

Author(s): Michelle Bassett, Steven W.J. Leonard, Evelyn K. Chia, Michael F. Clarke, Andrew F. Bennett

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Black carbon on coarse woody debris in once- and twice- burned mixed conifer forest**

[www.nrfirescience.org/resource/16584](http://www.nrfirescience.org/resource/16584)

One important outcome of wildfire is the production of charcoal. Charcoal is highly resistant to decomposition and its physical and chemical properties enhance soil fertility and influence nutrient cycling. We compared the amount of black C (the carbon fraction of charcoal) on coarse woody debris (CWD; >7.6 cm diameter) and total...

Author(s): Aspen Ward, C. Alina Cansler, Andrew J. Larson

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Learn from the burn: The High Park Fire 5 years later**

[www.nrfirescience.org/resource/16520](http://www.nrfirescience.org/resource/16520)

It has been 5 years since the High Park Fire burned over 85,000 acres in Northern Colorado, causing extensive property damage, loss of life, and severe impacts to the water quality of the Poudre River. In the fall of 2016, a conference was organized by the USFS Rocky Mountain Research Station and the Coalition for the Poudre River...

Author(s): Charles C. Rhoades, Peter R. Robichaud, Sandra E. Ryan, Jen Kovecses, Carl Chambers, Sara Rathburn, Jared Heath, Stephanie Kampf, Codie Wilson, Dan Brogan, Brad Piehl, Mary Ellen Miller, John Giordanengo, Erin Berryman, Monique E. Rocca

Year Published: 2017

Type: Document

Research Brief or Fact Sheet

### **Assessment of fire effects based on forest inventory and analysis data and a long-term fire mapping data set**

[www.nrfirescience.org/resource/15534](http://www.nrfirescience.org/resource/15534)

Integration of Forest Inventory and Analysis (FIA) plot data with Monitoring Trends in Burn Severity (MTBS) data can provide new information about fire effects on forests. This integration allowed broad-scale assessment of the cover types burned in large fires, the relationship between prefire stand conditions and fire severity, and...

Author(s): John D. Shaw, Sara Goeking, James Menlove, Charles E. Werstak

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Mixed-severity fire and salvage logging in dry forests of Oregon's western Cascades**

[www.nrfirescience.org/resource/15054](http://www.nrfirescience.org/resource/15054)

Interest in PNW forests is shifting from a focus on old-growth forests alone to include the ecological value and processes of early-seral communities. However, focusing on the alpha and omega states of a linear successional model does not account for the suite of conditions derived from mixed-severity fire common in many forests....

Author(s): Christopher J. Dunn, John D. Bailey

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Technical Report or White Paper

### **Relating fire-caused change in forest structure to remotely sensed estimates of fire severity**

[www.nrfirescience.org/resource/14891](http://www.nrfirescience.org/resource/14891)

Fire severity maps are an important tool for understanding fire effects on a landscape. The relative differenced normalized burn ratio (RdNBR) is a commonly used severity index in California forests, and is typically divided into four categories: unchanged, low, moderate, and high. RdNBR is often calculated twice—from images...

Author(s): Jamie M. Lydersen, Brandon M. Collins, Jay D. Miller, Danny L. Fry, Scott L. Stephens

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Fire and drought**

[www.nrfirescience.org/resource/14525](http://www.nrfirescience.org/resource/14525)

Historical and presettlement relationships between drought and wildfire have been well documented in much of North America, with forest fire occurrence and area burned clearly increasing in response to drought. Drought interacts with other controls (forest productivity, topography, and fire weather) to affect fire intensity and...

Author(s): Jeremy S. Littell, David L. Peterson, Karen L. Riley, Yongqiang Liu, Charles H. Luce

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Area burned in alpine treeline ecotones reflects region-wide trends**

[www.nrfirescience.org/resource/14828](http://www.nrfirescience.org/resource/14828)

The direct effects of climate change on alpine treeline ecotones – the transition zones between subalpine forest and non-forested alpine vegetation – have been studied extensively, but climate-induced changes in disturbance regimes have received less attention. To determine if recent increases in area burned extend to these...

Author(s): C. Alina Cansler, Donald McKenzie, Charles B. Hansler

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Drivers and trends in landscape patterns of stand-replacing fire in forests of the US Northern Rocky Mountains (1984-2010)**

[www.nrfirescience.org/resource/14513](http://www.nrfirescience.org/resource/14513)

Resilience in fire-prone forests is strongly affected by landscape burn-severity patterns, in part by governing propagule availability around stand-replacing patches in which all or most vegetation is killed. However, little is known about drivers of landscape patterns of stand-replacing fire, or whether...

Author(s): Brian J. Harvey, Daniel C. Donato, Monica G. Turner

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

**Critical assessment of wildland fire emissions inventories: methodology, uncertainty, effectiveness - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/15585](http://www.nrfirescience.org/resource/15585)

The project addressed the following tasks: 1) Review and summarize the technical details of major FEIS. 2) Quantify the uncertainty of the components of burned area, fuel loading, and emission factors of each FEIS. 3) Quantify the uncertainty of emissions estimated by each FEIS at scales relevant to modeling ozone, PM2.5 NAAQS, and...

Author(s): Wei Min Hao, Shawn P. Urbanski, Helen T. Naughton

Year Published: 2016

Type: Document

Technical Report or White Paper

**Toward a more ecologically informed view of severe forest fires**

[www.nrfirescience.org/resource/14023](http://www.nrfirescience.org/resource/14023)

We use the historical presence of high-severity fire patches in mixed-conifer forests of the western United States to make several points that we hope will encourage development of a more ecologically informed view of severe wildland fire effects. First, many plant and animal species use, and have sometimes evolved to depend on,...

Author(s): Richard L. Hutto, Robert E. Keane, Rosemary L. Sherriff, Christopher T. Rota, Lisa A. Eby, Victoria A. Saab

Year Published: 2016

Type: Document

Book or Chapter or Journal Article, Synthesis

**Prior wildfires influence burn severity of subsequent large fires**

[www.nrfirescience.org/resource/14814](http://www.nrfirescience.org/resource/14814)

With longer and more severe fire seasons predicted, the incidence and extent of fires are expected to increase in western North America. As more area is burned, past wildfires may influence the spread and burn severity of subsequent fires, with implications for ecosystem resilience and fire management. We examined how previous burn...

Author(s): Camille Stevens-Rumann, Susan J. Prichard, Eva K. Strand, Penelope Morgan

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

**Avian relationships with wildfire at two dry forest locations with different historical fire regimes**

[www.nrfirescience.org/resource/14479](http://www.nrfirescience.org/resource/14479)

Wildfire is a key factor influencing bird community composition in western North American forests. We need to understand species and community responses to wildfire and how responses vary regionally to effectively manage dry conifer forests for maintaining biodiversity. We compared avian relationships with wildfire burn severity...

Author(s): Quresh Latif, Jamie Sanderlin, Victoria A. Saab, William M. Block, Jonathan G. Dudley

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

**Towards a new paradigm in fire severity research using dose-response experiments**

[www.nrfirescience.org/resource/13917](http://www.nrfirescience.org/resource/13917)

Most landscape-scale fire severity research relies on correlations between field measures of fire effects and relatively simple spectral reflectance indices that are not direct measures of heat output or changes in plant physiology. Although many authors have highlighted limitations of this approach and called for improved...

Author(s): Alistair M. S. Smith, Aaron M. Sparks, Crystal A. Kolden, John T. Abatzoglou, Alan F. Talhelm, Daniel M. Johnson, Luigi Boschetti, James A. Lutz, Kent G. Apostol, Kara M. Yedinak, Wade T. Tinkham, Robert L. Kremens

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Type: Document

Book or Chapter or Journal Article

### **Non-deforestation fire vs. fossil fuel combustion: the source of CO2 emissions affects the global carbon cycle and climate responses**

[www.nrfirescience.org/resource/14328](http://www.nrfirescience.org/resource/14328)

Non-deforestation fire – i.e., fire that is typically followed by the recovery of natural vegetation – is arguably the most influential disturbance in terrestrial ecosystems, thereby playing a major role in carbon exchanges and affecting many climatic processes. The radiative effect from a given atmospheric CO2 perturbation is...

Author(s): Jean-Sebastien Landry, H. Damon Matthews

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Measurements relating fire radiative energy density and surface fuel consumption - RxCADRE 2011 and 2012**

[www.nrfirescience.org/resource/13845](http://www.nrfirescience.org/resource/13845)

Small-scale experiments have demonstrated that fire radiative energy is linearly related to fuel combusted but such a relationship has not been shown at the landscape level of prescribed fires. This paper presents field and remotely sensed measures of pre-fire fuel loads, consumption, fire radiative energy density (FRED) and fire...

Author(s): Andrew T. Hudak, Matthew B. Dickinson, Benjamin C. Bright, Robert L. Kremens, E. Louise Loudermilk, Joseph J. O'Brien, Benjamin Hornsby, Roger D. Ottmar

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Positive effects of fire on birds may appear only under narrow combinations of fire severity and time-since-fire**

[www.nrfirescience.org/resource/14642](http://www.nrfirescience.org/resource/14642)

We conducted bird surveys in 10 of the first 11 years following a mixed-severity fire in a dry, low-elevation mixed-conifer forest in western Montana, United States. By defining fire in terms of fire severity and time-since-fire, and then comparing detection rates for species inside 15 combinations of fire severity and time-since-...

Author(s): Richard L. Hutto, David A. Patterson

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Evaluation of spectral indices for estimating burn severity in semiarid grasslands**

[www.nrfirescience.org/resource/13799](http://www.nrfirescience.org/resource/13799)

Using Landsat imagery, this study was conducted to evaluate a fire disturbance that occurred in

Canada's Grasslands National Park on 27 April 2013. We used spectral indices (e.g. Normalised Burn Ratio (NBR) and Mid-infrared Burn Index (MIRBI)) derived from Landsat images to evaluate burn severity and to analyse the vegetation...

Author(s): Bing Lu, Yuhong He, Alexander Tong

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Soil heating during the complete combustion of mega-logs and broadcast burning in central Oregon USA pumice soils**

[www.nrfirescience.org/resource/14604](http://www.nrfirescience.org/resource/14604)

The environmental effect of extreme soil heating, such as occurs with the complete combustion of large downed wood during wildfires, is a post-fire management concern to forest managers. To address this knowledge gap, we stacked logs to create 'mega-log' burning conditions and compared the temperature, duration and penetration...

Author(s): Jane E. Smith, Ariel D. Cowan, Stephen A. Fitzgerald

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Recovering lost ground: effects of soil burn intensity on nutrients and ectomycorrhiza communities of ponderosa pine seedlings**

[www.nrfirescience.org/resource/14547](http://www.nrfirescience.org/resource/14547)

Fuel accumulation and climate shifts are predicted to increase the frequency of high-severity fires in ponderosa pine (*Pinus ponderosa*) forests of central Oregon. The combustion of fuels containing large downed wood can result in intense soil heating, alteration of soil properties, and mortality of microbes. Previous studies show...

Author(s): Ariel D. Cowan, Jane E. Smith, Stephen A. Fitzgerald

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Detecting unburned areas within wildfire perimeters using Landsat and ancillary data across the northwestern United States**

[www.nrfirescience.org/resource/14897](http://www.nrfirescience.org/resource/14897)

Wildfires shape the distribution and structure of vegetation across the inland northwestern United States. However, fire activity is expected to increase given the current rate of climate change, with uncertain outcomes. A fire impact that has not been widely addressed is the development of unburned islands; areas within the fire...

Author(s): Arjan J. H. Meddens, Crystal A. Kolden, James A. Lutz

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Infiltration and interrill erosion rates after a wildfire in western Montana, USA**

[www.nrfirescience.org/resource/14528](http://www.nrfirescience.org/resource/14528)

The 2000 Valley Complex wildfire burned in steep montane forests with ash cap soils in western Montana, USA. The effects of high soil burn severity on forest soil hydrologic function were examined using rainfall simulations (100mmh<sup>-1</sup> for 1 h) on 0.5-m<sup>2</sup> plots. Infiltration rates, sediment yields and sediment concentrations were...

Author(s): Peter R. Robichaud, Joseph W. Wagenbrenner, Frederick B. Pierson, Kenneth E. Spaeth,

Louise E. Ashmun, Corey A. Moffet  
Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Cumulative disturbance on the landscape: lessons from the Pole Creek fire, Oregon**

[www.nrfirescience.org/resource/14519](http://www.nrfirescience.org/resource/14519)

Previous research has focused on quantifying fuel loadings and using operational fire behavior models to understand changes in fire severity following MPB outbreaks. In this study however, researchers used direct field measurements taken from the 2012 Pole Creek Fire that burned in lodgepole pine forests in central Oregon's...

Author(s): Northwest Fire Science Consortium

Year Published: 2016

Type: Document

Research Brief or Fact Sheet

### **Duff distribution influences fire severity and post-fire vegetation recovery in sagebrush steppe**

[www.nrfirescience.org/resource/14820](http://www.nrfirescience.org/resource/14820)

Woody plant expansion is a global phenomenon that alters the spatial distribution of nutrients, biomass, and fuels in affected ecosystems. Altered fuel patterns across the landscape influences ecological processes including fire behavior, fire effects, and can impact post-fire plant germination and establishment. The purpose of this...

Author(s): Nathan I. Weiner, Eva K. Strand, Stephen C. Bunting, Alistair M. S. Smith

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Burn me twice, shame on who? Interactions between successive forest fires across a temperate mountain region**

[www.nrfirescience.org/resource/14793](http://www.nrfirescience.org/resource/14793)

Increasing rates of natural disturbances under a warming climate raise important questions about how multiple disturbances interact. Escalating wildfire activity in recent decades has resulted in some forests re-burning in short succession, but how the severity of one wildfire affects that of a subsequent wildfire is not fully...

Author(s): Brian J. Harvey, Daniel C. Donato, Monica G. Turner

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Determination of the effects of heating mechanisms and moisture content on ignition of live fuels**

[www.nrfirescience.org/resource/15576](http://www.nrfirescience.org/resource/15576)

Effect of moisture content and heat flux type on ignition of foliage from 10 live fuels was examined over the course of a year using two apparatuses: a flat-flame burner coupled with a radiant panel and a Forced Ignition and flame Spread Test (FIST) apparatus. Results of the experiments were compared to predictions made with the...

Author(s): David R. Weise, Thomas H. Fletcher, Shankar M. Mahalingam, Sara S. McAllister, Babak Shotorban, William Matt Jolly

Year Published: 2016

Type: Document

Technical Report or White Paper



### **How will climate change affect wildland fire severity in the western US?**

[www.nrfirescience.org/resource/13983](http://www.nrfirescience.org/resource/13983)

Fire regime characteristics in North America are expected to change over the next several decades as a result of anthropogenic climate change. Although some fire regime characteristics (e.g., area burned and fire season length) are relatively well-studied in the context of a changing climate, fire severity has received less...

Author(s): Sean A. Parks, Carol Miller, John T. Abatzoglou, Lisa M. Holsinger, Marc-Andre Parisien, Solomon Z. Dobrowski

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western United States?**

[www.nrfirescience.org/resource/14718](http://www.nrfirescience.org/resource/14718)

There is a widespread view among land managers and others that the protected status of many forestlands in the western United States corresponds with higher fire severity levels due to historical restrictions on logging that contribute to greater amounts of biomass and fuel loading in less intensively managed areas, particularly...

Author(s): Curtis M. Bradley, Chad T. Hanson, Dominick A. DellaSala

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Forest fire policy: change conventional thinking of smoke management to prioritize long-term air quality and public health**

[www.nrfirescience.org/resource/14467](http://www.nrfirescience.org/resource/14467)

Wildland fire smoke is inevitable. Size and intensity of wildland fires are increasing in the western USA. Smoke-free skies and public exposure to wildland fire smoke have effectively been postponed through suppression. The historic policy of suppression has systematically both instilled a public expectation of a smoke-free...

Author(s): D.W. Schweizer, Richard Cisneros

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Protecting the source: tools to evaluate fuel treatment cost vs. water quality protection**

[www.nrfirescience.org/resource/14698](http://www.nrfirescience.org/resource/14698)

High-intensity wildfires are one of the leading causes of severe soil erosion in western U.S. watersheds. This erosion can lead to disruptive deposits of sediment in reservoirs and water supply systems. Fuel treatments such as controlled burns and forest thinning can reduce wildfire intensity and help preserve topsoil. But while...

Author(s): Brian Cooke

Year Published: 2016

Type: Document

Research Brief or Fact Sheet

### **Tree mortality based fire severity classification for forest inventories: a Pacific Northwest national forests example**

[www.nrfirescience.org/resource/13821](http://www.nrfirescience.org/resource/13821)

Determining how the frequency, severity, and extent of forest fires are changing in response to changes in management and climate is a key concern in many regions where fire is an important natural disturbance. In the USA the only national-scale fire severity classification uses satellite image change-detection to produce maps for...

Author(s): Thomas R. Whittier, Andrew N. Gray

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Post-fire vegetation and fuel development influences fire severity patterns in reburns**

[www.nrfirescience.org/resource/14638](http://www.nrfirescience.org/resource/14638)

In areas where fire regimes and forest structure have been dramatically altered, there is increasing concern that contemporary fires have the potential to set forests on a positive feedback trajectory with successive reburns, one in which extensive stand-replacing fire could promote more stand-replacing fire. Our study utilized an...

Author(s): Michelle Coppoletta, Kyle E. Merriam, Brandon M. Collins

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Do insect outbreaks reduce the severity of subsequent forest fires?**

[www.nrfirescience.org/resource/14260](http://www.nrfirescience.org/resource/14260)

Understanding the causes and consequences of rapid environmental change is an essential scientific frontier, particularly given the threat of climate- and land use-induced changes in disturbance regimes. In western North America, recent widespread insect outbreaks and wildfires have sparked acute concerns about potential insect...

Author(s): Garrett W. Meigs, Harold S. Zald, John L. Campbell, William S. Keeton, Robert E. Kennedy

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Particulate air pollution from wildfires in the western US under climate change**

[www.nrfirescience.org/resource/14558](http://www.nrfirescience.org/resource/14558)

Wildfire can impose a direct impact on human health under climate change. While the potential impacts of climate change on wildfires and resulting air pollution have been studied, it is not known who will be most affected by the growing threat of wildfires. Identifying communities that will be most affected will inform development...

Author(s): Jia Coco Liu, Loretta J. Mickley, Melissa P. Sulprizio, Francesca Dominici, Xu Yue, Keita Ebisu, Georgiana Brooke Anderson, Rafi F.A. Khan, Mercedes Bravo, Michelle L. Bell

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **1984–2010 trends in fire burn severity and area for the conterminous US**

[www.nrfirescience.org/resource/14199](http://www.nrfirescience.org/resource/14199)

Burn severity products created by the Monitoring Trends in Burn Severity (MTBS) project were used to analyse historical trends in burn severity. Using a severity metric calculated by modelling the cumulative distribution of differenced Normalized Burn Ratio (dNBR) and Relativized dNBR (RdNBR) data, we examined burn area and burn...

Author(s): Joshua J. Picotte, Birgit Peterson, Gretchen Meier, Stephen M. Howard

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Type: Document  
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### **Smoke management photographic guide: a visual aid for communicating impacts**

[www.nrfirescience.org/resource/14538](http://www.nrfirescience.org/resource/14538)

Communicating emissions impacts to the public can sometimes be difficult because quantitatively conveying smoke concentrations is complicated. Regulators and land managers often refer to particulate-matter concentrations in micrograms per cubic meter, but this may not be intuitive or meaningful to everyone. The primary purpose of...

Author(s): Joshua C. Hyde, Jarod Blades, Troy E. Hall, Roger D. Ottmar, Alistair M. S. Smith

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Wildfire smoke and public health risk**

[www.nrfirescience.org/resource/13562](http://www.nrfirescience.org/resource/13562)

Wildfire activity is predicted to increase with global climate change, resulting in longer fire seasons and larger areas burned. The emissions from fires are highly variable owing to differences in fuel, burning conditions and other external environmental factors. The smoke that is generated can impact human populations spread over...

Author(s): Fabienne Reisen, Sandra M. Duran, Michael D. Flannigan, Catherine Elliott, Karen Rideout

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Relations between soil hydraulic properties and burn severity**

[www.nrfirescience.org/resource/13987](http://www.nrfirescience.org/resource/13987)

Wildfire can affect soil hydraulic properties, often resulting in reduced infiltration. The magnitude of change in infiltration varies depending on the burn severity. Quantitative approaches to link burn severity with changes in infiltration are lacking. This study uses controlled laboratory measurements to determine relations...

Author(s): John A. Moody, Brian A. Ebel, Petter Nyman, Deborah A. Martin, Cathelijine Stoof, Randy McKinley

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Daily weather and other factors influencing burn severity in central Idaho and western Montana**

[www.nrfirescience.org/resource/15316](http://www.nrfirescience.org/resource/15316)

Burn severity as inferred from satellite-derived differenced Normalized Burn Ratio (dNBR) is useful for evaluating fire impacts on ecosystems but the environmental controls on burn severity across large forest fires are both poorly understood and likely to be different than those influencing fire extent. We related dNBR to...

Author(s): Donovan Birch, Penelope Morgan, Crystal A. Kolden, John T. Abatzoglou, Gregory K. Dillon, Andrew T. Hudak, Alistair M. S. Smith

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **Interactions among climate, wildfire and tree regeneration at lower treeline in the U.S. northern rockies**

[www.nrfirescience.org/resource/15564](http://www.nrfirescience.org/resource/15564)

Recent increases in area burned in the western U.S. have raised concerns about the resilience of forests to large wildfires, particularly in dry mixed-conifer forests, where climate change and 20th-century land management have altered species composition, fuel loads, and fire regimes. To study forest resilience to recent wildfires,...

Author(s): Philip E. Higuera, Kerry Kemp

Year Published: 2015

Type: Document

Technical Report or White Paper

## **Vegetation response to burn severity, native grass seeding, and salvage logging**

[www.nrfirescience.org/resource/13422](http://www.nrfirescience.org/resource/13422)

As the size and extent of wildfires has increased in recent decades, so has the cost and extent of post-fire management, including seeding and salvage logging. However, we know little about how burn severity, salvage logging, and post-fire seeding interact to influence vegetation recovery long-term. We sampled understory plant...

Author(s): Penelope Morgan, Marshall Moy, Christine A. Droske, Leigh B. Lentile, Sarah A. Lewis, Peter R. Robichaud, Andrew T. Hudak, Christopher Jason Williams

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **Using bird ecology to learn about the benefits of severe fire**

[www.nrfirescience.org/resource/15556](http://www.nrfirescience.org/resource/15556)

In this chapter in the book "The Ecological Importance of Mixed Severity Fires: Nature's Phoenix, the authors do not provide an encyclopedic review of the more than 450 published papers that describe some kind of effect of fire on birds. Instead, they chose to highlight underappreciated principles or lessons that emerge from...

Author(s): Richard L. Hutto, Monica L. Bond, Dominick A. DellaSala

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **A case study comparison of LANDFIRE fuel loading and emissions on a mixed conifer forest in northern Idaho, USA**

[www.nrfirescience.org/resource/13750](http://www.nrfirescience.org/resource/13750)

The use of fire as a land management tool is well recognized for its ecological benefits in many natural systems. To continue to use fire while complying with air quality regulations, land managers are often tasked with modeling emissions from fire during the planning process. To populate such models, the Landscape Fire...

Author(s): Joshua C. Hyde, Eva K. Strand, Andrew T. Hudak, Dale Hamilton

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **A systematic review of the physical health impacts from non-occupational exposure to wildfire smoke**

[www.nrfirescience.org/resource/13262](http://www.nrfirescience.org/resource/13262)

Climate change is likely to increase the threat of wild fires, and little is known about how wild fires affect

health in exposed communities. A better understanding of the impacts of the resulting air pollution has important public health implications for the present day and the future. Method: We performed a systematic search to...

Author(s): Jia C. Liu, Gavin Pereira, Sarah A. Uhl, Mercedes Bravo, Michelle L. Bell

Year Published: 2015

Type: Document

Synthesis

### **Does wildfire likelihood or severity increase following insect outbreaks in conifer forests?**

[www.nrfirescience.org/resource/14153](http://www.nrfirescience.org/resource/14153)

Although there is acute concern that insect-caused tree mortality increases the likelihood or severity of subsequent wildfire, previous studies have been mixed, with findings typically based on stand-scale simulations or individual events. This study investigates landscape- and regional-scale wildfire likelihood following outbreaks...

Author(s): Garrett W. Meigs, John L. Campbell, Harold S. Zald, John D. Bailey, David C. Shaw, Robert E. Kennedy

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Assessing soil and vegetation recovery following the 2005 School Fire, Umatilla National Forest - 10-year update**

[www.nrfirescience.org/resource/12811](http://www.nrfirescience.org/resource/12811)

Following the 2005 School Fire which burned ~ 50,000 acres across forest and grasslands, managers were particularly concerned with treating severely burned areas to mitigate weed spread and to limit soil erosion. Various mulching treatments (wheat straw, wood strand, and hydromulch) were implemented to control...

Author(s): Peter R. Robichaud, Penelope Morgan, Leigh B. Lentile, Sarah A. Lewis, Andrew T. Hudak, Deborah S. Page-Dumroese

Year Published: 2015

Type: Document

Research Brief or Fact Sheet

### **Vegetation, topography and daily weather influenced burn severity in central Idaho and western Montana forests**

[www.nrfirescience.org/resource/13621](http://www.nrfirescience.org/resource/13621)

Burn severity as inferred from satellite-derived differenced Normalized Burn Ratio (dNBR) is useful for evaluating fire impacts on ecosystems but the environmental controls on burn severity across large forest fires are both poorly understood and likely to be different than those influencing fire extent. We related dNBR to...

Author(s): Donovan Birch, Penelope Morgan, Crystal A. Kolden, John T. Abatzoglou, Gregory K. Dillon, Andrew T. Hudak, Alistair M. S. Smith

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Limitations and utilisation of monitoring trends in burn severity products for assessing wildfire severity in the USA**

[www.nrfirescience.org/resource/15631](http://www.nrfirescience.org/resource/15631)

The Monitoring Trends in Burn Severity project is a comprehensive fire atlas for the United States that includes perimeters and severity data for all fires greater than a particular size (,400 ha in the western

US, and,200 ha in the eastern US). Although the database was derived for management purposes, the scientific community has...

Author(s): Crystal A. Kolden, Alistair M. S. Smith, John T. Abatzoglou

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Fire legacies impact conifer regeneration across environmental gradients in the U.S. northern Rockies**

[www.nrfirescience.org/resource/14018](http://www.nrfirescience.org/resource/14018)

Context: An increase in the incidence of large wildfires worldwide has prompted concerns about the resilience of forest ecosystems, particularly in the western U.S., where recent changes are linked with climate warming and 20th-century land management practices. Objectives: To study forest resilience to recent wildfires, we examined...

Author(s): Kerry Kemp, Philip E. Higuera, Penelope Morgan

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Belowground impacts of pile burning in the Inland Northwestern U.S.**

[www.nrfirescience.org/resource/15565](http://www.nrfirescience.org/resource/15565)

Forest restoration efforts require thinning operations to reduce tree density, wildfire risk, or insect and disease conditions to improve ecosystem processes and function. However, one issue with the thinned stands is to dispose of the residues. Slash pile burning is currently used on many forest sites as a preferred method for...

Author(s): Deborah S. Page-Dumroese, Christopher R. Keyes, Martin F. Jurgensen, William J. Massman, Bret W. Butler

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Mixed severity fire effects within the Rim fire: relative importance of local climate, fire weather, topography, and forest structure**

[www.nrfirescience.org/resource/13857](http://www.nrfirescience.org/resource/13857)

Recent and projected increases in the frequency and severity of large wildfires in the western U.S. makes understanding the factors that strongly affect landscape fire patterns a management priority for optimizing treatment location. We compared the influence of variations in the local environment on burn severity patterns on the...

Author(s): Van R. Kane, C. Alina Cansler, Nicholas A. Povak, Jonathan T. Kane, Bob McGaughey, James A. Lutz, Derek J. Churchill, Malcolm P. North

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Deriving fundamental statistical shrub fuel models by laser scanning and combustion experimentation**

[www.nrfirescience.org/resource/15558](http://www.nrfirescience.org/resource/15558)

We exploited the measurement capacity of a terrestrial laser scanner to precisely characterize shrub fuel matrices in a laboratory setting, to abstract fuel elements for fire behavior modeling, and to identify strengths and limitations of TLS for these purposes. Simultaneously, we produced statistical distributions of combustion...

Author(s): Carl A. Seielstad, Thomas H. Fletcher, David R. Weise  
Year Published: 2015  
Type: Document  
Technical Report or White Paper

### **Paths of recovery: landscape variability in forest structure, function, and fuels after the 1988 Yellowstone Fires**

[www.nrfirescience.org/resource/13720](http://www.nrfirescience.org/resource/13720)

Understanding the rates, trajectories, and spatial variability in succession following severe wildfire is increasingly important for forest managers in western North America and critical for anticipating the resilience or vulnerability of forested landscapes to changing environmental conditions. However, few long-term...

Author(s): Monica G. Turner, William H. Romme, Daniel B. Tinker, Daniel C. Donato, Brian J. Harvey  
Year Published: 2015  
Type: Document  
Technical Report or White Paper

### **Modelling the effects of fire and rainfall regimes on extreme erosion events in forested landscapes**

[www.nrfirescience.org/resource/15758](http://www.nrfirescience.org/resource/15758)

Existing models of post-fire erosion have focused primarily on using empirical or deterministic approaches to predict the magnitude of response from catchments given some initial rainfall and burn conditions. These models are concerned with reducing uncertainties associated with hydro-geomorphic transfer processes and typically...

Author(s): Owen D. Jones, Petter Nyman, Gary J. Sheridan  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **Integrating satellite imagery with simulation modeling to improve burn severity mapping**

[www.nrfirescience.org/resource/12957](http://www.nrfirescience.org/resource/12957)

Both satellite imagery and spatial fire effects models are valuable tools for generating burn severity maps that are useful to fire scientists and resource managers. The purpose of this study was to test a new mapping approach that integrates imagery and modeling to create more accurate burn severity maps. We developed and assessed...

Author(s): Eva C. Karau, Pamela G. Sikkink, Robert E. Keane, Gregory K. Dillon  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **Patterns and mechanisms of plant succession after fire on Artemisia-grass sites in southeastern Idaho**

[www.nrfirescience.org/resource/15400](http://www.nrfirescience.org/resource/15400)

Cover data for plant species on eight environmentally similar sites that were each burned in a different year (from 2 to 36 years ago) were used to construct a composite sequence of vegetational change after fire on Artemisia-grassland sites in southeastern Idaho. Some species were early successional such as *Lithospermum ruderales*,...

Author(s): David L. Humphrey  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **The effects of previous wildfires on subsequent wildfire behavior and post-wildfire recovery**

[www.nrfirescience.org/resource/12650](http://www.nrfirescience.org/resource/12650)

Over the past several decades, size and extent of wildfires have been increasing in the western United States (Westerling et al. 2006; Littell et al. 2009). As the number and size of recent wildfires increases across landscapes, fire managers are questioning how past wildfires may influence the spread and effects of subsequent...

Author(s): Camille Stevens-Rumann, Susan J. Prichard, Penelope Morgan

Year Published: 2014

Type: Document

Synthesis

### **Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western north America**

[www.nrfirescience.org/resource/12904](http://www.nrfirescience.org/resource/12904)

There is widespread concern that fire exclusion has led to an unprecedented threat of uncharacteristically severe fires in ponderosa pine (*Pinus ponderosa* Dougl. ex. Laws) and mixed-conifer forests of western North America. These extensive montane forests are considered to be adapted to a low/moderate-severity fire regime that...

Author(s): Dennis C. Odion, Chad T. Hanson, Andre Arsenault, William L. Baker, Dominick A.

DellaSala, Richard L. Hutto, Walt Klenner, Max A. Moritz, Rosemary L. Sherriff, Thomas T. Veblen,

Mark A. Williams

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Impacts of mega-fires on large U.S. urban area air quality under changing climate and fuels**

[www.nrfirescience.org/resource/15569](http://www.nrfirescience.org/resource/15569)

Mega-fires can adversely impact air quality in the United States and the impacts are likely to become more serious in the future due to the possibility of more frequent and intense mega-fires in response to the projected climate change. This study investigated U.S. mega-fires and fuel conditions and their environmental impacts under...

Author(s): Yongqiang Liu, Scott L. Goodrick, John A. Stanturf, Hanqin Tian

Year Published: 2014

Type: Document

Technical Report or White Paper

### **Fire activity and severity in the western US vary along proxy gradients representing fuel amount and fuel moisture**

[www.nrfirescience.org/resource/13016](http://www.nrfirescience.org/resource/13016)

Numerous theoretical and empirical studies have shown that wildfire activity (e.g., area burned) at regional to global scales may be limited at the extremes of environmental gradients such as productivity or moisture. Fire activity, however, represents only one component of the fire regime, and no studies to date have characterized...

Author(s): Sean A. Parks, Marc-Andre Parisien, Carol Miller, Solomon Z. Dobrowski

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Perverse incentives: the case of wildfire smoke regulation**



[www.nrfirescience.org/resource/14235](http://www.nrfirescience.org/resource/14235)

Wildfire is on the rise. The United States is witnessing a spectacular increase in acres lost to catastrophic wildfires, a phenomenon fed by the generally hotter and dryer conditions associated with climate change. In addition to losses in lives, property, and natural resources, wildfires contribute thousands of tons of air...

Author(s): Kirsten H. Engel

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Recent mountain pine beetle outbreaks, wildfire severity, and postfire tree regeneration in the US northern Rockies**

[www.nrfirescience.org/resource/13007](http://www.nrfirescience.org/resource/13007)

Widespread tree mortality caused by outbreaks of native bark beetles (Circulionidae: Scolytinae) in recent decades has raised concern among scientists and forest managers about whether beetle outbreaks fuel more ecologically severe forest fires and impair postfire resilience. To investigate this question, we collected extensive...

Author(s): Brian J. Harvey, Daniel C. Donato, Monica G. Turner

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **The climate-wildfire-air quality system: interactions and feedbacks across spatial and temporal scales**

[www.nrfirescience.org/resource/13698](http://www.nrfirescience.org/resource/13698)

Future climate change and its effects on social and ecological systems present challenges for preserving valued ecosystem services, including local and regional air quality. Wildfire is a major source of air-quality impact in some locations, and a substantial contributor to pollutants of concern, including nitrogen oxides and...

Author(s): E. Natasha Stavros, Donald McKenzie, Narasimhan K. Larkin

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Large wildfire trends in the western United States, 1984-2011**

[www.nrfirescience.org/resource/12971](http://www.nrfirescience.org/resource/12971)

We used a database capturing large wildfires (> 405 ha) in the western U.S. to document regional trends in fire occurrence, total fire area, fire size, and day of year of ignition for 1984-2011. Over the western U.S. and in a majority of ecoregions, we found significant, increasing trends in the number of large fires and/or total...

Author(s): Philip E. Dennison, Simon C. Brewer, James D. Arnold, Max A. Moritz

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Defining extreme wildland fires using geospatial and ancillary metrics**

[www.nrfirescience.org/resource/12953](http://www.nrfirescience.org/resource/12953)

There is a growing professional and public perception that 'extreme' wildland fires are becoming more common due to changing climatic conditions. This concern is heightened in the wildland-urban interface where social and ecological effects converge. 'Mega-fires', 'conflagrations', 'extreme' and 'catastrophic' are descriptors...

Author(s): Karen O. Lannom, Wade T. Tinkham, Alistair M. S. Smith, John T. Abatzoglou, Beth A. Newingham, Troy E. Hall, Penelope Morgan, Eva K. Strand, Travis B. Paveglio, John Anderson, Aaron M. Sparks  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **Mapping day-of-burning with coarse-resolution satellite fire-detection data**

[www.nrfirescience.org/resource/12764](http://www.nrfirescience.org/resource/12764)

Evaluating the influence of observed daily weather on observed fire-related effects (e.g. smoke production, carbon emissions and burn severity) often involves knowing exactly what day any given area has burned. As such, several studies have used fire progression maps - in which the perimeter of an actively burning fire is mapped at...

Author(s): Sean A. Parks  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **Northern Rockies pyrogeography: an example of fire atlas utility**

[www.nrfirescience.org/resource/12923](http://www.nrfirescience.org/resource/12923)

We demonstrated the utility of digital fire atlases by analyzing forest fire extent across cold, dry, and mesic forests, within and outside federally designated wilderness areas during three different fire management periods: 1900 to 1934, 1935 to 1973, and 1974 to 2008. We updated an existing atlas with a 12,070,086 ha recording...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Carol Miller, Aaron M. Wilson, Carly E. Gibson  
Year Published: 2014  
Type: Document  
Book or Chapter or Journal Article

### **Challenges of assessing fire and burn severity using field measures, remote sensing and modeling**

[www.nrfirescience.org/resource/15319](http://www.nrfirescience.org/resource/15319)

Comprehensive assessment of ecological change after fires have burned forests and rangelands is important if we are to understand, predict and measure fire effects. We highlight the challenges in effective assessment of fire and burn severity in the field and using both remote sensing and simulation models. We draw on diverse recent...

Author(s): Penelope Morgan, Robert E. Keane, Gregory K. Dillon, Theresa B. Jain, Andrew T. Hudak, Eva C. Karau, Pamela G. Sikkink, Zachary A. Holden, Eva K. Strand  
Year Published: 2014  
Type: Document  
Synthesis

### **Previous fires moderate burn severity of subsequent wildland fires in two large western US wilderness areas**

[www.nrfirescience.org/resource/12051](http://www.nrfirescience.org/resource/12051)

Wildland fire is an important natural process in many ecosystems. However, fire exclusion has reduced frequency of fire and area burned in many dry forest types, which may affect vegetation structure and composition, and potential fire behavior. In forests of the western U.S., these effects pose a challenge for fire and land...

Author(s): Sean A. Parks, Carol Miller, Cara R. Nelson, Zachary A. Holden  
Year Published: 2014

Type: Document  
Book or Chapter or Journal Article

### **Vegetation response after post-fire mulching and native grass seeding**

[www.nrfirescience.org/resource/15317](http://www.nrfirescience.org/resource/15317)

Post-fire mulch and seeding treatments, often applied on steep, severely burned slopes immediately after large wildfires, are meant to reduce the potential of erosion and establishment of invasive plants, especially non-native plants, that could threaten values at risk. However, the effects of these treatments on native vegetation...

Author(s): Penelope Morgan, Marshall Moy, Christine A. Droske, Leigh B. Lentile, Sarah A. Lewis, Peter R. Robichaud, Andrew T. Hudak

Year Published: 2014

Type: Document  
Book or Chapter or Journal Article

### **A new metric for quantifying burn severity: the relativized burn ratio**

[www.nrfirescience.org/resource/13053](http://www.nrfirescience.org/resource/13053)

Satellite-inferred burn severity data have become increasingly popular over the last decade for management and research purposes. These data typically quantify spectral change between pre-and post-fire satellite images (usually Landsat). There is an active debate regarding which of the two main equations, the delta normalized burn...

Author(s): Sean A. Parks, Gregory K. Dillon, Carol Miller

Year Published: 2014

Type: Document  
Book or Chapter or Journal Article

### **Is proportion burned severely related to daily area burned?**

[www.nrfirescience.org/resource/13018](http://www.nrfirescience.org/resource/13018)

The ecological effects of forest fires burning with high severity are long-lived and have the greatest impact on vegetation successional trajectories, as compared to low-to-moderate severity fires. The primary drivers of high severity fire are unclear, but it has been hypothesized that wind-driven, large fire-growth days play a...

Author(s): Donovan Birch, Penelope Morgan, Crystal A. Kolden, Andrew T. Hudak, Alistair M. S. Smith

Year Published: 2014

Type: Document  
Book or Chapter or Journal Article

### **Fire severity and tree regeneration following bark beetle outbreaks: the role of outbreak stage and burning conditions**

[www.nrfirescience.org/resource/13328](http://www.nrfirescience.org/resource/13328)

The degree to which recent bark beetle (*Dendroctonus ponderosae*) outbreaks may influence fire severity and postfire tree regeneration is of heightened interest to resource managers throughout western North America, but empirical data on actual fire effects are lacking. Outcomes may depend on burning conditions (i.e., weather during...

Author(s): Brian J. Harvey, Daniel C. Donato, William H. Romme, Monica G. Turner

Year Published: 2014

Type: Document  
Book or Chapter or Journal Article

### **A synthesis of post-fire Burned Area Reports from 1972 to 2009 for western US Forest Service**

## **lands: trends in wildfire characteristics and post-fire stabilisation treatments and expenditures**

[www.nrfirescience.org/resource/13010](http://www.nrfirescience.org/resource/13010)

Over 1200 post-fire assessment and treatment implementation reports from four decades (1970s-2000s) of western US forest fires have been examined to identify decadal patterns in fire characteristics and the justifications and expenditures for the post-fire treatments. The main trends found were: (1) the area burned by wildfire...

Author(s): Peter R. Robichaud, Hakjun Rhee, Sarah A. Lewis

Year Published: 2014

Type: Document

Book or Chapter or Journal Article, Synthesis

## **Six basic smoke management practices for prescribed burning**

[www.nrfirescience.org/resource/12384](http://www.nrfirescience.org/resource/12384)

Smoke management has become one of the leading challenges facing prescribed fire practitioners in the Southeast and the continued use of prescribed fire in the region may depend on effective smoke and emission mitigation practices. While not a comprehensive list of smoke management strategies, the 2011 USFS-NRCS guide to Basic Smoke...

Author(s): David R. Godwin, Alan J. Long, Peter Lahm

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

## **Briefing: climate and wildfire in western U.S. forests**

[www.nrfirescience.org/resource/12991](http://www.nrfirescience.org/resource/12991)

Wildfire in western U.S. federally managed forests has increased substantially in recent decades, with large (>1000 acre) fires in the decade through 2012 over five times as frequent (450 percent increase) and burned area over ten times as great (930 percent increase) as the 1970s and early 1980s. These changes are closely linked...

Author(s): Anthony L. Westerling, Timothy J. Brown, Tania L. Schoennagel, Thomas W. Swetnam, Monica G. Turner, Thomas T. Veblen

Year Published: 2014

Type: Document

Technical Report or White Paper

## **Seeing red: new tools for mapping and understanding fire severity**

[www.nrfirescience.org/resource/11996](http://www.nrfirescience.org/resource/11996)

Large, severe fires are ecologically and socially important because they have lasting effects on vegetation and soils, can potentially threaten people and property, and can be costly to manage. The goals of the Fire Severity Mapping Project (FIRESEV), which covers lands in the continental western United States, are to understand...

Author(s): Rocky Mountain Research Station

Year Published: 2013

Type: Document

Research Brief or Fact Sheet

## **Fuel moisture and prescribed burning**

[www.nrfirescience.org/resource/12397](http://www.nrfirescience.org/resource/12397)

Moisture is the overriding factor governing fuel flammability. It determines whether ignition will take place and to what depth the forest floor will be consumed. If one uses enough torch mix, he/she can ignite the immediate area, but if fuel moisture is much above 22% in pine litter or 16% in hardwood litter, a headfire is...

Author(s): Dale D. Wade  
Year Published: 2013  
Type: Document  
Research Brief or Fact Sheet

### **Interactive effects of wildfire, forest management, and isolation on amphibian and parasite abundance**

[www.nrfirescience.org/resource/11970](http://www.nrfirescience.org/resource/11970)

Projected increases in wildfire and other climate-driven disturbances will affect populations and communities worldwide, including host-parasite relationships. Research in temperate forests has shown that wildfire can negatively affect amphibians, but this research has occurred primarily outside of managed landscapes where...

Author(s): Blake R. Hossack, Winsor H. Lowe, R. Ken Honeycutt, Sean A. Parks, Paul S. Corn  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **Regional and forest-level estimates of carbon stored in harvested wood products from the United States Forest Service Northern Region, 1906-2010**

[www.nrfirescience.org/resource/13089](http://www.nrfirescience.org/resource/13089)

Global forests capture and store significant amounts of CO<sub>2</sub> through photosynthesis. When carbon is removed from forests through harvest, a portion of the harvested carbon is stored in wood products, often for many decades. The United States Forest Service (USFS) and other agencies are interested in accurately accounting for carbon...

Author(s): Nathaniel Anderson, Jesse Young, Keith Stockmann, Kenneth E. Skog, Sean P. Healey, Dan R. Loeffler, J. Greg Jones, James F. Morrison  
Year Published: 2013  
Type: Document  
Technical Report or White Paper

### **Combustion efficiency and emission factors for wildfire-season fires in mixed conifer forests of the northern Rocky Mountains, US**

[www.nrfirescience.org/resource/13481](http://www.nrfirescience.org/resource/13481)

In the US, wildfires and prescribed burning present significant challenges to air regulatory agencies attempting to achieve and maintain compliance with air quality regulations. Fire emission factors (EF) are essential input for the emission models used to develop wildland fire emission inventories. Most previous studies quantifying...

Author(s): Shawn P. Urbanski  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **Wildland fire emissions, carbon, and climate: modeling fuel consumption**

[www.nrfirescience.org/resource/12442](http://www.nrfirescience.org/resource/12442)

Fuel consumption specifies the amount of vegetative biomass consumed during wildland fire. It is a two-stage process of pyrolysis and combustion that occurs simultaneously and at different rates depending on the characteristics and condition of the fuel, weather, topography, and in the case of prescribed fire, ignition rate and...

Author(s): Roger D. Ottmar  
Year Published: 2013  
Type: Document

Book or Chapter or Journal Article, Synthesis

### **Fuel moisture influences on fire-altered carbon in masticated fuels: an experimental study**

[www.nrfirescience.org/resource/12021](http://www.nrfirescience.org/resource/12021)

Biomass burning is a significant contributor to atmospheric carbon emissions, but may also provide an avenue in which fire-affected ecosystems can accumulate carbon over time, through the generation of highly resistant fire-altered carbon. Identifying how fuel moisture, and subsequent changes in the fire behavior, relates to the...

Author(s): Nolan W. Brewer, Alistair M. S. Smith, Jeff A. Hatten, Philip E. Higuera, Andrew T. Hudak, Roger D. Ottmar, Wade T. Tinkham

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **The merits of prescribed fire outweigh potential carbon emission effects**

[www.nrfirescience.org/resource/12426](http://www.nrfirescience.org/resource/12426)

While North American ecosystems vary widely in their ecology and natural historical fire regimes, they are unified in benefitting from prescribed fire when judiciously applied with the goal of maintaining and restoring native ecosystem composition, structure, and function. On a modern landscape in which historical fire regimes...

Author(s): Association for Fire Ecology, International Association of Wildland Fire, Tall Timbers Research Station, The Nature Conservancy

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Fire intensity and fire severity: how hot is your fire and why is that important?**

[www.nrfirescience.org/resource/12398](http://www.nrfirescience.org/resource/12398)

Achieving natural resource objectives typically requires the application of periodic fire because fire is truly THE ECOLOGICAL IMPERATIVE! But how does one measure success or failure? Determining how close a fire came to meeting your objective(s) is a difficult but crucial part of every burn evaluation and is not always immediately...

Author(s): Dale D. Wade

Year Published: 2013

Type: Document

Research Brief or Fact Sheet

### **Models for predicting fuel consumption in sagebrush-dominated ecosystems**

[www.nrfirescience.org/resource/11978](http://www.nrfirescience.org/resource/11978)

Fuel consumption predictions are necessary to accurately estimate or model fire effects, including pollutant emissions during wildland fires. Fuel and environmental measurements on a series of operational prescribed fires were used to develop empirical models for predicting fuel consumption in big sagebrush (*Artemisia tridentata*...

Author(s): Clinton S. Wright

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **The relationship of post-fire white ash cover to surface fuel consumption**

[www.nrfirescience.org/resource/13119](http://www.nrfirescience.org/resource/13119)

White ash results from the complete combustion of surface fuels, making it a logically simple retrospective indicator of surface fuel consumption. However, the strength of this relationship has been neither tested nor adequately demonstrated with field measurements. We measured surface fuel loads and cover fractions of white ash and...

Author(s): Andrew T. Hudak, Roger D. Ottmar, Robert E. Vihnanek, Nolan W. Brewer, Alistair M. S. Smith, Penelope Morgan

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Influence of wildland fire along a successional gradient in sagebrush steppe and western juniper woodlands**

[www.nrfirescience.org/resource/12149](http://www.nrfirescience.org/resource/12149)

Western juniper (*Juniperus occidentalis* Hook. var. *occidentalis*) has been expanding into sagebrush (*Artemisia* L. spp.) steppe over the past 130 years in Idaho, Oregon, and California. Fuel characteristics and expected fire behavior and effects change as sagebrush steppe transitions into juniper woodlands. Little is currently known...

Author(s): Eva K. Strand, Stephen C. Bunting, Robert F. Keefe

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Gas-particle partitioning of primary organic aerosol emissions: 3. Biomass burning**

[www.nrfirescience.org/resource/13476](http://www.nrfirescience.org/resource/13476)

Atmospheric organic aerosol concentrations depend in part on the gas-particle partitioning of primary organic aerosol (POA) emissions. Consequently, heating and dilution were used to investigate the volatility of biomass-burning smoke particles from combustion of common North American trees/shrubs/grasses during the third Fire Lab...

Author(s): Andrew A. May, Ezra Levin, Christopher J. Hennigan, Ilona Riipinen, Taehyoung Lee, Jeffrey L. Collett, Jose L. Jimenez, Sonia M. Kreidenweis, Allen L. Robinson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Latent resilience in ponderosa pine forest: effects of resumed frequent fire**

[www.nrfirescience.org/resource/12018](http://www.nrfirescience.org/resource/12018)

Ecological systems often exhibit resilient states that are maintained through negative feedbacks. In ponderosa pine forests, fire historically represented the negative feedback mechanism that maintained ecosystem resilience; fire exclusion reduced that resilience, predisposing the transition to an alternative ecosystem state upon...

Author(s): Andrew J. Larson, R. Travis Belote, C. Alina Cansler, Sean A. Parks, Matthew S. Dietz

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Is burn severity related to fire intensity? Observations from landscape scale remote sensing**

[www.nrfirescience.org/resource/12026](http://www.nrfirescience.org/resource/12026)

Biomass burning by wildland fires has significant ecological, social and economic impacts. Satellite remote sensing provides direct measurements of radiative energy released by the fire (i.e. fire intensity) and surrogate measures of ecological change due to the fire (i.e. fire or burn severity). Despite anecdotal observations...

Author(s): Heather Heward, Alistair M. S. Smith, David P. Roy, Wade T. Tinkham, Chad M. Hoffman, Penelope Morgan, Karen O. Lannom  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **The impacts of changing disturbance regimes on serotinous plant populations and communities**

[www.nrfirescience.org/resource/12406](http://www.nrfirescience.org/resource/12406)

Climatic change is anticipated to alter disturbance regimes for many ecosystems. Among the most important effects are changes in the frequency, size, and intensity of wildfires. Serotiny (long-term canopy storage and the heat-induced release of seeds) is a fire-resilience mechanism found in many globally important terrestrial...

Author(s): Brian Buma, Carissa D. Brown, Daniel C. Donato, Joseph B. Fontaine, Jill F. Johnstone  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **Characterizing fire-on-fire interactions in three large wilderness areas**

[www.nrfirescience.org/resource/8339](http://www.nrfirescience.org/resource/8339)

The interaction of fires, where one fire burns into another recently burned area, is receiving increased attention from scientists and land managers wishing to describe the role of fire scars in affecting landscape pattern and future fire spread. Here, we quantify fire-on-fire interactions in terms of frequency, size, and time-since...

Author(s): Casey Teske, Carl A. Seielstad, Lloyd P. Queen  
Year Published: 2012  
Type: Document  
Book or Chapter or Journal Article

### **Pattern and process of prescribed fires influence effectiveness at reducing wildfire severity in dry coniferous forests**

[www.nrfirescience.org/resource/11476](http://www.nrfirescience.org/resource/11476)

We examined the effects of three early season (spring) prescribed fires on burn severity patterns of summer wildfires that occurred 1-3 years post-treatment in a mixed conifer forest in central Idaho. Wildfire and prescribed fire burn severities were estimated as the difference in normalized burn ratio (dNBR) using Landsat imagery....

Author(s): Robert S. Arkle, David S. Pilliod, Justin L. Welty  
Year Published: 2012  
Type: Document  
Book or Chapter or Journal Article

### **Research perspectives on the public and fire management: a synthesis of current social science on eight essential questions**

[www.nrfirescience.org/resource/12601](http://www.nrfirescience.org/resource/12601)

As part of a Joint Fire Science Program project, a team of social scientists reviewed existing fire social science literature to develop a targeted synthesis of scientific knowledge on the following questions: 1. What is the public's understanding of fire's role in the ecosystem? 2. Who are trusted sources of information about fire...

Author(s): Sarah M. McCaffrey, Christine Olsen  
Year Published: 2012  
Type: Document  
Synthesis



### **Effects of bark beetle-caused tree mortality on wildfire**

[www.nrfirescience.org/resource/13294](http://www.nrfirescience.org/resource/13294)

Millions of trees killed by bark beetles in western North America have raised concerns about subsequent wildfire, but studies have reported a range of conclusions, often seemingly contradictory, about effects on fuels and wildfire. In this study, we reviewed and synthesized the published literature on modifications to fuels and fire...

Author(s): Jeffrey A. Hicke, Morris C. Johnson, Jane L. Hayes, Haiganoush K. Preisler

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Measurements of convective and radiative heating in wildland fires**

[www.nrfirescience.org/resource/8374](http://www.nrfirescience.org/resource/8374)

Time-resolved irradiance and convective heating and cooling of fast-response thermopile sensors were measured in 13 natural and prescribed wildland fires under a variety of fuel and ambient conditions. It was shown that a sensor exposed to the fire environment was subject to rapid fluctuations of convective transfer whereas...

Author(s): David Frankman, Brent W. Webb, Bret W. Butler, Daniel M. Jimenez, Jason M. Forthofer, Paul Sopko, Kyle S. Shannon, J. Kevin Hiers, Roger D. Ottmar

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Mapped versus actual burned area within wildfire perimeters: characterizing the unburned**

[www.nrfirescience.org/resource/8350](http://www.nrfirescience.org/resource/8350)

For decades, wildfire studies have utilized fire occurrence as the primary data source for investigating the causes and effects of wildfire on the landscape. Fire occurrence data fall primarily into two categories: ignition points and perimeter polygons which are used to calculate a 'burned area' for a fire. However, understanding...

Author(s): Crystal A. Kolden, James A. Lutz, Carl H. Key, Jonathan T. Kane, Jan W. van Wagtenonk

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Fire effects on gross inorganic N transformation in riparian soils in coniferous forests of central Idaho, USA: wildfires v. prescribed fires**

[www.nrfirescience.org/resource/11469](http://www.nrfirescience.org/resource/11469)

We investigated differences between wildfires and prescribed fires in their effects on nitrogen (N) dynamics in mineral soils collected from riparian coniferous forests of central Idaho, USA. Specifically, we investigated how the two types of fires affected inorganic N concentrations, microbial biomass N and gross transformation...

Author(s): Akihiro Koyama, Kirsten Stephan, Kathleen L. Kavanagh

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Fire effects on the spatial patterning of soil properties in sagebrush steppe, USA: a meta-analysis**

[www.nrfirescience.org/resource/11484](http://www.nrfirescience.org/resource/11484)

Understanding effects of changes in ecological disturbance regimes on soil properties, and capacity of soil properties to resist disturbance, is important for assessing ecological condition. In this meta-analysis, we examined the resilience of surface soil properties and their spatial patterning to disturbance by fire in sagebrush...

Author(s): Joel B. Sankey, Temuulen T. Sankey, Matthew J. Germino

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

### **A new forest fire paradigm: the need for high-severity fires**

[www.nrfirescience.org/resource/14505](http://www.nrfirescience.org/resource/14505)

During the 2012 fire season from June through August, wildfires in the droughtstricken western and central United States burned more than 3.6 million acres of forest and shrubland. In the hot, dry, windy conditions seen that season, a single spark can start an understory fire that ascends into the...

Author(s): Monica L. Bond, Rodney B. Siegel, Richard L. Hutto, Victoria A. Saab, Stephen A. Shunk

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Can climate change increase fire severity independent of fire intensity? - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11228](http://www.nrfirescience.org/resource/11228)

We tested the idea that climate may affect forest fire severity independent of fire intensity. Pervasive warming can lead to chronic stress on forest trees (McDowell et al. 2008; Raffa et al. 2008), resulting in higher sensitivity to fire-induced damage (van Mantgem et al. 2003). Thus, there may be ongoing increases in fire severity...

Author(s): Phillip J. van Mantgem, MaryBeth Keifer, Robert C. Klinger, Eric E. Knapp

Year Published: 2012

Type: Document

Technical Report or White Paper

### **Wildfire severity mediates fluxes of plant material and terrestrial invertebrates to mountain streams**

[www.nrfirescience.org/resource/11477](http://www.nrfirescience.org/resource/11477)

Wildfire effects upon riparian plant community structure, composition, and distribution may strongly influence the dynamic relationships between riparian vegetation and stream ecosystems. However, few studies have examined the influence of fire on these processes. To that end, we compared the quantity and composition of...

Author(s): Breeanne K. Jackson, S. Mazeika P. Sullivan, Rachel L. Malison

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests**

[www.nrfirescience.org/resource/13484](http://www.nrfirescience.org/resource/13484)

Aim: Wildfire is often considered more severe now than historically in dry forests of the western United States. Tree-ring reconstructions, which suggest that historical dry forests were park-like with large, old trees maintained by low-severity fires, are from small, scattered studies. To overcome this limitation, we developed...

Author(s): William L. Baker, Mark A. Williams

Year Published: 2012  
Type: Document  
Book or Chapter or Journal Article

### **Rapid increases and time-lagged declines in amphibian occupancy after wildfire**

[www.nrfirescience.org/resource/11998](http://www.nrfirescience.org/resource/11998)

Climate change is expected to increase the frequency and severity of drought and wildfire. Aquatic and moisture-sensitive species, such as amphibians, may be particularly vulnerable to these modified disturbance regimes because large wildfires often occur during extended droughts and thus may compound environmental threats. However...

Author(s): Blake R. Hossack, Winsor H. Lowe, Paul S. Corn

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Effects of spring prescribed burning and wildfires on watershed nitrogen dynamics of central Idaho headwater areas**

[www.nrfirescience.org/resource/8294](http://www.nrfirescience.org/resource/8294)

Fire is known for its potential to profoundly affect nitrogen (N) dynamics in both terrestrial and aquatic ecosystems. However, few studies have investigated fire effects on several important watershed N pools simultaneously or have directly compared effects of spring prescribed burns and wildfires that occurred in the same...

Author(s): Kirsten Stephan, Kathleen L. Kavanagh, Akihiro Koyama

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **The effect of sampling rate on interpretation of the temporal characteristics of radiative and convective heating in wildland flames**

[www.nrfirescience.org/resource/8373](http://www.nrfirescience.org/resource/8373)

Time-resolved radiative and convective heating measurements were collected on a prescribed burn in coniferous fuels at a sampling frequency of 500 Hz. Evaluation of the data in the time and frequency domain indicate that this sampling rate was sufficient to capture the temporal fluctuations of radiative and convective heating. The...

Author(s): David Frankman, Brent W. Webb, Bret W. Butler, Daniel M. Jimenez, Michael G. Harrington

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Wind erosion of soils burned by wildfire**

[www.nrfirescience.org/resource/11492](http://www.nrfirescience.org/resource/11492)

Wind erosion and aeolian transport processes are largely unstudied in the post-wildfire environment, but recent studies have shown that wind erosion can play a major role in burned landscapes. A wind erosion monitoring system was installed immediately following a wildfire in southeastern Idaho, USA to measure wind erosion from the...

Author(s): Natalie S. Wagenbrenner, Matthew J. Germino, Brian K. Lamb, Randy B. Foltz, Peter R. Robichaud

Year Published: 2011

Type: Document

Conference Proceedings

### **Predicted fates of ground-nesting bees in soil heated by wildfire: thermal tolerances of life stages and a survey of nesting depths**

[www.nrfirescience.org/resource/12144](http://www.nrfirescience.org/resource/12144)

Periodic wildfire defines plant community composition and dynamics in many of the world's semi-arid biomes, whose climates and floras also favor wild bee diversity. Invasive flammable grasses, deforestation, historical fire suppression and human ignition are increasing fire frequency and intensifying its severity, as well as...

Author(s): James H. Cane, John L. Neff

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Mapping the potential for high severity wildfire in the western United States**

[www.nrfirescience.org/resource/15320](http://www.nrfirescience.org/resource/15320)

Each year, large areas are burned in wildfires across the Western United States. Assessing the ecological effects of these fires is crucial to effective postfire management. This requires accurate, efficient, and economical methods to assess the severity of fires at broad landscape scales (Brennan and Hardwick 1999; Parsons and...

Author(s): Gregory K. Dillon, Penelope Morgan, Zachary A. Holden

Year Published: 2011

Type: Document

Synthesis

### **The beauty of a burned forest**

[www.nrfirescience.org/resource/14506](http://www.nrfirescience.org/resource/14506)

In the Northern Rockies, forests that have escaped fire are rare. In the Crown, fire is just as important as rainfall and sunlight are to plants and animals. For the vast majority of forest types within the region, the predominant fire regime is one of infrequent, intense, stand-replacement fires—not one of...

Author(s): Richard L. Hutto

Year Published: 2011

Type: Document

Research Brief or Fact Sheet

### **Variation in aboveground cover influences soil nitrogen availability at fine spatial scales following severe fire in subalpine conifer forests**

[www.nrfirescience.org/resource/12031](http://www.nrfirescience.org/resource/12031)

Following fire, fine-scale variation in early successional vegetation and soil nutrients may influence development of ecosystem structure and function. We studied conifer forests burned by stand-replacing wildfire in Greater Yellowstone (Wyoming, USA) to address two questions: (1) How do the variability and spatial structure of...

Author(s): Monica G. Turner, William H. Romme, Erica A. H. Smithwick, Daniel B. Tinker, Jun Zhu

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Both topography and climate affected forest and woodland burn severity in two regions of the western US**

[www.nrfirescience.org/resource/15318](http://www.nrfirescience.org/resource/15318)

Fire is a keystone process in many ecosystems of western North America. Severe fires kill and consume large amounts of above- and belowground biomass and affect soils, resulting in long-lasting

consequences for vegetation, aquatic ecosystem productivity and diversity, and other ecosystem properties. We analyzed the occurrence of,...

Author(s): Gregory K. Dillon, Zachary A. Holden, Penelope Morgan, Michael A. Crimmins, Emily K. Heyerdahl, Charles H. Luce

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Modeling effects of climate change and fire management on western white pine (*Pinus monticola*) in the northern rocky mountains, USA**

[www.nrfirescience.org/resource/13512](http://www.nrfirescience.org/resource/13512)

Climate change is projected to profoundly influence vegetation patterns and community compositions, either directly through increased species mortality and shifts in species distributions or indirectly through disturbance dynamics such as increased wildfire activity and extent, shifting fire regimes, and pathogenesis. Mountainous...

Author(s): Rachel A. Loehman, Jason A. Clark, Robert E. Keane

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Emissions of air pollutants by Canadian wildfires from 2000 to 2004**

[www.nrfirescience.org/resource/14707](http://www.nrfirescience.org/resource/14707)

A wildfire emission model, based on the Canadian Forest Fire Behaviour Prediction System and the Canadian weather forecast Global Environmental Multiscale model, was applied to forest fires that occurred in Canada between 2000 and 2004. Emissions of 21 chemical species and injection heights were calculated hourly for a regular 0.4...

Author(s): David Lavoue, Brian J. Stocks

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Situational awareness: nighttime smoke and fog on prescribed burns**

[www.nrfirescience.org/resource/12440](http://www.nrfirescience.org/resource/12440)

Nighttime smoke dispersal from most prescribed fires is critical for public health and safety. For this reason, prescribed fire training and guidelines include detailed information about smoke management and remind burn managers to be constantly aware of weather, fuel, and other situations that might lead to smoke dispersion...

Author(s): Anthony Matthews, Vince Carver

Year Published: 2011

Type: Document

Research Brief or Fact Sheet

### **Review of fuel treatment effectiveness in forests and rangelands and a case study from the 2007 megafires in central, Idaho, USA**

[www.nrfirescience.org/resource/11449](http://www.nrfirescience.org/resource/11449)

This report provides managers with the current state of knowledge regarding the effectiveness of fuel treatments for mitigating severe wildfire effects. A literature review examines the effectiveness of fuel treatments that had been previously applied and were subsequently burned through by wildfire in forests and rangelands. A case...

Author(s): Andrew T. Hudak, Ian Rickert, Penelope Morgan, Eva K. Strand, Sarah A. Lewis, Peter R. Robichaud, Chad M. Hoffman, Zachary A. Holden

Year Published: 2011  
Type: Document  
Synthesis, Technical Report or White Paper

**The wildland fire emission inventory: western United States emission estimates and an evaluation of uncertainty**

[www.nrfirescience.org/resource/8356](http://www.nrfirescience.org/resource/8356)

Biomass burning emission inventories serve as critical input for atmospheric chemical transport models that are used to understand the role of biomass fires in the chemical composition of the atmosphere, air quality, and the climate system. Significant progress has been achieved in the development of regional and global biomass...

Author(s): Shawn P. Urbanski, Wei Min Hao, Bryce L. Nordgren

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

**Restoration of whitebark pine forests in the northern Rocky Mountains, USA**

[www.nrfirescience.org/resource/11900](http://www.nrfirescience.org/resource/11900)

Whitebark pine (*Pinus albicaulis*) has been declining across much of its range in North America because of the combined effects of mountain pine beetle epidemics, fire exclusion policies, and widespread exotic blister rust infections. Whitebark pine seed is dispersed by a bird, the Clark's nutcracker, which caches seed in open,...

Author(s): Robert E. Keane

Year Published: 2011

Type: Document

Conference Proceedings

**Influence of fire on mycorrhizal colonization of planted and natural whitebark pine seedlings: ecology and management implications**

[www.nrfirescience.org/resource/11898](http://www.nrfirescience.org/resource/11898)

Whitebark pine (*Pinus albicaulis*) is a threatened keystone species in subalpine zones of Western North America that plays a role in watershed dynamics and maintenance of high elevation biodiversity (Schwandt, 2006). Whitebark pine has experienced significant mortality due to white pine blister rust, mountain pine beetle outbreaks...

Author(s): Paul E. Trusty, Cathy L. Cripps

Year Published: 2011

Type: Document

Conference Proceedings

**Greater sage-grouse: Ecology and conservation of a landscape species and its habitats**

[www.nrfirescience.org/resource/15406](http://www.nrfirescience.org/resource/15406)

The greater sage-grouse is at the center of a complex challenge to conserve sagebrush ecosystems. The species has declined across much of its range, including 11 western states and 2 Canadian provinces, mostly due to loss of critical sagebrush habitat. Agriculture, roads, development of energy resources, wildfire, and invasive...

Author(s): Steve Knick, John W. Connelly

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Plains prickly pear response to fire: effects of fuel load, heat, fire weather, and donor site soil**

[www.nrfirescience.org/resource/8283](http://www.nrfirescience.org/resource/8283)

Plains prickly pear (*Opuntia polyacantha* Haw.) is common throughout the Great Plains and often becomes detrimental to agricultural production on noncultivated lands. We examined direct fire effects on plains prickly pear and mechanisms of tissue damage to facilitate development of fire prescriptions. Cladodes from clones on three...

Author(s): Lance T. Vermeire, Aaron D. Roth

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Rill erosion rates in burned forests**

[www.nrfirescience.org/resource/11032](http://www.nrfirescience.org/resource/11032)

Wildfires often produce large increases in runoff and erosion rates (e.g., Moody and Martin, 2009), and land managers need to predict the frequency and magnitude of postfire erosion to determine the needs for hazard response and possible erosion mitigation to reduce the impacts of increased erosion on public safety and valued...

Author(s): Joseph W. Wagenbrenner, Peter R. Robichaud

Year Published: 2011

Type: Document

Conference Proceedings

### **Fire, plant invasions, and erosion events on western rangelands**

[www.nrfirescience.org/resource/8290](http://www.nrfirescience.org/resource/8290)

Millions of hectares of rangeland in the western United States have been invaded by annual and woody plants that have increased the role of wildland fire. Altered fire regimes pose significant implications for runoff and erosion. In this paper we synthesize what is known about fire impacts on rangeland hydrology and erosion, and how...

Author(s): Frederick B. Pierson, Christopher Jason Williams, Stuart P. Hardegree, Mark A. Weltz, Jeffrey J. Stone, Patrick E. Clark

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Fire effects on the cheatgrass seed bank pathogen *Pyrenophora semeniperda***

[www.nrfirescience.org/resource/11450](http://www.nrfirescience.org/resource/11450)

The generalist fungal pathogen *Pyrenophora semeniperda* occurs primarily in cheatgrass (*Bromus tectorum*) seed banks, where it causes high mortality. We investigated the relationship between this pathogen and its cheatgrass host in the context of fire, asking whether burning would facilitate host escape from the pathogen or increase...

Author(s): Julie Beckstead, Laura E. Street, Susan E. Meyer, Phil S. Allen

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Wildfire extent and severity correlated with annual streamflow distribution and timing in the Pacific Northwest, USA (1984-2005)**

[www.nrfirescience.org/resource/8375](http://www.nrfirescience.org/resource/8375)

Climate change effects on wildfire occurrence have been attributed primarily to increases in temperatures causing earlier snowpack ablation and longer fire seasons. Variability in precipitation is also an important control on snowpack accumulation and, therefore, on timing of meltwater inputs. We

evaluate the correlation of total...

Author(s): Zachary A. Holden, Charles H. Luce, Michael A. Crimmins, Penelope Morgan

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Effects of biomass removal treatments on stand-level fire characteristics in major forest types of the Northern Rocky Mountains**

[www.nrfirescience.org/resource/8189](http://www.nrfirescience.org/resource/8189)

Removal of dead and live biomass from forested stands affects subsequent fuel dynamics and fire potential. The amount of material left onsite after biomass removal operations can influence the intensity and severity of subsequent unplanned wildfires or prescribed burns. We developed a set of biomass removal treatment scenarios and...

Author(s): Elizabeth D. Reinhardt, Lisa M. Holsinger, Robert E. Keane

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **The validity and utility of MODIS data for simple estimation of area burned and aerosols emitted by wildfire events**

[www.nrfirescience.org/resource/8371](http://www.nrfirescience.org/resource/8371)

Wildfire emissions are challenging to measure and model, but simple and realistic estimates can benefit multiple disciplines. We evaluate the potential of MODIS (Moderate Resolution Imaging Spectroradiometer) data to address this objective. A total of 11,004 fire pixels detected over 92 days were clustered into 242 discrete fire...

Author(s): Sarah B. Henderson, Charles Ichoku, Benjamin J. Burkholder, Michael Brauer, Peter L. Jackson

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Restoring whitebark pine forests of the northern Rocky Mountains, USA**

[www.nrfirescience.org/resource/8394](http://www.nrfirescience.org/resource/8394)

Whitebark pine (*Pinus albicaulis*) has been declining across much of its range in North America because of the combined effects of mountain pine beetle (*Dendroctonus ponderosae*) epidemics, fire exclusion policies, and widespread exotic blister rust infections. Whitebark pine seed is dispersed by a bird, the Clark's nutcracker (...)

Author(s): Robert E. Keane, Russell A. Parsons

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Sink or source? Fire and the forest carbon cycle**

[www.nrfirescience.org/resource/12620](http://www.nrfirescience.org/resource/12620)

As the size and severity of fires in the western U.S. continue to increase, it has become ever more important to understand carbon dynamics in response to fire. Many subalpine forests experience stand-replacing wildfires, and these fires and subsequent recovery can change the amount of carbon released to the atmosphere...

Author(s): Christine Frame

Year Published: 2010

Type: Document



### **Field guide for mapping post-fire soil burn severity**

[www.nrfirescience.org/resource/15310](http://www.nrfirescience.org/resource/15310)

Following wildfires in the United States, the U.S. Department of Agriculture and U.S. Department of the Interior mobilize Burned Area Emergency Response (BAER) teams to assess immediate post-fire watershed conditions. BAER teams must determine threats from flooding, soil erosion, and instability. Developing a postfire soil burn...

Author(s): Annette Parson, Peter R. Robichaud, Sarah A. Lewis, Carolyn Napper, Jess T. Clark

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Using fuzzy C-means and local autocorrelation to cluster satellite-inferred burn severity classes**

[www.nrfirescience.org/resource/11447](http://www.nrfirescience.org/resource/11447)

Burn severity classifications derived from multitemporal Landsat Thematic Mapper images and the Normalised Burn Ratio (NBR) are commonly used to assess the post-fire ecological effects of wildfires. Ongoing efforts to retrospectively map historical burn severity require defensible, objective methods of classifying continuous...

Author(s): Zachary A. Holden, Jeffrey S. Evans

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Influence of wildfire severity on riparian plant community heterogeneity in an Idaho, USA wilderness**

[www.nrfirescience.org/resource/11445](http://www.nrfirescience.org/resource/11445)

Despite the increasing recognition of riparian zones as important ecotones that link terrestrial and aquatic ecosystems and of fire as a critical natural disturbance, much remains unknown regarding the influence of fire on stream-riparian ecosystems. To further this understanding, we evaluated the effects of mixed severity wildfire...

Author(s): Breeanne K. Jackson, S. Mazeika P. Sullivan

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Effects of timber harvest following wildfire in western North America**

[www.nrfirescience.org/resource/11122](http://www.nrfirescience.org/resource/11122)

Timber harvest following wildfire leads to different outcomes depending on the biophysical setting of the forest, pattern of burn severity, operational aspects of tree removal, and other management activities. Fire effects range from relatively minor, in which fire burns through the understory and may kill a few trees, to severe, in...

Author(s): David L. Peterson, James K. Agee, Gregory H. Aplet, Dennis P. Dykstra, Russell T. Graham, John F. Lehmkuhl, David S. Pilliod, Donald F. Potts, Robert F. Powers, John D. Stuart

Year Published: 2009

Type: Document

Technical Report or White Paper

### **Thermal characteristics of amphibian microhabitats in a fire-disturbed landscape**

[www.nrfirescience.org/resource/8402](http://www.nrfirescience.org/resource/8402)

Disturbance has long been a central issue in amphibian conservation, often regarding negative effects of logging or other forest management activities, but some amphibians seem to prefer disturbed habitats. After documenting increased use of recently burned forests by boreal toads (*Bufo boreas*), we hypothesized that burned habitats...

Author(s): Blake R. Hossack, Lisa A. Eby, C. Gregory Guscio, Paul S. Corn

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Ecological effects of prescribed fire season: a literature review and synthesis for managers**

[www.nrfirescience.org/resource/12616](http://www.nrfirescience.org/resource/12616)

This synthesis project on season of prescribed burning is to summarize results from studies to date in order to provide managers a resource for predicting fire effects and understanding what variables drive these fire effects in different areas of the country with varying fire regimes. A secondary objective will be to identify key...

Author(s): Eric E. Knapp, Becky L. Estes, Carl N. Skinner

Year Published: 2009

Type: Document

Synthesis, Technical Report or White Paper

### **Listening to the message of the Black-backed Woodpecker, a hot fire specialist**

[www.nrfirescience.org/resource/11083](http://www.nrfirescience.org/resource/11083)

The Black-backed Woodpecker is an uncommon bird of the northern coniferous forests of North America. It is one of several species of fauna that are considered fire specialists. This woodpecker nests in cavities it creates in dead standing trees and feeds on wood-boring beetles and their larvae, which are also attracted to stressed...

Author(s): Elise LeQuire

Year Published: 2009

Type: Document

Research Brief or Fact Sheet

### **A MODIS direct broadcast algorithm for mapping wildfire burned area in the western United States**

[www.nrfirescience.org/resource/8191](http://www.nrfirescience.org/resource/8191)

Improved wildland fire emission inventory methods are needed to support air quality forecasting and guide the development of air shed management strategies. Air quality forecasting requires dynamic fire emission estimates that are generated in a timely manner to support real-time operations. In the regulatory and planning realm,...

Author(s): Shawn P. Urbanski, J. Meghan Salmon, Bryce L. Nordgren, Wei Min Hao

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Fuel treatments, fire suppression, and their interaction with wildfire and its impacts: the Warm Lake experience during the Cascade Complex of wildfires in central Idaho, 2007**

[www.nrfirescience.org/resource/11435](http://www.nrfirescience.org/resource/11435)

Wildfires during the summer of 2007 burned over 500,000 acres within central Idaho. These fires burned around and through over 8,000 acres of fuel treatments designed to offer protection from wildfire to over 70 summer homes and other buildings located near Warm Lake. This area east of Cascade, Idaho, exemplifies the difficulty of...

Author(s): Russell T. Graham, Theresa B. Jain, Mark Loseke

Year Published: 2009  
Type: Document  
Technical Report or White Paper

### **Modeling the effects of fire and climate change on carbon and nitrogen storage in lodgepole pine (*Pinus contorta*) stands**

[www.nrfirescience.org/resource/13547](http://www.nrfirescience.org/resource/13547)

The interaction between disturbance and climate change and resultant effects on ecosystem carbon (C) and nitrogen (N) fluxes are poorly understood. Here, we model (using CENTURY version 4.5) how climate change may affect C and N fluxes among mature and regenerating lodgepole pine (*Pinus contorta* var. *latifolia* Engelm. ex S. Wats.)...

Author(s): Erica A. H. Smithwick, Michael G. Ryan, Daniel M. Kashian, William H. Romme, Daniel B. Tinker, Monica G. Turner

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Three years of hillslope sediment yields following the Valley Complex fires, western Montana**

[www.nrfirescience.org/resource/11147](http://www.nrfirescience.org/resource/11147)

The 2000 Bitterroot Valley wildfires provided an opportunity to measure post-fire effects and recovery rates. We established 24 small (0.01 ha [0.02 acre]) plots in four high-severity burn sites. We measured sediment yields at each site with silt fences. We also measured rainfall characteristics, soil water repellency, vegetative...

Author(s): Peter R. Robichaud, Joseph W. Wagenbrenner, Robert E. Brown, Kevin M. Spigel

Year Published: 2009

Type: Document

Technical Report or White Paper

### **Filling in the blanks for prescribed fire in shrublands: developing information to support improved fire planning**

[www.nrfirescience.org/resource/11086](http://www.nrfirescience.org/resource/11086)

By collecting information on fuel loading, fuel consumption, fuel moisture, site conditions and fire weather on fires in a variety of shrubland types, researchers are developing a fuller knowledge of shrubland fire effects. Results are being integrated into the software package CONSUME, a user-friendly software tool for predicting...

Author(s): Jake Delwiche

Year Published: 2009

Type: Document

Research Brief or Fact Sheet

### **Seasonal predictions for wildland fire severity**

[www.nrfirescience.org/resource/11064](http://www.nrfirescience.org/resource/11064)

The National Fire Danger Rating System (NFDRS) indices deduced from the monthly to seasonal predictions of a meteorological climate model at 50-km grid space from January 1998 through December 2003 were used in conjunction with a probability model to predict the expected number of fire occurrences and large fires over the U.S. West...

Author(s): Shyh-Chin Chen, Haiganoush K. Preisler, Francis M. Fujioka, John W. Benoit, John O. Roads

Year Published: 2009

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Fire intensity, fire severity and burn severity: a brief review**

[www.nrfirescience.org/resource/16309](http://www.nrfirescience.org/resource/16309)

Several recent papers have suggested replacing the terminology of fire intensity and fire severity. Part of the problem with fire intensity is that it is sometimes used incorrectly to describe fire effects, when in fact it is justifiably restricted to measures of energy output. Increasingly, the term has created confusion because...

Author(s): Jon E. Keeley

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Assessing fuel treatment effectiveness using satellite imagery and spatial statistics**

[www.nrfirescience.org/resource/8227](http://www.nrfirescience.org/resource/8227)

Understanding the influences of forest management practices on wildfire severity is critical in fire-prone ecosystems of the western United States. Newly available geospatial data sets characterizing vegetation, fuels, topography, and burn severity offer new opportunities for studying fuel treatment effectiveness at regional to...

Author(s): Michael C. Wimberly, Mark A. Cochrane, Adam D. Baer, Kari Pabst

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Landscape heterogeneity following large fires: insights from Yellowstone National Park, USA**

[www.nrfirescience.org/resource/8198](http://www.nrfirescience.org/resource/8198)

We characterised the remarkable heterogeneity following the large, severe fires of 1988 in Yellowstone National Park (YNP), in the northern Rocky Mountains, Wyoming, USA, by focussing on spatial variation in post-fire structure, composition and ecosystem function at broad, meso, and fine scales. Ecological heterogeneity at multiple...

Author(s): Tania L. Schoennagel, Erica A. H. Smithwick, Monica G. Turner

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Spatial characteristics of fire severity in relation to fire growth in a Rocky Mountain subalpine forest**

[www.nrfirescience.org/resource/11485](http://www.nrfirescience.org/resource/11485)

We compared the spatial characteristics of fire severity patches within individual fire "runs" (contiguous polygons burned during a given day) resulting from a 72,000 ha fire in central Idaho in 1994. Our hypothesis was that patch characteristics of four fire severity classes (high, moderate, low, and unburned), as captured by five...

Author(s): Calvin A. Farris, Ellis Q. Margolis, John A. Kupfer

Year Published: 2008

Type: Document

Conference Proceedings, Technical Report or White Paper

### **The ecological importance of severe wildfires: some like it hot**

[www.nrfirescience.org/resource/8229](http://www.nrfirescience.org/resource/8229)

Many scientists and forest land managers concur that past fire suppression, grazing, and timber harvesting practices have created unnatural and unhealthy conditions in the dry, ponderosa pine forests

of the western United States. Specifically, such forests are said to carry higher fuel loads and experience fires that are more severe...

Author(s): Richard L. Hutto

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Earth and fire: forests rely on healthy soils for a well-rounded diet**

[www.nrfirescience.org/resource/11081](http://www.nrfirescience.org/resource/11081)

Historically, frequent low-intensity, dormant-season fire shaped the landscape across a variety of forests in the United States, from eastern hardwood and hardwood/conifer mixtures to western coniferous forests. Decades of fire exclusion have resulted in heavy fuel loads and increased threat of severe wildfire compared to historic...

Author(s): Elise LeQuire

Year Published: 2008

Type: Document

Research Brief or Fact Sheet

### **Real time monitoring of the three dimensional distribution of smoke aerosol levels from prescribed fires and wildfires - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11168](http://www.nrfirescience.org/resource/11168)

Particulates emitted by wildfires and prescribed fires can severely affect visibility and air quality resulting in car accidents, airport and road closures, and public health problems. Researchers have developed a new remote-sensing instrument (lidar) and are now calibrating and testing this and auxiliary instrumentation and new...

Author(s): Wei Min Hao, Vladimir A. Kovalev

Year Published: 2008

Type: Document

Technical Report or White Paper

### **A 2000-year environmental history of Jackson Hole, Wyoming, inferred from lake-sediment records**

[www.nrfirescience.org/resource/15402](http://www.nrfirescience.org/resource/15402)

Little is known about the disturbance history of low-elevation forest and steppe vegetation in the western United States, nor about the relative importance of climate and human activity in shaping present-day plant communities. We analyzed pollen and high-resolution macroscopic charcoal records spanning the last 2100, 1000, and 550...

Author(s): Karen Jacobs, Cathy L. Whitlock

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Soil water repellency and infiltration in coarse-textured soils of burned and unburned sagebrush ecosystems**

[www.nrfirescience.org/resource/11424](http://www.nrfirescience.org/resource/11424)

Millions of dollars are spent each year in the United States to mitigate the effects of wildfires and reduce the risk of flash floods and debris flows. Research from forested, chaparral, and rangeland communities indicate that severe wildfires can cause significant increases in soil water repellency resulting in increased runoff and...

Author(s): Frederick B. Pierson, Peter R. Robichaud, Corey A. Moffet, Kenneth E. Spaeth, Christopher Jason Williams, Stuart P. Hardegree, Patrick E. Clark

Year Published: 2008  
Type: Document  
Book or Chapter or Journal Article

### **Fire, native species, and soil resource interactions influence the spatio-temporal invasion pattern of *Bromus tectorum***

[www.nrfirescience.org/resource/8362](http://www.nrfirescience.org/resource/8362)

*Bromus tectorum* (cheatgrass) is an invasive annual that occupies perennial grass and shrub communities throughout the western United States. *Bromus tectorum* exhibits an intriguing spatio-temporal pattern of invasion in low elevation ponderosa pine *Pinus ponderosa*/bunchgrass communities in western Montana where it forms dense rings...

Author(s): Michael J. Gundale, Steve Sutherland, Thomas H. DeLuca

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Wildfire smoke: a guide for public health officials**

[www.nrfirescience.org/resource/12451](http://www.nrfirescience.org/resource/12451)

Smoke rolls into town, blanketing the city, turning on streetlights, creating an eerie and choking fog. Switchboards light up as people look for answers. Citizens want to know what they should do to protect themselves. School officials want to know if outdoor events should be cancelled. The news media want to know how dangerous the...

Author(s): Michael Lipsett, Barbara Materna, Susan Lyon Stone, Shannon Therriault, Robert Blaisdell, Jeff Cook

Year Published: 2008

Type: Document

Technical Report or White Paper

### **Fuel consumption and flammability thresholds in shrub-dominated ecosystems - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11164](http://www.nrfirescience.org/resource/11164)

Research to quantify fuel consumption and flammability in shrub-dominated ecosystems has received little attention despite the widespread occurrence of fire-influenced, shrub-dominated landscapes across the arid lands of the western United States. While some research has addressed issues relating to fire behavior in some shrub...

Author(s): Clinton S. Wright, Roger D. Ottmar, Sue A. Ferguson, Robert E. Vihnanek

Year Published: 2007

Type: Document

Technical Report or White Paper

### **Big and black sagebrush landscapes**

[www.nrfirescience.org/resource/15405](http://www.nrfirescience.org/resource/15405)

Perhaps no plant evokes a common vision of the semi-arid landscapes of western North America as do the sagebrushes. A collective term, sagebrush is applied to shrubby members of the mostly herbaceous genus, *Artemisia* L. More precisely, the moniker is usually restricted to members of subgenus *Tridentatae*, a collection of some 20...

Author(s): Stanley G. Kitchen, E. Durant McArthur

Year Published: 2007

Type: Document

Conference Proceedings

### **Assessing accuracy of manually-mapped wildfire perimeters in topographically dissected areas**

[www.nrfirescience.org/resource/11430](http://www.nrfirescience.org/resource/11430)

Accurate mapping of wildfires is critical to fire management. Technological advances in remotesensing and Geographic Information Systems (GIS) over the last decade have been widely incorporated into wildfire mapping and management, but neither have been assessed for accuracy nor compared to established manual methods. Since Landsat-...

Author(s): Crystal A. Kolden, Peter J. Weisberg

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **The relation between tree burn severity and forest structure in the Rocky Mountains**

[www.nrfirescience.org/resource/11987](http://www.nrfirescience.org/resource/11987)

Many wildfire events have burned thousands of hectares across the western United States, such as the Bitterroot (Montana), Rodeo-Chediski (Arizona), Hayman (Colorado), and Biscuit (Oregon) fires. These events led to Congress enacting the Healthy Forest Restoration Act of 2003, which, with other policies, encourages federal and state...

Author(s): Theresa B. Jain, Russell T. Graham

Year Published: 2007

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Vegetation and soil effects from prescribed, wild, and combined fire events along a ponderosa pine and grassland mosaic**

[www.nrfirescience.org/resource/11241](http://www.nrfirescience.org/resource/11241)

We describe the efficacy of prescribed fires after two wildfires burned through and around these fires located in eastern Montana within the Missouri River Breaks. The objectives of the prescribed fires were to decrease tree density and favor increased herbaceous cover, thus decreasing the potential for crown fire. Our objective was...

Author(s): Theresa B. Jain, Molly Juillerat, Jonathan Sandquist, Mike Ford, Brad Sauer, Robert J. Mitchell, Scott McAvoy, Justin Hanley, Jon David

Year Published: 2007

Type: Document

Technical Report or White Paper

### **The relationship of multispectral satellite imagery to immediate fire effects**

[www.nrfirescience.org/resource/8390](http://www.nrfirescience.org/resource/8390)

The Forest Service Remote Sensing Applications Center (RSAC) and the U.S. Geological Survey Earth Resources Observation and Science (EROS) Data Center produce Burned Area Reflectance Classification (BARC) maps for use by Burned Area Emergency Response (BAER) teams in rapid response to wildfires. BAER teams desire maps indicative of...

Author(s): Andrew T. Hudak, Penelope Morgan, Michael J. Bobbitt, Alistair M. S. Smith, Sarah A. Lewis, Leigh B. Lentile, Peter R. Robichaud, Jess T. Clark, Randy McKinley

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Predicting postfire erosion and mitigation effectiveness with a web-based probabilistic erosion model**

[www.nrfirescience.org/resource/8138](http://www.nrfirescience.org/resource/8138)

The decision of where, when, and how to apply the most effective postfire erosion mitigation treatments requires land managers to assess the risk of damaging runoff and erosion events occurring after a fire. To meet this challenge, the Erosion Risk Management Tool (ERMiT) was developed. ERMiT is a web-based application that uses the...

Author(s): Peter R. Robichaud, William J. Elliot, Frederick B. Pierson, David E. Hall, Corey A. Moffet

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Delayed Conifer Tree Mortality Following Fire in California**

[www.nrfirescience.org/resource/16311](http://www.nrfirescience.org/resource/16311)

Fire injury was characterized and survival monitored for 5,246 trees from five wildfires in California that occurred between 1999 and 2002. Logistic regression models for predicting the probability of mortality were developed for incense-cedar, Jeffrey pine, ponderosa pine, red fir and white fir. Two-year post-fire preliminary...

Author(s): Sharon M. Hood, Sheri L. Smith, Danny R. Cluck

Year Published: 2007

Type: Document

Technical Report or White Paper

### **The effect of spring prescribed fires on nitrogen dynamics within riparian and stream ecosystems - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11173](http://www.nrfirescience.org/resource/11173)

The effects of prescribed fires on nitrogen dynamics in N limited headwater ecosystems in the northern Rocky Mountains of central Idaho are being investigated. This replicated study studies causal mechanisms that regulate nitrogen (N) dynamics between small headwater streams, riparian vegetation and soil following spring prescribed...

Year Published: 2007

Type: Document

Technical Report or White Paper

### **Assessing post-fire values-at-risk with a new calculation tool**

[www.nrfirescience.org/resource/11127](http://www.nrfirescience.org/resource/11127)

Wildfire effects include loss of vegetative cover and changes to soil properties that may lead to secondary effects of increased runoff, erosion, flooding, sedimentation, and vulnerability to invasive weeds. These secondary effects may threaten human life and safety, cultural and ecological resources, land use, and existing...

Author(s): David E. Calkin, Kevin D. Hyde, Peter R. Robichaud, J. Greg Jones, Louise E. Ashmun, Dan R. Loeffler

Year Published: 2007

Type: Document

Technical Report or White Paper

### **Runoff and erosion effects after prescribed fire and wildfire on volcanic ash-cap soils**

[www.nrfirescience.org/resource/11041](http://www.nrfirescience.org/resource/11041)

After prescribed burns at three locations and one wildfire, rainfall simulations studies were completed to compare postfire runoff rates and sediment yields on ash-cap soil in conifer forest regions of northern Idaho and western Montana. The measured fire effects were differentiated by burn severity (unburned, low, moderate, and...

Author(s): Peter R. Robichaud, Frederick B. Pierson, Robert E. Brown

Year Published: 2007



Type: Document  
Conference Proceedings

### **Post-fire burn severity and vegetation response following eight large wildfires across the western United States**

[www.nrfirescience.org/resource/8168](http://www.nrfirescience.org/resource/8168)

Vegetation response and burn severity were examined following eight large wildfires that burned in 2003 and 2004: two wildfires in California chaparral, two each in dry and moist mixed-conifer forests in Montana, and two in boreal forests in interior Alaska. Our research objectives were: 1) to characterize one year post-fire...

Author(s): Leigh B. Lentile, Penelope Morgan, Andrew T. Hudak, Michael J. Bobbitt, Sarah A. Lewis, Alistair M. S. Smith, Peter R. Robichaud

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Using focus groups to involve citizens in resource management - investigating perceptions of smoke as a barrier to prescribed forest burning**

[www.nrfirescience.org/resource/11214](http://www.nrfirescience.org/resource/11214)

Participants in a series of focus groups discussed how their tolerance for smoke varied by the source of the smoke and found their opinions changing as they talked with other participants. Even those opposed to smoke from agricultural burning eventually found smoke from prescribed forest burning would be acceptable under appropriate...

Author(s): Brad R. Weisshaupt, Matthew S. Carroll, Keith A. Blatner, Pamela J. Jakes

Year Published: 2006

Type: Document

Technical Report or White Paper

### **Managing fire-prone forests in the Western United**

[www.nrfirescience.org/resource/16308](http://www.nrfirescience.org/resource/16308)

The management of fire-prone forests is one of the most controversial natural resource issues in the US today, particularly in the west of the country. Although vegetation and wildlife in these forests are adapted to fire, the historical range of fire frequency and severity was huge. When fire regimes are altered by human activity,...

Author(s): Reed F. Noss, Jerry F. Franklin, William L. Baker, Tania L. Schoennagel, Peter B. Moyle

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **The relation between forest structure and soil burn severity**

[www.nrfirescience.org/resource/10978](http://www.nrfirescience.org/resource/10978)

A study funded through National Fire Plan evaluates the relation between pre-wildfire forest structure and post-wildfire soil burn severity across three forest types: dry, moist, and cold forests. Over 73 wildfires were sampled in Idaho, Oregon, Montana, Colorado, and Utah, which burned between 2000 and 2003. Because of the study's...

Author(s): Theresa B. Jain, Russell T. Graham, David S. Pilliod

Year Published: 2006

Type: Document

Conference Proceedings

### **Vegetation response to restoration treatments in ponderosa pine-Douglas-fir forests**

[www.nrfirescience.org/resource/11503](http://www.nrfirescience.org/resource/11503)

The study site is located at the University of Montana's Lubrecht Experimental Forest, Missoula County, Montana, USA. This study is 1 of 13 in a nationwide network of Fire/Fire Surrogate (FFS) studies investigating the interdisciplinary effects of treatments designed to reduce fire hazard and restore the structure and function of...

Author(s): Kerry L. Metlen, Erich K. Dodson, Carl E. Fiedler

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

### **Fire effects on vegetation recovery following eight large western wildfires**

[www.nrfirescience.org/resource/10986](http://www.nrfirescience.org/resource/10986)

We examined vegetation diversity and landscape pattern relative to burn severity following eight large wildfires that burned in 2003 and 2004 in California chaparral, in mixed conifer forests in Montana, and in boreal forests in interior Alaska. Our goal was to relate post-fire vegetation recovery and field and remotely sensed...

Author(s): Leigh B. Lentile, Penelope Morgan, Michael J. Bobbitt, Sarah A. Lewis, Andrew T. Hudak, Peter R. Robichaud

Year Published: 2006

Type: Document

Conference Proceedings

### **Short- and longer-term effects of fire and herbivory on sagebrush communities in south-central Montana**

[www.nrfirescience.org/resource/15440](http://www.nrfirescience.org/resource/15440)

To better understand the role of herbivory and fire as potential disturbance processes in sagebrush communities, we examined responses of a grazing ungulate, elk (*Cervus elaphus*), following prescribed burning of sagebrush (*Artemisia tridentata* ssp. *vaseyana*) in south-central Montana (USA.) with concurrent monitoring of changes in...

Author(s): Fred Van Dyke, Jeffrey A. Darragh

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Understory recovery after low-and high-intensity fires in northern Idaho ponderosa pine forests**

[www.nrfirescience.org/resource/11502](http://www.nrfirescience.org/resource/11502)

Comparisons between unburned sites, low-intensity fires, and high-intensity fires in this ponderosa pine-dominated community indicate that a majority of the species coverages and frequencies are unchanged regardless of burn treatment. Also, a majority of species that were impacted by the fires showed increased coverage and/or...

Author(s): Corey L. Gucker

Year Published: 2005

Type: Document

Research Brief or Fact Sheet

### **Automated forecasting of smoke dispersion and air quality using NASA terra and aqua satellite data (Task 5) - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11150](http://www.nrfirescience.org/resource/11150)

This document contains a description of the air quality forecasting system in operation at the Missoula Fire Science Laboratory. This air quality forecasting system has been steadily assimilating new

techniques and algorithms as they have been developed over the past four years. Individual components as well as assemblies of...

Author(s): Wei Min Hao, Shawn P. Urbanski

Year Published: 2005

Type: Document

Technical Report or White Paper

### **Assessing the causes, consequences and spatial variability of burn severity: a rapid response proposal - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11149](http://www.nrfirescience.org/resource/11149)

In this rapid response project, we have collected data on post-fire effects and pre-fire fuels and vegetation from 10 large fires that burned in 2003 and 2004. We use field and remotely sensed data collected during and soon after wildfires to quantify the interactions and spatial variability in fire effects, fuels, fire behavior,...

Author(s): Penelope Morgan, Andrew T. Hudak, Peter R. Robichaud, Kevin C. Ryan

Year Published: 2005

Type: Document

Technical Report or White Paper

### **Fish and stream habitat risks from uncharacteristic wildfire: observations from 17 years of fire-related disturbances on the Boise National Forest, Idaho**

[www.nrfirescience.org/resource/11451](http://www.nrfirescience.org/resource/11451)

Several large, uncharacteristic wildfires occurred on the Boise National Forest in Southwest Idaho, from 1986 to 2003. From 1987 to 1994, severe wildfires burned almost 50% of the ponderosa pine forest types (about 200,000 ha). The intensity of the fires varied across the landscape, with a mix of low to moderate severity, and lesser...

Author(s): Timothy A. Burton

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

### **Post-fire vegetative dynamics as drivers of microbial community structure and function in forest soils**

[www.nrfirescience.org/resource/7938](http://www.nrfirescience.org/resource/7938)

Soil microorganisms have numerous functional roles in forest ecosystems, including: serving as sources and sinks of key nutrients and catalysts of nutrient transformations; acting as engineers and maintainers of soil structure; and forming mutualistic relationships with roots that improve plant fitness. Although both prescribed and...

Author(s): Stephen C. Hart, Thomas H. DeLuca, Gregory S. Newman, M. Derek MacKenzie, Sarah I. Boyle

Year Published: 2005

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Changes in bird abundance after wildfire: importance of fire severity and time since fire**

[www.nrfirescience.org/resource/8256](http://www.nrfirescience.org/resource/8256)

Fire can cause profound changes in the composition and abundance of plant and animal species, but logistics, unpredictability of weather, and inherent danger make it nearly impossible to study high-severity fire effects experimentally. We took advantage of a unique opportunity to use a before-after/control-impact (BACI) approach to...

Author(s): Kristina M. Smucker, Richard L. Hutto, Brian M. Steele

Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article

**Measurement of post-fire hillslope erosion to evaluate and model rehabilitation treatment effectiveness and recovery**

[www.nrfirescience.org/resource/8137](http://www.nrfirescience.org/resource/8137)

The increasing size and severity of wildfires in the western United States has caused a corresponding increase in post-fire emergency erosion control activities. Hillslope treatments, such as broadcast seeding, mulching and installed barriers, are applied to reduce runoff and erosion, as well as downslope sedimentation. However,...

Author(s): Peter R. Robichaud

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

**Near real-time emissions of trace gases and aerosol particles from biomass burning based on MODIS direct broadcast data**

[www.nrfirescience.org/resource/10961](http://www.nrfirescience.org/resource/10961)

Biomass burning is an important source of many atmospheric trace gases and aerosol particles. Quantitative characterization of biomass burning emissions is critical for modeling atmospheric chemistry and assessing the impact of fires on air quality, tropospheric ozone chemistry, and global climate. However, advancement in...

Author(s): Wei Min Hao, J. Meghan Salmon, Bryce L. Nordgren, Shawn P. Urbanski

Year Published: 2005

Type: Document

Conference Proceedings

**Effects of prescribed and wildland fire on aquatic ecosystems in western forests - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11161](http://www.nrfirescience.org/resource/11161)

The goal of the project is to understand how fire in upland and riparian forests influence stream communities and whether prescription burning mimics the ecological function of fire in a watershed. The project has two components: wildland fire and prescribed fire. To document the range of biotic and abiotic responses to wildland...

Author(s): David S. Pilliod, R. Bruce Bury, Paul S. Corn

Year Published: 2005

Type: Document

Technical Report or White Paper

**Lewis's Woodpecker (*Melanerpes lewis*): a technical conservation assessment**

[www.nrfirescience.org/resource/11498](http://www.nrfirescience.org/resource/11498)

Lewis's woodpecker (*Melanerpes lewis*) is a locally common but patchily distributed woodpecker species usually seen in open forests of western North America. The combination of its sporadic distribution, its diet of adult-stage free-living insects (primarily aerial), its preference to nest in burned landscapes, and its variable...

Author(s): Stephen C. Abele, Victoria A. Saab, Edward O. Garton

Year Published: 2004

Type: Document

Technical Report or White Paper

### **Is forest structure related to fire severity? Yes, no, and maybe: methods and insights in quantifying the answer**

[www.nrfirescience.org/resource/10977](http://www.nrfirescience.org/resource/10977)

Wildfires in 2000 burned over 500,000 forested ha in the Northern Rocky Mountains. In 2001, National Fire Plan funding became available to evaluate the influence of pre-wildfire forest structure on post wildfire fire severity. Results from this study will provide information on forest structures that are resilient to wildfire. Three...

Author(s): Theresa B. Jain, Russell T. Graham

Year Published: 2004

Type: Document

Conference Proceedings

### **Western white pine growth relative to forest openings**

[www.nrfirescience.org/resource/7946](http://www.nrfirescience.org/resource/7946)

In northern Rocky Mountains moist forests, timber harvesting, fire exclusion, and an introduced stem disease have contributed to the decline in western white pine (*Pinus monticola* Dougl. ex D. Don) abundance (from 90% to 10% of the area). Relations between canopy openings (0.1-15 ha) and western white pine growth within different...

Author(s): Theresa B. Jain, Russell T. Graham, Penelope Morgan

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

### **The relationship of field burn severity measures to satellite-derived Burned Area Reflectance Classification (BARC) maps**

[www.nrfirescience.org/resource/10971](http://www.nrfirescience.org/resource/10971)

Preliminary results are presented from ongoing research on spatial variability of fire effects on soils and vegetation from the Black Mountain Two and Cooney Ridge wildfires, which burned in western Montana during the 2003 fire season. Extensive field fractional cover data were sampled to assess the efficacy of quantitative...

Author(s): Andrew T. Hudak, Penelope Morgan, Carter Stone, Peter R. Robichaud, Theresa B. Jain, Jess T. Clark

Year Published: 2004

Type: Document

Conference Proceedings

### **Fuels planning: science synthesis and integration; environmental consequences fact sheet 2: First Order Fire Effects Model (FOFEM)**

[www.nrfirescience.org/resource/11098](http://www.nrfirescience.org/resource/11098)

FOFEM 5.2 is a simple, yet versatile computer program that predicts first order fire effects using text and graphic outputs. It can be used in a variety of situations including: determining acceptable upper and lower fuel moistures for conducting prescribed burns, determining the number of acres that may be burned on a given day...

Author(s): Steve Sutherland

Year Published: 2004

Type: Document

Research Brief or Fact Sheet

### **Field validation of Burned Area Reflectance Classification (BARC) products for post fire assessment**

[www.nrfirescience.org/resource/10972](http://www.nrfirescience.org/resource/10972)

The USFS Remote Sensing Applications Center (RSAC) and the USGS EROS Data Center (EDC) produce Burned Area Reflectance Classification (BARC) maps for use by Burned Area Emergency Rehabilitation (BAER) teams in rapid response to wildfires. BAER teams desire maps indicative of soil burn severity, but photosynthetic and...

Author(s): Andrew T. Hudak, Peter R. Robichaud, Jeffrey B. Evans, Jess T. Clark, Keith Lannom, Penelope Morgan, Carter Stone

Year Published: 2004

Type: Document

Conference Proceedings

### **Smoke produced from residual combustion**

[www.nrfirescience.org/resource/11140](http://www.nrfirescience.org/resource/11140)

Considerable research has been carried out to estimate the chemical composition and the amount of trace gases and particulate matter emitted during short-duration flaming and smoldering combustion of fuels in the fire-prone forest and grassland ecosystems. For other forest ecosystems, where long-duration residual smoldering...

Author(s): Ronald E. Babbitt, Wei Min Hao

Year Published: 2004

Type: Document

Technical Report or White Paper

### **Performance of fuel treatments subjected to wildfires**

[www.nrfirescience.org/resource/11038](http://www.nrfirescience.org/resource/11038)

Fire severity was evaluated in eight recent wildfires with standardized methods in adjacent treated and untreated stands. Sampled sites occurred in a variety of conifer forests throughout the Western United States. Treatments included reduction of surface fuels and crown fuels, both in isolation and in combination. Synthesis of our...

Author(s): Erik J. Martinson, Philip N. Omi

Year Published: 2003

Type: Document

Conference Proceedings

### **Postfire aspen seedling recruitment across the Yellowstone (USA) landscape**

[www.nrfirescience.org/resource/13542](http://www.nrfirescience.org/resource/13542)

Landscape patterns of quaking aspen (*Populus tremuloides*) seedling occurrence and abundance were studied after a rare recruitment event following the 1988 fires in Yellowstone National Park, Wyoming, USA. Belt transects (1 to 17 km in length, 4 m width) along 18 foot trails were surveyed for aspen seedlings on the...

Author(s): Monica G. Turner, William H. Romme, Gerald A. Tuskan, Rebecca A. Reed

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Performance of high temperature heat flux plates and soil moisture probes during controlled surface fires**

[www.nrfirescience.org/resource/10987](http://www.nrfirescience.org/resource/10987)

Natural and prescribed fires play an important role in managing and maintaining most ecosystems in the western United States. The high soil temperatures associated with fire influence forests and their ability to regenerate after a fire by altering soil properties and soil chemistry and by killing microbes, plant roots, and seeds....

Author(s): William J. Massman, John M. Frank, S. M. Massman, Wayne D. Shepperd  
Year Published: 2003  
Type: Document  
Conference Proceedings

**The normalized burn ratio (NBR): A Landsat TM radiometric measure of burn severity**

[www.nrfirescience.org/resource/11185](http://www.nrfirescience.org/resource/11185)

We used the Composite Burn Indices sampled in the field to test performance of radiometric measures as estimators of burn severity. Two 1994 fires occurring at Glacier National Park, Montana, were investigated. Indices incorporated band ratios and multi-temporal differencing derived from the Landsat Thematic Mapper, including: 1)...

Author(s): Carl H. Key, Nathan C. Benson  
Year Published: 2003  
Type: Document  
Technical Report or White Paper

**Impacts of fire on hydrology and erosion in steep mountain big sagebrush communities**

[www.nrfirescience.org/resource/11407](http://www.nrfirescience.org/resource/11407)

Wildfire is an important ecological process and management issue on western rangelands. Major unknowns associated with wildfire are its affects on vegetation and soil conditions that influence hydrologic processes including infiltration, surface runoff, erosion, sediment transport, and flooding. Post wildfire hydrologic response was...

Author(s): Frederick B. Pierson, Peter R. Robichaud, Kenneth E. Spaeth, Corey A. Moffet  
Year Published: 2003  
Type: Document  
Conference Proceedings

**Microbial activity and nitrogen mineralization in forest mineral soils following heating: evaluation of post-fire effects**

[www.nrfirescience.org/resource/8292](http://www.nrfirescience.org/resource/8292)

Heat generated during fire induces chemical oxidation of soil organic matter thereby altering carbon (C) and nitrogen (N) transformations. Prior soil fire history and soil moisture content at the time of heating can be confounding factors in the interpretation of the influence of heat on soil processes. In this study we evaluated...

Author(s): Urszula Choromanska, Thomas H. DeLuca  
Year Published: 2002  
Type: Document  
Book or Chapter or Journal Article

**Wildfire and erosion: when to expect the unexpected**

[www.nrfirescience.org/resource/10999](http://www.nrfirescience.org/resource/10999)

Wildfire is a major ecological process and management issue in the western U.S. The 2000, 2001 and 2002 fire seasons were some of the biggest in history with over 2 million ha burned annually. What happens when the rains come? Most wildfires create a patchwork of low, moderate, and high severity burn areas, often causing spatially...

Author(s): Peter R. Robichaud  
Year Published: 2002  
Type: Document  
Conference Proceedings

### **Wildland fire in ecosystems: effects of fire on air**

[www.nrfirescience.org/resource/12587](http://www.nrfirescience.org/resource/12587)

This state-of-knowledge review about the effects of fire on air quality can assist land, fire, and air resource managers with fire and smoke planning, and their efforts to explain to others the science behind fire-related program policies and practices to improve air quality. Chapter topics include air quality regulations and fire;...

Author(s): David V. Sandberg, Roger D. Ottmar, Janice L. Peterson, John Core

Year Published: 2002

Type: Document

Technical Report or White Paper

### **Using a MODIS direct broadcast system to monitor fires and smoke, and forecast air quality**

[www.nrfirescience.org/resource/10960](http://www.nrfirescience.org/resource/10960)

The MODIS instrument on the NASA Terra satellite has been conducting routine global measurements of active fires and aerosol optical depths since late 2000. Currently, it takes more than 4 days to acquire MODIS data from the NASA DAAC Center, making it difficult to use the results to understand air quality and the extent of fire and...

Author(s): Wei Min Hao, Yoram J. Kaufman, Jacques Descloitres, Christopher O. Justice, Robert Sohlberg, Thomas Bobbe

Year Published: 2002

Type: Document

Conference Proceedings

### **Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests**

[www.nrfirescience.org/resource/8121](http://www.nrfirescience.org/resource/8121)

Fire exclusion policies have affected stand structure and wildfire hazard in north American ponderosa pine forests. Wildfires are becoming more severe in stands where trees are densely stocked with shade-tolerant understory trees. Although forest managers have been employing fuel treatment techniques to reduce wildfire hazard for...

Author(s): Jolie Pollet, Philip N. Omi

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **Impacts of wildfire on soil hydrological properties of steep sagebrush-steppe rangeland**

[www.nrfirescience.org/resource/11441](http://www.nrfirescience.org/resource/11441)

In late August 1996, a wildfire swept across the sagebrush-dominated foothills above Boise, Idaho. Fire impacts on infiltration and inter-rill erosion were examined 1 year following the fire with simulated rainfall. Densely vegetated north-facing slopes were compared with sparsely vegetated south-facing slopes under both burned (...)

Author(s): Frederick B. Pierson, D. H. Carlson, Kenneth E. Spaeth

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **Fire as a coarse filter for snags and logs**

[www.nrfirescience.org/resource/11075](http://www.nrfirescience.org/resource/11075)

Fire played an important role in maintaining and creating conditions suitable for native flora and fauna in the forests of western North America. Recent coarse filter conservation strategies have advocated creating future landscapes that incorporate historic or natural ranges of variability, including fire regimes. Historic fire...



Author(s): James K. Agee  
Year Published: 2002  
Type: Document  
Conference Proceedings, Technical Report or White Paper

### **Real-time smoke particulate sampling; fire storm 2000**

[www.nrfirescience.org/resource/11202](http://www.nrfirescience.org/resource/11202)

Reports the findings of a study comparing the results of instruments measuring smoke particulate in real time to gravimetric samplers in Missoula and Hamilton, Montana, during the summer of 2000. Real-time, particulate monitoring instruments were evaluated to determine their accuracy when measuring smoke particulate concentrations...

Author(s): Andy Trent, Mary A. Davies, Richard Karsky, Richard W. Fisher

Year Published: 2001

Type: Document

Technical Report or White Paper

### **Water quality, substratum and biotic responses of five central Idaho (USA) streams during the first year following the Mortar Creek fire**

[www.nrfirescience.org/resource/11442](http://www.nrfirescience.org/resource/11442)

The Mortar Creek Fire burned 26 000 ha of mixed-conifer Rocky Mountain forest in July-August 1979. Changes in burn stream conditions were examined relative to reference streams for various ecological factors on two to six occasions, from October 1979 to August 1980. Factors included major ions and nutrients, suspended and benthic...

Author(s): G. Wayne Minshall, James T. Brock, Douglas A. Andrews, Christopher T. Robinson

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **Infiltration rates after wildfires in the Bitterroot Valley**

[www.nrfirescience.org/resource/8425](http://www.nrfirescience.org/resource/8425)

Recent fires have renewed interest in fire's effect on different components of the ecosystem, in particular fire's effects on infiltration and runoff. Forests subjected to high severity burns often develop water repellent soil conditions. Under this condition, the infiltration of water into the soil is lowered and consequently...

Author(s): Juli A. Brady, Peter R. Robichaud, Frederick B. Pierson

Year Published: 2001

Type: Document

Conference Proceedings

### **Water repellency by laboratory burning of four Northern Rocky Mountain forest soils**

[www.nrfirescience.org/resource/8133](http://www.nrfirescience.org/resource/8133)

Highly variable water repellent soil conditions have been reported after forest fires. We examined interactions among heating, soil water content and soil texture on water repellency. Undisturbed, 305-mm diameter cores were collected in the field from four soils commonly referred to as ash-cap, mixed ash-cap, no ash-cap and granitic...

Author(s): Peter R. Robichaud, Roger D. Hungerford

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

## **Effects of selection harvest and prescribed fire on the soil nitrogen status of ponderosa pine forests**

[www.nrfirescience.org/resource/8272](http://www.nrfirescience.org/resource/8272)

One hundred years of timber harvest and reduced fire frequency have resulted in the conversion of once open stands of ponderosa pine (*Pinus ponderosa*) forests to dense forests dominated by Douglas-fir (*Pseudotsuga menziesii*). Selection harvest and harvest with prescribed fire have been identified as possible tools to restore...

Author(s): Thomas H. DeLuca, Kristin L. Zouhar

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

## **Fuel: logs, sticks, needles, duff, and much more**

[www.nrfirescience.org/resource/10957](http://www.nrfirescience.org/resource/10957)

Fuels burned by either prescribed or wildfires are complex and important components of forested ecosystems. Fine fuels consisting of fallen limbs, twigs, and leaves of shrubs and trees are rich in nutrients. If these fuels are not immediately burned, nutrients can leach from these materials into the forest floor, especially if they...

Author(s): Russell T. Graham, Theresa B. Jain, Alan E. Harvey

Year Published: 2000

Type: Document

Conference Proceedings, Synthesis

## **Chapter 1: Introduction to wildland fire in ecosystems: effects of fire on fauna**

[www.nrfirescience.org/resource/12603](http://www.nrfirescience.org/resource/12603)

Fires affect animals mainly through effects on their habitat. Fires often cause short-term increases in wildlife foods that contribute to increases in populations of some animals. These increases are moderated by the animals' ability to thrive in the altered, often simplified, structure of the postfire environment. The extent of...

Author(s): Jack L. Lyon, James K. Brown, Mark H. Huff, Jane Kapler Smith

Year Published: 2000

Type: Document

Technical Report or White Paper

## **Smoke exposure at western wildfires**

[www.nrfirescience.org/resource/11193](http://www.nrfirescience.org/resource/11193)

Smoke exposure measurements among firefighters at wildfires in the Western United States between 1992 and 1995 showed that altogether most exposures were not significant, between 3 and 5 percent of the shift-average exposures exceeded occupational exposure limits for carbon monoxide and respiratory irritants. Exposure to benzene and...

Author(s): Timothy E. Reinhardt, Roger D. Ottmar

Year Published: 2000

Type: Document

Technical Report or White Paper

## **Fire effects on infiltration rates after prescribed fire in Northern Rocky Mountain forests, USA**

[www.nrfirescience.org/resource/8134](http://www.nrfirescience.org/resource/8134)

Infiltration rates in undisturbed forest environments are generally high. These high infiltration rates may be reduced when forest management activities such as timber harvesting and/or prescribed fires are used. Post-harvest residue burning is a common site preparation treatment used in the Northern Rocky Mountains, USA, to reduce...

Author(s): Peter R. Robichaud  
Year Published: 2000  
Type: Document  
Book or Chapter or Journal Article

### **The role of fire in management of watershed responses**

[www.nrfirescience.org/resource/12004](http://www.nrfirescience.org/resource/12004)

Hydrologic responses of watersheds are strongly related to vegetation and soil disturbances. Many of the storage and transfer components of the global hydrologic cycle are altered by the occurrence of fire. The major effect of fire on the hydrologic functioning of watersheds is the removal of vegetation and litter materials that...

Author(s): Malcomb J. Zwolinski  
Year Published: 2000  
Type: Document  
Conference Proceedings

### **Spatial interpolation and simulation of post-burn duff thickness after prescribed fire**

[www.nrfirescience.org/resource/8132](http://www.nrfirescience.org/resource/8132)

Prescribed fire is used as a site treatment after timber harvesting. These fires result in spatial patterns with some portions consuming all of the forest floor material (duff) and others consuming little. Prior to the burn, spatial sampling of duff thickness and duff water content can be used to generate geostatistical spatial...

Author(s): Peter R. Robichaud, S. M. Miller  
Year Published: 1999  
Type: Document  
Book or Chapter or Journal Article

### **Prefire heterogeneity, fire severity, and early postfire plant reestablishment in subalpine forests of Yellowstone National Park, Wyoming**

[www.nrfirescience.org/resource/8212](http://www.nrfirescience.org/resource/8212)

The 1988 fires in Yellowstone National Park provided an opportunity to study effects of a large infrequent disturbance on a natural community. This study addressed two questions: (1) How does prefire heterogeneity of the landscape affect postfire patterns of fire severity? and (2) How do postfire patterns of burn severity influence...

Author(s): Monica G. Turner, William H. Romme, Robert H. Gardner  
Year Published: 1999  
Type: Document  
Book or Chapter or Journal Article

### **Germination and initial growth of four coniferous species on varied duff depths in northern Idaho**

[www.nrfirescience.org/resource/13129](http://www.nrfirescience.org/resource/13129)

Four conifer species [Douglas-fir (*Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco), ponderosa pine (*Pinus ponderosa* Dougl. ex. Laws.), western larch (*Larix occidentalis* Nutt.), and western white pine (*Pinus monticola* Dougl. ex. D. Don)], growing on three different duff depths on burned and unburned seedbeds, were examined for...

Author(s): Brian P. Oswald, Kent Wellner, Robin Boyce, Leon F. Neuenschwander  
Year Published: 1998  
Type: Document  
Book or Chapter or Journal Article

### **Effects of slash pile burning on the physical and chemical soil properties of Vassar soils**

[www.nrfirescience.org/resource/13125](http://www.nrfirescience.org/resource/13125)

To determine the initial effects of slash pile burning on chemical and physical properties in the Vassar soil series, mineral soil samples from two depths (2.5 cm and 12.5 cm) were collected before and after burning slash piles of four fuel loadings (0.5 m, 1 m, 2 m and 3 m) over wet and dry soils, as well as from burned and...

Author(s): Brian P. Oswald, Douglas Davenport, Leon F. Neuenschwander

Year Published: 1998

Type: Document

Book or Chapter or Journal Article

### **Reduce fire hazards in ponderosa pine by thinning**

[www.nrfirescience.org/resource/8148](http://www.nrfirescience.org/resource/8148)

Forest stands of fire-dependent ponderosa pine cover about 40 million acres (16 million ha) in the Western United States. Ponderosa pine is commonly found in pure stands on dry sites, but in more moist conditions, it is associated with Douglas-fir, lodgepole pine, western larch, and others.

Historically, these were often widely...

Author(s): Joe H. Scott

Year Published: 1998

Type: Document

Book or Chapter or Journal Article

### **Spatially-varied erosion modeling using WEPP for timber harvested and burned hillslopes**

[www.nrfirescience.org/resource/11035](http://www.nrfirescience.org/resource/11035)

Spatially-varied hydrologic surface conditions exist on steep hillslopes after timber harvest operation and site preparation burning treatments. Site preparation burning creates low- and high-severity burn surface conditions or disturbances. In this study, a hillslope was divided into multiple combinations of surface conditions to...

Author(s): Peter R. Robichaud, T. M. Monroe

Year Published: 1997

Type: Document

Conference Proceedings

### **A rare episode of sexual reproduction in aspen (*Populus tremuloides* Michx) following the 1988 Yellowstone fires**

[www.nrfirescience.org/resource/8236](http://www.nrfirescience.org/resource/8236)

No description available.

Author(s): William H. Romme, Monica G. Turner, Robert H. Gardner, William W. Hargrove, Gerald A. Tuskan, Don G. Despain, Roy A. Renkin

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

### **An introduction to the Fire and Fuels Extension to FVS**

[www.nrfirescience.org/resource/11073](http://www.nrfirescience.org/resource/11073)

The Fire Effects Model Extension is a new extension to FVS and the PPE that allows users to simulate the effects of fire on a number of indicators, including stand structure and composition, fuel loading, and size and density of snags. In the absence of fire, the model can be used to simulate snag and fuel dynamics resulting from...

Author(s): Sarah J. Beukema, Julee A. Greenough, Donald C. E. Robinson, Werner A. Kurz, Elizabeth

D. Reinhardt, Nicholas L. Crookston, Albert R. Stage  
Year Published: 1997  
Type: Document  
Conference Proceedings, Technical Report or White Paper

### **Effects of fire size and pattern on succession in Yellowstone National Park**

[www.nrfirescience.org/resource/13535](http://www.nrfirescience.org/resource/13535)

The Yellowstone fires of 1988 affected >250000 ha, creating a mosaic of burn severities across the landscape and providing an ideal opportunity to study effects of fire size and pattern on postfire succession. We asked whether vegetation responses differed between small and large burned patches within the fire-created mosaic in...

Author(s): Monica G. Turner, William H. Romme, Robert H. Gardner, William W. Hargrove

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

### **Geostatistics: a new tool for describing spatially-varied surface conditions from timber harvested and burned hillslopes**

[www.nrfirescience.org/resource/11012](http://www.nrfirescience.org/resource/11012)

Geostatistics provides a method to describe the spatial continuity of many natural phenomena. Spatial models are based upon the concept of scaling, kriging and conditional simulation. These techniques were used to describe the spatially-varied surface conditions on timber harvest and burned hillslopes. Geostatistical techniques...

Author(s): Peter R. Robichaud

Year Published: 1997

Type: Document

Conference Proceedings

### **Effects of fire size and pattern on early succession in Yellowstone National Park**

[www.nrfirescience.org/resource/8238](http://www.nrfirescience.org/resource/8238)

The Yellowstone fires of 1988 affected >250000 ha, creating a mosaic of burn severities across the landscape and providing an ideal opportunity to study effects of fire size and pattern on postfire succession. We asked whether vegetation responses differed between small and large burned patches within the fire-created mosaic in...

Author(s): Monica G. Turner, William H. Romme, Robert H. Gardner, William W. Hargrove

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

### **Open-path Fourier transform infrared studies of large-scale laboratory biomass fires**

[www.nrfirescience.org/resource/8401](http://www.nrfirescience.org/resource/8401)

A series of nine large-scale, open fires was conducted in the Intermountain Fire Sciences Laboratory (IFSL) controlled-environment combustion facility. The fuels were pure pine needles or sagebrush or mixed fuels simulating forest-floor, ground fires; crown fires; broadcast burns; and slash pile burns. Mid-infrared spectra of the...

Author(s): Robert J. Yokelson, David W. T. Griffith, Darold E. Ward

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

### **Remote sensing of forest fire severity and vegetation recovery**

[www.nrfirescience.org/resource/8152](http://www.nrfirescience.org/resource/8152)

Burned forested areas have patterns of varying burn severity as a consequence of various topographic, vegetation, and meteorological factors. These patterns are detected and mapped using satellite data. Other ecological information can be abstracted from satellite data regarding rates of recovery of vegetation foliage and variation...

Author(s): Joseph D. White, Kevin C. Ryan, Carl H. Key, Steven W. Running

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

### **Consequences of fire on aquatic nitrate and phosphate dynamics in Yellowstone National Park**

[www.nrfirescience.org/resource/11990](http://www.nrfirescience.org/resource/11990)

Airborne remotely sensed data were collected and analyzed during and following the 1988 Greater Yellowstone Ecosystem (GYE) fires in order to characterize the fire front movements, burn intensities and various vegetative components of selected watersheds. Remotely sensed data were used to categorize the burn intensities as: severely...

Author(s): James A. Brass, Vincent G. Ambrosia, Philip J. Riggan, Paul D. Sebesta

Year Published: 1996

Type: Document

Conference Proceedings

### **Onsite sediment production and nutrient losses from a low-severity burn in the interior northwest**

[www.nrfirescience.org/resource/11013](http://www.nrfirescience.org/resource/11013)

Postharvest residue burning is a common site preparation treatment used in the interior Northwest to reduce forest fuels and prepare sites for tree regeneration. A study was conducted to measure runoff, sediment production, and nutrient changes caused by broadcast burning of logging slash. The site was a northern Idaho mixed conifer...

Author(s): Peter R. Robichaud, Russell T. Graham, Roger D. Hungerford

Year Published: 1994

Type: Document

Conference Proceedings

### **Comparisons of particulate-emissions and smoke impacts from presettlement, full suppression, and prescribed natural fire period in the Selway-Bitterroot Wilderness**

[www.nrfirescience.org/resource/8216](http://www.nrfirescience.org/resource/8216)

Total particulate matter (PM) emissions were estimated for recent fires (1979-1990) and the presettlement period (prior to 1935) in the Selway-Bitterroot Wilderness (SBW) in Idaho and Montana. Recent period emissions were calculated by 10-day periods for surface fire and crown fire based on estimates of percentage fuel consumption...

Author(s): James K. Brown, Larry S. Bradshaw

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

### **Fire growth maps for the 1988 Greater Yellowstone Area fires**

[www.nrfirescience.org/resource/11212](http://www.nrfirescience.org/resource/11212)

Daily fire growth maps display the growth of the 1988 fires in the Greater Yellowstone Area. Information and data sources included daily infrared photography flights, satellite imagery, ground and aerial reconnaissance, command center intelligence, and the personal recollections of fire behavior

observers. Fire position was...

Author(s): Richard C. Rothermel, Roberta A. Hartford, Carolyn H. Chase

Year Published: 1994

Type: Document

Technical Report or White Paper

### **When it's hot, it's hot... or maybe it's not! (Surface flaming may not portend extensive soil heating)**

[www.nrfirescience.org/resource/7939](http://www.nrfirescience.org/resource/7939)

Fire effects on a plant community, soil, and air are not apparent when judged only by surface fire intensity. The fire severity or fire impact can be described by the temperatures reached within the forest floor and the duration of heating experienced in the vegetation, forest floor, and underlying mineral soil. Temporal...

Author(s): Roberta A. Hartford, William H. Frandsen

Year Published: 1992

Type: Document

Book or Chapter or Journal Article

### **Fire damage on extensively vs. intensively managed forest stands within the North Fork Fire, 1988**

[www.nrfirescience.org/resource/8342](http://www.nrfirescience.org/resource/8342)

The Greater Yellowstone fires of 1988 provide an opportunity to study important distinctions between lands managed for preservation versus multiple uses. We surveyed fuel loadings, fire severity, and fire damage to extensively managed, mature forest and to intensively managed, clearcut reproduction areas. Unburned, mature forests...

Author(s): Philip N. Omi, Kostas D. Kalabokidis

Year Published: 1991

Type: Document

Book or Chapter or Journal Article

### **Lodgepole pine arthropod litter community structure one year after the 1988 Yellowstone fires**

[www.nrfirescience.org/resource/12034](http://www.nrfirescience.org/resource/12034)

Litter arthropod data was collected every 10 days from nine intensively burned forest stands, five lightly burned stands, and nine unburned forest stands. For burned forest stands (n=540 samples, there were decreases in insect density (87 percent), noninsect density (67 Percent), noninsect taxa (63 percent), and noninsect diversity...

Author(s): Tim A. Christiansen, Robert J. Lavigne, Jeffrey A. Lockwood

Year Published: 1991

Type: Document

Technical Report or White Paper

### **Basal injury from smoldering fires in mature Pinus ponderosa Laws**

[www.nrfirescience.org/resource/8250](http://www.nrfirescience.org/resource/8250)

Fuel accumulations were measured in duff mounds around the bases of 19 mature Pinus ponderosa Laws. (ponderosa pine) in a 200-year-old stand in Glacier National Park, Montana. Tree diameter at breast height ranged from 50 to 114 cm (mean = 80 cm). The stand burned at intervals between 13 to 58 years prior to European settlement....

Author(s): Kevin C. Ryan, William H. Frandsen

Year Published: 1991

Type: Document

Book or Chapter or Journal Article

### **Woody fuel and duff consumption by prescribed fire in northern Idaho mixed conifer logging slash**

[www.nrfirescience.org/resource/11966](http://www.nrfirescience.org/resource/11966)

Describes results of prescribed burning 36 plots in northern Idaho mixed conifer logging slash. Fuel characteristics and methods for predicting duff and woody fuel consumption are reported. Guidelines are included for developing fire prescriptions.

Author(s): Elizabeth D. Reinhardt

Year Published: 1991

Type: Document

Technical Report or White Paper

### **Management and productivity of western-montane forest soils, proceedings**

[www.nrfirescience.org/resource/12000](http://www.nrfirescience.org/resource/12000)

Includes 35 papers and six poster synopses presenting state-of-the-art knowledge on the nature and problems of integrating soils information and expertise into management of inland western forest resources. Papers emphasize regional information, but include data from world literature and previously unpublished material from regional...

Author(s): Alan E. Harvey, Leon F. Neuenschwander

Year Published: 1991

Type: Document

Conference Proceedings, Technical Report or White Paper

### **The effect of fire on soil properties**

[www.nrfirescience.org/resource/12001](http://www.nrfirescience.org/resource/12001)

Fire affects nutrient cycling and the physical, chemical, and biological properties of soils occupied by western montane forests. Combustion of litter and soil organic matter (OM) increases the availability of some nutrients, although others are volatilized (for example, N, P, S). Soil OM loss also affects cation exchange capacity,...

Author(s): Leonard F. DeBano

Year Published: 1991

Type: Document

Conference Proceedings

### **Predicting duff and woody fuel consumption in northern Idaho prescribed fires**

[www.nrfirescience.org/resource/7914](http://www.nrfirescience.org/resource/7914)

Experimental burns were conducted on 36 plots in mixed conifer logging slash in northern Idaho to investigate consumption of duff and woody fuel. Fires were conducted in spring and fall, in YUM (yarded unmerchantable material) and non-YUM clearcuts and seed-tree cuts. Preburn duff depth averaged 3.8 cm and consisted of a shallow...

Author(s): James K. Brown, Elizabeth D. Reinhardt, William C. Fischer

Year Published: 1991

Type: Document

Book or Chapter or Journal Article

### **Influence of fire on factors that affect site productivity**

[www.nrfirescience.org/resource/12002](http://www.nrfirescience.org/resource/12002)

Presettlement fire played an important role in nutrient conversion, plant succession, diversity, and stand dynamics in coniferous forests of western North America. Prescribed fire can maintain site quality and contribute to control of insect and disease problems while reducing wildfire hazard. Fire effects on soils



are largely...

Author(s): Roger D. Hungerford, Michael G. Harrington, William H. Frandsen, Kevin C. Ryan, Gerald J. Niehoff

Year Published: 1991

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Hydrocarbon and biomass fuel fire field tests**

[www.nrfirescience.org/resource/11021](http://www.nrfirescience.org/resource/11021)

Biomass and hydrocarbon fuel fires are two common sources of obscuring smoke which present significant operational challenges over a broad range of possible viewing wavelengths. This is especially true of very large fires where the primary smoke particles (approx. 0.1-0.3 um diameter) obscure vision by both scattering and absorption...

Author(s): Lawrence F. Radke, Dean A. Hegg, J. David Nance, Jaime H. Lyons, Krista K. Laursen, R. J. Ferek, Peter V. Hobbs, Raymond E. Weiss

Year Published: 1990

Type: Document

Conference Proceedings

### **The effects of fire on watersheds: a summary**

[www.nrfirescience.org/resource/11049](http://www.nrfirescience.org/resource/11049)

Over the past three days we have been presented with the results of a most impressive quantity and quality of research on the effects of fire on watersheds. My attempt to summarize these papers will hardly do them justice, but hopefully will recapitulate some of their more important and generalizable findings. My comments are...

Author(s): Nicholas Dennis

Year Published: 1989

Type: Document

Conference Proceedings

### **Ammonia emissions from biomass burning**

[www.nrfirescience.org/resource/8302](http://www.nrfirescience.org/resource/8302)

Measurements in the plumes from seven forest fires show that the concentrations of NH<sub>3</sub> were considerably in excess of ambient values. Calculation of NH<sub>3</sub> emissions from the fires, based on the ratio of NH<sub>3</sub>/CO in the plumes and emissions of CO from biomass burning, suggest that biomass burning may be a significant source of...

Author(s): Dean A. Hegg, Lawrence F. Radke, Peter V. Hobbs, Philip J. Riggan

Year Published: 1988

Type: Document

Book or Chapter or Journal Article

### **Airborne measurements on smokes from biomass burning**

[www.nrfirescience.org/resource/8384](http://www.nrfirescience.org/resource/8384)

Airborne measurements have been made in the smokes from large fires of standing coniferous trees and logging debris, standing chaparral, fallen jack pine, and wheat stubble. Particle emission factors, particle size distributions, optical properties of the smokes, and trace gas concentrations in the emissions are derived from the...

Author(s): Lawrence F. Radke, Dean A. Hegg, Jaime H. Lyons, Charles A. Brock, Peter V. Hobbs, Raymond E. Weiss, Rei A. Rasmussen

Year Published: 1988

Type: Document

**First decade plant succession following the Sundance forest fire, northern Idaho**

[www.nrfirescience.org/resource/11915](http://www.nrfirescience.org/resource/11915)

Describes the first 10 years of vegetation development following disturbance by a holocaustic forest fire in a western redcedar-western hemlock type in the Selkirk Range. Postfire development of vegetation is represented as life-form stages and predominant cover species. Differential development of plant species established in the...

Author(s): Peter F. Stickney

Year Published: 1986

Type: Document

Technical Report or White Paper

**Fire ecology of antelope bitterbrush in the Northern Rocky Mountains**

[www.nrfirescience.org/resource/11058](http://www.nrfirescience.org/resource/11058)

Frequency of resprouting and number of newly established seedlings of antelope bitterbrush were sampled on sites burned by prescribed burns and wildfires 3 to 10 years previously to determine the effect of habitat type, growth form, and season of the burn on bitterbrush. Significant differences in resprouting response occurred among...

Author(s): Stephen C. Bunting, Leon F. Neuenschwander, George E. Gruell

Year Published: 1985

Type: Document

Conference Proceedings, Technical Report or White Paper

**Rangeland fire effects**

[www.nrfirescience.org/resource/11003](http://www.nrfirescience.org/resource/11003)

Description not entered

Author(s): Ken Sanders, Jack Durham

Year Published: 1985

Type: Document

Conference Proceedings

**Fire's effects on a small bird population**

[www.nrfirescience.org/resource/11188](http://www.nrfirescience.org/resource/11188)

Changes in bird populations as a result of a 122 ha forest fire are evaluated. There is little evidence of any drastic effect on numbers of birds, species, or species diversity in the year of the fire or 2 years later.

Author(s): L. Jack Lyon, John M. Marzluff

Year Published: 1985

Type: Document

Technical Report or White Paper

**Influence of fire severity on response of evergreen ceanothus**

[www.nrfirescience.org/resource/11061](http://www.nrfirescience.org/resource/11061)

Fire plays an important role in *Ceanothus velutinus* habitat. Its impact varies with season and severity of fire. Knowledge of the interaction between fire severity and evergreen ceanothus habitat can assist managers in estimating the effect of fire on evergreen ceanothus and in developing burning prescriptions.

Author(s): Nonan V. Noste

Year Published: 1985

Type: Document  
Conference Proceedings, Technical Report or White Paper

### **Livestock grazing influences on community structure, fire intensity, and fire frequency within the Douglas-fir/ninebark habitat type**

[www.nrfirescience.org/resource/13126](http://www.nrfirescience.org/resource/13126)

Influences of livestock grazing on community structure, fire intensity, and normal fire frequency in the Douglas-fir/ninebark (*Pseudotsuga menziesii*/*Physocarpus malvaceus*) habitat type were studied at the University of Idaho's experimental forest in northern Idaho. Livestock grazing caused increased tree numbers...

Author(s): G. Thomas Zimmerman, Leon F. Neuenschwander

Year Published: 1984

Type: Document

Book or Chapter or Journal Article

### **Clearcutting and fire in the larch/Douglas-fir forests of western Montana: a multifaceted research summary**

[www.nrfirescience.org/resource/11180](http://www.nrfirescience.org/resource/11180)

Logging slash on 73 clearcuts was broadcast burned over a wide range of conditions, achieving a broad array of fire intensities and effects. An intense wildfire was also evaluated. Fire effectiveness was measured and related to preburn conditions and fire intensity. Treatment effects on air quality, forest regeneration, vegetation...

Author(s): Norbert V. DeByle

Year Published: 1981

Type: Document

Technical Report or White Paper

### **Effects of prescribed fire on soil nitrogen levels in a cutover Douglas-fir/western larch forest**

[www.nrfirescience.org/resource/11956](http://www.nrfirescience.org/resource/11956)

The effects of a prescribed broadcast fire on soil nitrogen (N) levels and related soil properties were determined following the clearcutting of a 250-year-old Douglas-fir/western larch stand in northwestern Montana. Soil N losses from burning amounted to slightly over 90 lb/acre (100 kg/ha), all from the surface organic layers....

Author(s): Martin F. Jurgensen, Alan E. Harvey, Michael J. Larsen

Year Published: 1981

Type: Document

Technical Report or White Paper

### **Effects of fire on nitrogen in forest floor horizons**

[www.nrfirescience.org/resource/13142](http://www.nrfirescience.org/resource/13142)

The effects of burning on nitrogen (N) losses and transformations in red pine (*Pinus resinosa* Ait.), eastern hemlock [*Tsuga canadensis* (L.) Carr.], and Douglas-fir (*Pseudotsuga menziesii*)/western larch (*Larix occidentalis* Nutt.) forest floor were investigated. Organic horizon samples were burned at 400°C for 30 min in a top-heating...

Author(s): G. D. Mroz, Martin F. Jurgensen, Alan E. Harvey, Michael J. Larsen

Year Published: 1980

Type: Document

Book or Chapter or Journal Article

### **The role and use of fire in sagebrush-grass and pinyon-juniper plant communities: a state-of-the-**

### **art review**

[www.nrfirescience.org/resource/11908](http://www.nrfirescience.org/resource/11908)

Fire frequencies averaged 32 to 70 years in sagebrush-grass communities. Early spring and late fall fires are the least harmful to perennial grasses, although small plants and those with coarse stems are more tolerant of fire than large plants and those with leafy stems. Cheatgrass can be suppressed by burning in early summer, but...

Author(s): Henry A. Wright, Leon F. Neuenschwander, Carlton M. Britton

Year Published: 1979

Type: Document

Synthesis, Technical Report or White Paper

### **Fire and nutrient cycling in a Douglas-fir/larch forest**

[www.nrfirescience.org/resource/8136](http://www.nrfirescience.org/resource/8136)

Twenty control burns performed with a wide range of fuel loadings and moisture conditions were used to study the effectiveness of old fuel reduction under standing Douglas-fir/larch forest. This paper reports the influence of burning on nutrient retention and loss from the soil. Sixty % of the fires were successful in reducing...

Author(s): Nellie M. Stark

Year Published: 1977

Type: Document

Book or Chapter or Journal Article

### **Response of blue huckleberry to prescribed fires in a western Montana larch-fir forest**

[www.nrfirescience.org/resource/11952](http://www.nrfirescience.org/resource/11952)

In a western larch/Douglas-fir forest type in western Montana, 9 spring and 11 fall under story burns were conducted. Multiple regression equations related the number of *Vaccinium globulare* (blue huckleberry) stems present 1 and 2 years after fire to the number present before fire, prefire fuel loadings, moisture content of fuel,...

Author(s): Melanie Miller

Year Published: 1977

Type: Document

Technical Report or White Paper

### **Intensive fiber utilization and prescribed fire: effects on the microbial ecology of forests**

[www.nrfirescience.org/resource/12150](http://www.nrfirescience.org/resource/12150)

Reviews current knowledge of the effects of intensive wood utilization, prescribed burning, or a combination of both treatments, on the microbial ecology of forest soils. Identifies additional research that must be done to fill voids in knowledge.

Author(s): Alan E. Harvey, Martin F. Jurgensen, Michael J. Larsen

Year Published: 1976

Type: Document

Synthesis, Technical Report or White Paper

### **Seedbed characteristics in western larch forests after prescribed burning**

[www.nrfirescience.org/resource/11948](http://www.nrfirescience.org/resource/11948)

Establishment of western larch (*Larix occidentalis* Nutt.) seedlings is favored by site preparation that reduces both the duff layer and the sprouting potential of competing vegetation. A cooperative study of the use of fire in silviculture in northwestern Montana provided conditions to research the effectiveness of prescribed...

Author(s): Raymond C. Shearer

Year Published: 1975

Type: Document  
Technical Report or White Paper

### **Broadcast burning in larch-fir clearcuts: the Miller Creek-Newman Ridge study**

[www.nrfirescience.org/resource/11950](http://www.nrfirescience.org/resource/11950)

Seventy-three clearcuts in western larch/Douglas-fir forests of western Montana were broadcast burned over a wide range of environmental conditions for the purpose of quantifying fire characteristics and burn accomplishment. The moisture content of the upper duff, and the National Fire-Danger Rating System Buildup Index (1964) were...

Author(s): William R. Beaufait, Charles E. Hardy, William C. Fischer

Year Published: 1975

Type: Document

Technical Report or White Paper

### **Smoke column height related to fire intensity**

[www.nrfirescience.org/resource/11946](http://www.nrfirescience.org/resource/11946)

Height of slash fire smoke columns, commonly thought to be a function of atmospheric conditions alone, through a series of 10-acre experimental fires is shown to be strongly related to fire intensity. By conducting intense fires, land managers can possibly burn forest debris and still maintain air quality when atmospheric conditions...

Author(s): Rodney A. Norum

Year Published: 1974

Type: Document

Technical Report or White Paper

### **Temperatures in a large natural-fuel fire**

[www.nrfirescience.org/resource/11475](http://www.nrfirescience.org/resource/11475)

Temperatures in a large natural fuel test fire were measured with bare, shielded aspirated, and shielded unshielded chromel-alumel thermocouples. With the bare thermocouples, values of 2650 F. were recorded--much higher than most previously published data from field and laboratory wood fires. Soil temperatures were consistent with...

Author(s): Charles W. Philpot

Year Published: 1966

Type: Document

Research Brief or Fact Sheet

### **Past, present, and future in the forests of California's Sierra Nevada: variability in forest response to environmental change, and the role of management in promoting ecosystem resilience**

[www.nrfirescience.org/resource/13224](http://www.nrfirescience.org/resource/13224)

During this Webinar, Dr. Safford contrasted the ecology and temporal trends (historical to current to projected future) of lower montane (oak woodland, yellow pine, mixed conifer) vs. upper montane (red fir) and subalpine forests in the Sierra Nevada, focusing on impacts of three classes of environmental stressors: climate change,...

Type: Media

Webinar

### **An overview of the Monitoring Trends in Burn Severity (MTBS) Project and field-based burn severity assessment (2011)**

[www.nrfirescience.org/resource/14139](http://www.nrfirescience.org/resource/14139)

Monitoring Trends in Burn Severity (MTBS) is a multi-year, interagency project designed to consistently map the location, extent and associated burn severity of large fires occurring on all lands of the United States from 1984 to present. The suite of mapping, data and analysis products facilitated by the project are derived from...

Type: Media

Webinar

### **Predicting local smoke dispersion during low-intensity wildland fires in forested environments**

[www.nrfirescience.org/resource/12835](http://www.nrfirescience.org/resource/12835)

Smoke generated from low-intensity prescribed fires used for fuels management can have an adverse impact on local air quality, raising human health and safety concerns especially in wildland-urban-interface areas. Local smoke behavior is a complex process and is highly dependent on local ambient atmospheric conditions (e.g....

Type: Media

Webinar

### **Insights into fire severity and post-fire recovery from an integrated analysis of forest inventory data and long-term fire mapping datasets**

[www.nrfirescience.org/resource/13672](http://www.nrfirescience.org/resource/13672)

Speaker: Sara Goeking, Biological Scientist, Forest Service, Rocky Mountain Research Station, Inventory and Monitoring Program. Event: Restoring the West Conference 2015 - Restoration and Fire in the Interior West.

Type: Media

Video

### **Fire activity and emissions inventories: their use in smoke management decision making and state implementation plans**

[www.nrfirescience.org/resource/14091](http://www.nrfirescience.org/resource/14091)

A 47-minute presentation recorded in February 2009 as part of Effective Communication for Smoke Management in a Changing Air Quality Environment workshops. This presentation describes fire activity and emission inventories, common sources of error in modeling and examples of current models in use.

Type: Media

Video

### **The ability of wildfire to act as a fuel treatment**

[www.nrfirescience.org/resource/12802](http://www.nrfirescience.org/resource/12802)

This webinar highlighted results from a study investigating the ability of wildfire to act as a fuel treatment. The study evaluated whether or not wildfires limited the occurrence, size, and severity of subsequent wildfires in four large wilderness complexes in Idaho, Montana, and New Mexico. The study focused on protected areas to...

Type: Media

Webinar

### **Diggin' dirt: fuel reduction practices and their effects on soil health**

[www.nrfirescience.org/resource/12939](http://www.nrfirescience.org/resource/12939)

In this webinar presented by Matt Busse on March 31, 2015 he covers: (1) ecological consequences of prescribed fire on soil heating, water repellency, and soil nutrient release, (2) pile burning, (3) whole tree harvesting and nutrient removal, and (4) the evils of soil compaction. He argues that with thoughtful planning and...

Type: Media

Webinar

### **Prescribed Fire: Smoke Management and Regulatory Challenges - Part 2**

[www.nrfirescience.org/resource/16759](http://www.nrfirescience.org/resource/16759)

This webinar addresses additional issues and questions that arose during the original webinar, "Prescribed Fire: Smoke Management and Regulatory Challenges." Moderator: Mike Zupko, Executive Director, Wildland Fire Leadership Council. Panelists: Pete Lahm, Smoke Manager, U.S. Forest Service; Mark Melvin, Chair, Coalition of...

Type: Media

Webinar

### **Effects of fire in whitebark pine communities of the alpine-treeline ecotone**

[www.nrfirescience.org/resource/14775](http://www.nrfirescience.org/resource/14775)

In this presentation by C. Alina Cansler, Research Ecologist, University of Washington, was part of the 2016 Whitebark Pine Ecosystem Foundation Annual Science and Management Workshop - Successes and Challenges in Managing the Jewel in the Crown of the Continent that occurred September 16, 2016 in Whitefish, MT.

Type: Media

Webinar

### **Effects of fuel treatments on the spatial probabilities of burning and final size of recent wildfire across the United States**

[www.nrfirescience.org/resource/12860](http://www.nrfirescience.org/resource/12860)

Large wildfire frequency has increased several-fold in recent decades throughout the western United States. These changes have resulted from a combination of human land use practices, altered climates and shifting forest and fire management policies. These fires have had increasingly severe consequences for ecosystems, human health...

Type: Media

Webinar

### **Advancement of smoke emissions models utilizing geospatial and remote sensing data for wildland fire management and risk reduction**

[www.nrfirescience.org/resource/13058](http://www.nrfirescience.org/resource/13058)

A Southern Fire Exchange webinar presented by Joe Roise of the North Carolina State University, Siamak Khorram of the University of California, Berkeley, and Duncan Lutes with the USDA Forest Service. This webinar presented an introduction to some recent interdisciplinary research attempting to improve wildland fire smoke emission...

Type: Media

Webinar

### **On the causes and movements of smoke-induced fog**

[www.nrfirescience.org/resource/12856](http://www.nrfirescience.org/resource/12856)

Smoke from residual combustion in the aftermath of prescribed burns or wildfires can combine with certain atmospheric conditions usually late at night to produce superfog -- a fog reducing visibility to less than 10 feet, and frequently to less than 3 feet. When this smoke/fog is transported across a major roadway, the results are...

Type: Media

Webinar

## **Fire severity and post-fire vegetation recovery in riparian areas of two Oregon fires**

[www.nrfirescience.org/resource/13024](http://www.nrfirescience.org/resource/13024)

Jessica Halofsky, Research Ecologist at the University of Washington, presents 'Fire severity & post-fire vegetation recovery in riparian areas of the Biscuit and B&B Complex fires, Oregon'

Type: Media

Webinar

## **Investigating trends in elk habitat selection across time and burn severity**

[www.nrfirescience.org/resource/15160](http://www.nrfirescience.org/resource/15160)

This presentation was part of the 13th Biennial Scientific Conference on the Greater Yellowstone Ecosystem held at Jackson Lake Lodge in Grand Teton National Park, October 4-6, 2016. The conference theme was Building on the Past, Leading into the Future: Sustaining the Greater Yellowstone Ecosystem in the Coming Century.

Type: Media

Webinar

## **Have definitions and standards for fire severity, hazard, and risk improved since 1999?**

[www.nrfirescience.org/resource/14269](http://www.nrfirescience.org/resource/14269)

In 1998 the General Accounting Office presented to Congress a comprehensive assessment of the wildfire threat to western national forests. The GAO report stated 'In 1995, the [Forest Service] agency estimated that 39 million acres are now at risk of large, uncontrollable, catastrophic fires.' The national assessment and mapping...

Type: Media

Video

## **A dataset for the evaluation of smoke models-emissions, plume rise, and dispersion**

[www.nrfirescience.org/resource/12843](http://www.nrfirescience.org/resource/12843)

An overview of the dataset "Airborne and Lidar measurements of smoke plume rise, emissions, and dispersion." The dataset consists of measurements of smoke emissions, plume rise, and dispersion for eight wildfires in the western United States and prescribed fires in California, Idaho, and North Carolina.

Type: Media

Webinar

## **Predicting smoke impacts with uncertain emissions and meteorology**

[www.nrfirescience.org/resource/12840](http://www.nrfirescience.org/resource/12840)

Smoke from wildland fires can have adverse impacts on visibility and also on public health. Models are available for simulating the dispersion, long-range transport, and chemical evolution of fire plumes and predicting their impacts on air quality. However, these models are not perfect tools for decision making purposes. There are...

Type: Media

Webinar

## **Proposed smoke management framework allows larger prescribed fires with fewer health risks**

[www.nrfirescience.org/resource/15511](http://www.nrfirescience.org/resource/15511)

Before a single drip torch is lit or blade of grass ignited, fire management staff must consult with state or local air quality control officials to negotiate a fine balance between using fire as a restorative tool on the landscape with concerns about smoke and its impacts on public health. For years, these determinations have been...

Type: Media



Webinar

### **Sub-canopy transport and dispersion of smoke: a unique observation dataset plus model evaluation of the BlueSky Framework**

[www.nrfirescience.org/resource/12837](http://www.nrfirescience.org/resource/12837)

Low intensity prescription burning is used to reduce fuels, improve ecosystem health, and to mimic a natural fire pattern that is otherwise suppressed during the more intense wildfire season. There are many constraints that limit the ability to conduct prescribed burn operations, including (but not limited to) visibility reduction...

Type: Media

Webinar

### **Burn Severity: Where, Why and So What?**

[www.nrfirescience.org/resource/15805](http://www.nrfirescience.org/resource/15805)

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...

Type: Media

Seminar

### **Vegetation recovery since the 2003 wildfires in western Montana**

[www.nrfirescience.org/resource/14878](http://www.nrfirescience.org/resource/14878)

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...

Type: Media

Webinar

### **The smoke management challenge and the need for leadership**

[www.nrfirescience.org/resource/14096](http://www.nrfirescience.org/resource/14096)

A 50-minute presentation recorded in February 2009 as part of Effective Communication for Smoke Management in a Changing Air Quality Environment. It briefly outlines the rules, policies, and guidance dictating smoke management. This presentation is still applicable, though some of the maps may no longer be current.

Type: Media

Video

### **Introduction to smoke management**

[www.nrfirescience.org/resource/14089](http://www.nrfirescience.org/resource/14089)

A 36-minute video recorded in February 2009 as part of the Effective Communication for Smoke Management in a Changing Air Quality Environment workshops. A presentation describing a progressive approach and overarching principles of smoke management. Also covers the development of basic and enhanced smoke management programs, and...

Type: Media

Video

### **Forests born of fire**

[www.nrfirescience.org/resource/14512](http://www.nrfirescience.org/resource/14512)

Western US forests burned by high-intensity fire are important and rare wildlife habitat and must be protected. Widespread policies of salvage logging and logging purported to prevent the likelihood of fire harms this rare habitat in private and National Forests. This video demonstrates the beauty and life found where burned forests...

Type: Media

Video

### **Introduction to WFDSS - air quality tools**

[www.nrfirescience.org/resource/12865](http://www.nrfirescience.org/resource/12865)

Introduction to WFDSS - Air Quality Tools Smoke management is an important aspect of managing wildland fire. While mitigating smoke impacts from prescribed burns is important, smoke from large wildfire complexes (such as the AZ/NM fires in 2011) can expose millions of people to significant smoke, with hundreds of thousands living in...

Type: Media

Webinar

### **Basic smoke management practices**

[www.nrfirescience.org/resource/13061](http://www.nrfirescience.org/resource/13061)

A Southern Fire Exchange webinar presented by USDA Forest Service Air Resource Specialist Pete Lahm. This webinar presented an introduction to the six components of the USFS-NRCS Basic Smoke Management Practices.

Type: Media

Webinar

### **Smoke management: preparing and informing the public**

[www.nrfirescience.org/resource/12859](http://www.nrfirescience.org/resource/12859)

For several months during 2011, wildfires throughout the Southwest Area and Mexico caused air quality impacts on public health across the region, with significant impacts measured hundreds of miles away from individual wildfires. In order to address the emerging issue, a concerted multi-state interagency air quality coordination...

Type: Media

Webinar

### **How effective were fuel treatments in the 2011 Wallow fire?**

[www.nrfirescience.org/resource/14301](http://www.nrfirescience.org/resource/14301)

This webinar presents results of an opportunistic study to quantify the performance of thinning and surface fuel treatment in migrating wildfire behavior and severity, as represented by bole char, crown scorch proportion, tree burn severity index, on the largest wildfire in southwest USA history: 2011 Wallow fire. The results...

Type: Media

Webinar

### **Monitoring trends in burn severity: project overview and data access**

[www.nrfirescience.org/resource/12852](http://www.nrfirescience.org/resource/12852)

Monitoring Trends in Burn Severity (MTBS) is a multi-year, interagency project designed to consistently map the location, extent and associated burn severity of large fires occurring on all lands of the United States from 1984 to present. The suite of mapping, data and analysis products facilitated by the project are derived from...

Type: Media

Webinar

### **Burn severity: Where, why, and so what?**

[www.nrfirescience.org/resource/15098](http://www.nrfirescience.org/resource/15098)

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...

Type: Media

Webinar

### **Evaluation and improvement of smoke plume rise models**

[www.nrfirescience.org/resource/12842](http://www.nrfirescience.org/resource/12842)

Plume height is one of the smoke properties that fire and air quality managers need to estimate in order to determine how much pollutants emitted from a prescribed burn are transported to remote populated areas from the burn site.

Type: Media

Webinar

### **Ecology and restoration in mixed severity fire regimes: climate thresholds, beta diversity, and collaboration in Montana forests**

[www.nrfirescience.org/resource/13775](http://www.nrfirescience.org/resource/13775)

Mixed severity fire regimes historically maintained landscape heterogeneity in fuels and ecological conditions, which limited fire spread and supported diverse species assemblages. Setting goals for ecosystem management and restoration targets in in these forests, where the frequency, severity, and effects of...

Type: Media

Webinar

### **Disturbances across boundaries: forest structure, wildfire severity, and post-fire resilience following recent bark beetle outbreaks in forests of Greater Yellowstone**

[www.nrfirescience.org/resource/13283](http://www.nrfirescience.org/resource/13283)

This is a recording from the 12th Biennial Scientific Conference on the Greater Yellowstone Ecosystem. The talk focused on research designed to: understand the effects of pine beetle outbreaks on the structure, fire severity, and post-fire recovery in lodgepole pine and Douglas-fir forests in the GYE.

Type: Media

Video

### **Smoke consequences of new wildfire regimes driven by climate change**

[www.nrfirescience.org/resource/12838](http://www.nrfirescience.org/resource/12838)

Smoke from wildfires has adverse biological and social consequences, and various lines of evidence suggest that smoke from wildfires in the future may be more intense and widespread, demanding that methods be developed to address its effects on people, ecosystems, and the atmosphere. Don McKenzie presented webinar on March 19, 2014...

Type: Media

Webinar

### **Bridging the Divide - Video 1: The West Fork Fire Complex**

[www.nrfirescience.org/resource/15941](http://www.nrfirescience.org/resource/15941)

During the summer of 2013 over 1000 wildfires burned throughout Colorado totaling almost 200,000

acres. One of these, the West Fork Fire Complex, burned through the beetle-killed forests of the Upper Rio Grande and San Juan National Forests in southern Colorado. While other fires in the state drew national attention due to proximity...

Type: Media

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