

### **From the stand?scale to the landscape?scale: predicting the spatial patterns of forest regeneration after disturbance**

[www.nrfirescience.org/resource/17733](http://www.nrfirescience.org/resource/17733)

Shifting disturbance regimes can have cascading effects on many ecosystems processes. This is particularly true when the scale of the disturbance no longer matches the regeneration strategy of the dominant vegetation. In the yellow pine and mixed conifer forests of California, over a century of fire exclusion and the warming climate...

Author(s): Kristen L. Shive, Haiganoush K. Preisler, Kevin R. Welch, Hugh Safford, Ramona J. Butz, Kevin L. O'Hara, Scott L. Stephens

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Quantile regression: an alternative approach to modelling forest area burned by individual fires**

[www.nrfirescience.org/resource/18056](http://www.nrfirescience.org/resource/18056)

Components of a fire regime have long been estimated using mean-value-based ordinary least-squares regression. But, forest and fire managers require predictions beyond the mean because impacts of small and large fires on forest ecosystems and wildland–urban interfaces are different. Therefore, different action plans are required...

Author(s): Baburam Rijal

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Limits to Ponderosa Pine Regeneration Following Large High-Severity Forest Fires in the United States Southwest**

[www.nrfirescience.org/resource/17687](http://www.nrfirescience.org/resource/17687)

High-severity fires in dry conifer forests of the United States Southwest have created large (>1000 ha) treeless areas that are unprecedented in the regional historical record. These fires have reset extensive portions of Southwestern ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson var. *scopulorum* Engelm.) forest...

Author(s): Collin M. Haffey, Thomas D. Sisk, Craig D. Allen, Andrea E. Thode, Ellis Q. Margolis

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Influence of landscape structure, topography, and forest type on spatial variation in historical fire regimes, Central Oregon, USA**

[www.nrfirescience.org/resource/18317](http://www.nrfirescience.org/resource/18317)

Context: In the interior Northwest, debate over restoring mixed-conifer forests after a century of fire exclusion is hampered by poor understanding of the pattern and causes of spatial variation in historical fire regimes. Objectives: To identify the roles of topography, landscape structure, and forest type in driving spatial...

Author(s): Andrew G. Merschel, Emily K. Heyerdahl, Thomas A. Spies, Rachel A. Loehman

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Composition and Structure of Forest Fire Refugia: What Are the Ecosystem Legacies across Burned Landscapes?**

[www.nrfirescience.org/resource/17619](http://www.nrfirescience.org/resource/17619)

Locations within forest fires that remain unburned or burn at low severity—known as fire refugia—are important components of contemporary burn mosaics, but their composition and structure at regional scales are poorly understood. Focusing on recent, large wildfires across the US Pacific Northwest (Oregon and Washington), our...

Author(s): Garrett W. Meigs, Meg A. Krawchuk

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Do Mixed Fire Regimes Shape Plant Flammability and Post-Fire Recovery Strategies?**

[www.nrfirescience.org/resource/18301](http://www.nrfirescience.org/resource/18301)

The development of frameworks for better-understanding ecological syndromes and putative evolutionary strategies of plant adaptation to fire has recently received a flurry of attention, including a new model hypothesizing that plants have diverged into three different plant flammability strategies due to natural selection. We...

Author(s): Helen M. Poulos, Andrew M. Barton, Jasper A. Slingsby, David M. J. S. Bowman

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Does repeated high severity fire in dry mixed conifer forests homogenize vegetation characteristics across scales? - JFSP Final Report**

[www.nrfirescience.org/resource/18039](http://www.nrfirescience.org/resource/18039)

When disturbances recur at rates shorter than an ecosystems rate of recovery, it has the potential to result in significant changes to ecosystem structure and function. In western US forests, wildfire activity has increased and many severely burned areas are now re-burning before reforestation occurs.

Historically, some of these...

Author(s): Kristen L. Shive, Scott L. Stephens

Year Published: 2018

Type: Document

Technical Report or White Paper

### **Effects of climate change and climate-altered fire regimes on whitebark pine populations - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/17562](http://www.nrfirescience.org/resource/17562)

As climate change alters global fire regimes, fire and forest managers must prioritize management actions that simultaneously protect sensitive resources and allow fire to maintain its ecological role. Over the last twenty years, this task has become more difficult, as increased fire severity and season length have caused...

Author(s): Diana F. Tomback, Elizabeth R. Pansing

Year Published: 2018

Type: Document

Technical Report or White Paper

### **Influence of past wildfires on wildfire effects in northern Rockies mixed-conifer forest - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/18251](http://www.nrfirescience.org/resource/18251)

Natural resource managers need to know how past wildfires influence the severity and ecological effects of subsequent wildfires in order to make informed decisions during and after wildfire events, and to effectively plan for the future. The overarching goals for this study were to quantify and compare the effects of single...

Author(s): Andrew J. Larson, R. Travis Belote  
Year Published: 2018  
Type: Document  
Technical Report or White Paper

### **Historical Fire Regimes in Ponderosa Pine and Mixed-Conifer Landscapes of the San Juan Mountains, Colorado, USA, from Multiple Sources**

[www.nrfirescience.org/resource/18031](http://www.nrfirescience.org/resource/18031)

Reconstructing historical fire regimes is difficult at the landscape scale, but essential to determine whether modern fires are unnaturally severe. I synthesized evidence across 725,000 ha of montane forests in the San Juan Mountains, Colorado, from forest atlases, forest-reserve reports, fire-scar studies, early reports, and...

Author(s): William L. Baker  
Year Published: 2018  
Type: Document  
Book or Chapter or Journal Article

### **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

### **High-severity fire: Evaluating its key drivers and mapping its probability across western US forests**

[www.nrfirescience.org/resource/17541](http://www.nrfirescience.org/resource/17541)

Wildland fire is a critical process in forests of the western United States (US). Variation in fire behavior, which is heavily influenced by fuel loading, terrain, weather, and vegetation type, leads to heterogeneity in fire severity across landscapes. The relative influence of these factors in driving fire severity, however, is...

Author(s): Sean A. Parks, Lisa M. Holsinger, Matthew Panunto, William Matt Jolly, Solomon Z. Dobrowski, Gregory K. Dillon  
Year Published: 2018  
Type: Document  
Book or Chapter or Journal Article

### **A Statement of Common Ground Regarding the Role of Wildfire in Forested Landscapes of the Western United States**

[www.nrfirescience.org/resource/18177](http://www.nrfirescience.org/resource/18177)

For millennia, wildfires have markedly influenced forests and non-forested landscapes of the western United States (US), and they are increasingly seen as having substantial impacts on society and nature. There is growing concern over what kinds and amounts of fire will achieve desirable outcomes and limit harmful effects on people...

Author(s): Max A. Moritz, Christopher Topik, Craig D. Allen, Paul F. Hessburg, Penelope Morgan, Dennis C. Odion, Thomas T. Veblen, Ian M. McCullough  
Year Published: 2018

Type: Document  
Technical Report or White Paper

### **Biological and geophysical feedbacks with fire in the Earth system**

[www.nrfirescience.org/resource/17407](http://www.nrfirescience.org/resource/17407)

Roughly 3% of the Earth's land surface burns annually, representing a critical exchange of energy and matter between the land and atmosphere via combustion. Fires range from slow smouldering peat fires, to low-intensity surface fires, to intense crown fires, depending on vegetation structure, fuel moisture, prevailing climate, and...

Author(s): Sally Archibald, Caroline E. R. Lehmann, Claire M. Belcher, William J. Bond, Ross A. Bradstock, Anne Laure Daniau, K. G. Dexter, Elisabeth J. Forrestel, M. Greve, Tianhua He, Steven I. Higgins, William A. Hoffmann, Byron B. Lamont, D. J. McGlenn, G. R. Moncrieff, Colin P. Osborne, Juli G. Pausas, Owen F. Price, Brad S. Ripley, Brendan M. Rogers, Dylan W. Schwilk, M. F. Simon, Merritt R. Turetsky, Guido R. Van der Werf, Amy E. Zanne

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **How does forest recovery following moderate-severity fire influence effects of subsequent wildfire in mixed-conifer forests?**

[www.nrfirescience.org/resource/18117](http://www.nrfirescience.org/resource/18117)

Given regional increases in fire activity in western North American forests, understanding how fire influences the extent and effects of subsequent fires is particularly relevant. Remotely sensed estimates of fire effects have allowed for spatial partitioning into different severity categories based on the degree of fire-caused...

Author(s): Brandon M. Collins, Jamie M. Lydersen, Richard G. Everett, Scott L. Stephens

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Quantifying variance across spatial scales as part of fire regime classifications**

[www.nrfirescience.org/resource/17942](http://www.nrfirescience.org/resource/17942)

The emergence of large-scale fire classifications and products informed by remote sensing data has enabled opportunities to include variability or heterogeneity as part of modern fire regime classifications. Currently, basic fire metrics such as mean fire return intervals are calculated without considering spatial variance in a...

Author(s): Rheinhardt Scholtz, Samuel D. Fuhlendorf, Sherry A. Leis, Joshua J. Picotte, Dirac Twidwell

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Fire patterns in piñon and juniper land cover types in the Semiarid Western United States from 1984 through 2013**

[www.nrfirescience.org/resource/18084](http://www.nrfirescience.org/resource/18084)

Increases in area burned and fire size have been reported across a wide range of forest and shrubland types in the Western United States in recent decades, but little is known about potential changes in fire regimes of piñon and juniper land cover types. We evaluated spatio-temporal patterns of fire in piñon and juniper land cover...

Author(s): David Board, Jeanne C. Chambers, Richard F. Miller, Peter J. Weisberg

Year Published: 2018

Type: Document

### **Mean composite fire severity metrics computed with Google Earth engine offer improved accuracy and expanded mapping potential**

[www.nrfirescience.org/resource/17913](http://www.nrfirescience.org/resource/17913)

Landsat-based fire severity datasets are an invaluable resource for monitoring and research purposes. These gridded fire severity datasets are generally produced with pre- and post-fire imagery to estimate the degree of fire-induced ecological change. Here, we introduce methods to produce three Landsat-based fire severity metrics...

Author(s): Sean A. Parks, Lisa M. Holsinger, Morgan A. Voss, Rachel A. Loehman, Nathaniel P. Robinson

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **The nature of the beast: examining climate adaptation options in forests with stand-replacing fire regimes**

[www.nrfirescience.org/resource/17221](http://www.nrfirescience.org/resource/17221)

Building resilience to natural disturbances is a key to managing forests for adaptation to climate change. To date, most climate adaptation guidance has focused on recommendations for frequent-fire forests, leaving few published guidelines for forests that naturally experience infrequent, stand-replacing wildfires. Because most...

Author(s): Joshua S. Halofsky, Daniel C. Donato, Jerry F. Franklin, Jessica E. Halofsky, David L. Peterson, Brian J. Harvey

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Bridging the Divide: Integrating Animal and Plant Paradigms to Secure the Future of Biodiversity in Fire-Prone Ecosystems**

[www.nrfirescience.org/resource/18075](http://www.nrfirescience.org/resource/18075)

Conserving animals and plants in fire-prone landscapes requires evidence of how fires affect modified ecosystems. Despite progress on this front, fire ecology is restricted by a dissonance between two dominant paradigms: 'fire mosaics' and 'functional types'. The fire mosaic paradigm focuses on animal responses to fire...

Author(s): Luke T. Kelly, Lluís Brotons, Katherine M. Giljohann, Michael A. McCarthy, Juli G. Pausas, Annabel L. Smith

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Effect of topography on persistent fire refugia of the Canadian Rocky Mountains**

[www.nrfirescience.org/resource/17772](http://www.nrfirescience.org/resource/17772)

Persistent fire refugia, which are forest stands that have survived multiple fires, play an important ecological role in the resilience of mountainous forest ecosystems following disturbances. The loss of numerous refugia patches to large, high-severity fires in recent years is prompting the need to better understand drivers of fire...

Author(s): Marie-Pierre Rogeau, Quinn E. Barber, Marc-Andre Parisien

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Abrupt change in ecological systems: diagnosis and inference**

[www.nrfirescience.org/resource/18420](http://www.nrfirescience.org/resource/18420)

Abrupt ecological changes occur rapidly relative to typical rates of ecosystem change and are increasingly observed in ecosystems worldwide, thereby challenging adaptive capacities. Abrupt ecological changes can arise from many processes, only some of which are transitions between alternative states. Focusing solely on the mean...

Author(s): Zak Ratjczak, S. R. Carpenter, A. R. Ives, Chris J. Kucharik, T. Ramiadantsoa, A. M. Stegner, J. Williams, J. Zhang, Monica G. Turner

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Sparking New Opportunities for Charcoal-Based Fire History Reconstructions**

[www.nrfirescience.org/resource/17103](http://www.nrfirescience.org/resource/17103)

Paleofire research is the study of past fire regimes using a suite of proxies (frequency, area burned, severity, intensity, etc.). Charcoal preserved in sedimentary archives constitutes one of the most ubiquitous measures of past fire regimes along with fire-scarred tree rings, chemical markers of fire, and black carbon residue [1,2...

Author(s): Julie C. Aleman, Andy Hennebelle, Boris Vannière, Olivier Blarquez, Global Paleofire Working Group

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **How vegetation recovery and fuel conditions in past fires influences fuels and future fire management in five western U.S. ecosystems - JFSP Final Report**

[www.nrfirescience.org/resource/18062](http://www.nrfirescience.org/resource/18062)

Mixed severity wildfires burn large areas in western North America forest ecosystems in most years and this is expected to continue or increase with climate change. Little is understood about vegetation recovery and changing fuel conditions more than a decade post-fire because it exceeds the duration of most studies of fire effects...

Author(s): Andrew T. Hudak, Beth A. Newingham, Eva K. Strand, Penelope Morgan

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Towards improved quantification and prediction of post-fire recovery in conifers: Expanding laboratory fire radiative energy-tree physiology experiments to a mature forest stand - JFSP Final Report**

[www.nrfirescience.org/resource/17721](http://www.nrfirescience.org/resource/17721)

Current assessments of the ecological impacts of fires, termed burn severity, investigate the degree to which an ecosystem has changed due to a fire and typically encompass both vegetation and soil effects. Burn severity assessments at local to regional scales are typically achieved using spectral indices (such as the differenced...

Author(s): Crystal A. Kolden, Aaron M. Sparks

Year Published: 2018

Type: Document

Technical Report or White Paper



### **It takes a few to tango: changing climate and fire regimes can cause regeneration failure of two subalpine conifers**

[www.nrfirescience.org/resource/18334](http://www.nrfirescience.org/resource/18334)

Environmental change is accelerating in the 21st century, but how multiple drivers may interact to alter forest resilience remains uncertain. In forests affected by large high-severity disturbances, tree regeneration is a resilience linchpin that shapes successional trajectories for decades. We modeled stands of two widespread...

Author(s): Winslow D. Hansen, Kristin H. Braziunas, Werner Rammer, Rupert Seidl, Monica G. Turner

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **A World in Pixels: How New Research Is Helping to Predict Probability of High-Severity Fire**

[www.nrfirescience.org/resource/18051](http://www.nrfirescience.org/resource/18051)

With drought across much of the southern and western States, it's shaping up to be another record year for wildfires. According to the National Oceanic and Atmospheric Administration, May 2018 was the fourthworst May since 2000 in terms of U.S. acres burned by wildfires. The year 2000 is a significant measuring point, since the...

Author(s): Sean A. Parks

Year Published: 2018

Type: Document

Research Brief or Fact Sheet

### **Fire refugia: What are they, and why do they matter for global change?**

[www.nrfirescience.org/resource/18303](http://www.nrfirescience.org/resource/18303)

Fire refugia are landscape elements that remain unburned or minimally affected by fire, thereby supporting postfire ecosystem function, biodiversity, and resilience to disturbances. Although fire refugia have been studied across continents, scales, and affected taxa, they have not been characterized systematically over space and...

Author(s): Arjan J. H. Meddens, Crystal A. Kolden, James A. Lutz, Alistair M. S. Smith, C. Alina Cansler, John T. Abatzoglou, Garrett W. Meigs, William M. Downing, Meg A. Krawchuk

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Historic frequency and severity of fire in whitebark pine forests of the Cascade Mountain Range, USA**

[www.nrfirescience.org/resource/16810](http://www.nrfirescience.org/resource/16810)

Whitebark pine (*Pinus albicaulis* Engelm.) is a foundation species of high elevation forest ecosystems in the Cascade Mountain Range of Oregon, Washington, and British Columbia. We examined fire evidence on 55 fire history sites located in the Cascade Range. To estimate dates of historic fires we analyzed 57 partial cross-sections...

Author(s): Michael P. Murray, Joel Siderius

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Large-scale restoration increases carbon stability under projected climate and wildfire regimes**

[www.nrfirescience.org/resource/17573](http://www.nrfirescience.org/resource/17573)

Changing climate and increasing area burned pose a challenge to forest carbon (C) storage, which is compounded by an elevated risk of high-severity wildfire due to long-term fire suppression in the

western US. Restoration treatments that reduce tree density and reintroduce surface fire are effective at moderating fire effects...

Author(s): Shuang Liang, Matthew D. Hurteau, Anthony L. Westerling

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Effects of fuels management on fire intensity, rate of spread, severity, and resultant forest structure within the 2013 Rim Fire landscape - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/18259](http://www.nrfirescience.org/resource/18259)

Large wildfires with uncharacteristically high severity are occurring more frequently in western U.S. forests. The increasing size and severity of wildfires has been attributed to both an increase in weather conducive to fire spread and changes to forest structure and fuel loads due to management practices that included fire...

Author(s): Brandon M. Collins, Jamie M. Lydersen, Van R. Kane, Nicholas A. Povak, Matthew L. Brooks, Douglas F. Smith

Year Published: 2018

Type: Document

Technical Report or White Paper

### **Improving the use of early timber inventories in reconstructing historical dry forests and fire in the western United States: Comment**

[www.nrfirescience.org/resource/18036](http://www.nrfirescience.org/resource/18036)

Knowledge of historical forest conditions and disturbance regimes improves our understanding of landscape dynamics and provides a frame of reference for evaluating modern patterns, processes, and their interactions. In the western United States, understanding historical fire regimes is particularly important given ongoing climatic...

Author(s): R. Keala Hagmann, Jens T. Stevens, Jamie M. Lydersen, Brandon M. Collins, John J. Battles, Paul F. Hessburg, Carrie R. Levine, Andrew G. Merschel, Scott L. Stephens, Alan H. Taylor, Jerry F. Franklin, Debora L. Johnson, K. Norman Johnson

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Fire regimes approaching historic norms reduce wildfire-facilitated conversion from forest to non-forest**

[www.nrfirescience.org/resource/17545](http://www.nrfirescience.org/resource/17545)

Extensive high-severity wildfires have driven major losses of ponderosa pine and mixed-conifer forests in the southwestern United States, in some settings catalyzing enduring conversions to non-forested vegetation types. Management interventions to reduce the probability of stand-replacing wildfire have included mechanical...

Author(s): Ryan B. Walker, Jonathan D. Coop, Sean A. Parks, Laura Trader

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Time series of high-resolution images enhances efforts to monitor post-fire condition and recovery, Waldo Canyon fire, Colorado, USA**

[www.nrfirescience.org/resource/18249](http://www.nrfirescience.org/resource/18249)

Interpretations of post-fire condition and rates of vegetation recovery can influence management priorities, actions and perception of latent risks from landslides and floods. In this study, we used the



Waldo Canyon fire (2012, Colorado Springs, Colorado, USA) as a case study to explore how a time series (2011–2016) of high-...

Author(s): Melanie K. Vanderhoof, Clifton Burt, Todd J. Hawbaker

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Fire planning for multispecies conservation: integrating growth stage and fire severity**

[www.nrfirescience.org/resource/17417](http://www.nrfirescience.org/resource/17417)

Setting suitable conservation targets is an important part of ecological fire planning. Growth-stage optimisation (GSO) determines the relative proportions of post-fire growth stages (categorical representations of time since fire) that maximise species diversity, and is a useful method for determining such targets. Optimisation...

Author(s): Matthew Swan, Holly Sitters, Jane G. Cawson, Thomas J. Duff, Yohannes Wibisono, Alan York

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Survival analysis and classification methods for forest fire size**

[www.nrfirescience.org/resource/17328](http://www.nrfirescience.org/resource/17328)

Factors affecting wildland-fire size distribution include weather, fuels, and fire suppression activities. We present a novel application of survival analysis to quantify the effects of these factors on a sample of sizes of lightning-caused fires from Alberta, Canada. Two events were observed for each fire: the size at initial...

Author(s): Piers-Olivier Tremblay, Thierry Duchesne, Steve G. Cumming

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Determining the minimum sampling frequency for ground measurements of burn severity**

[www.nrfirescience.org/resource/17932](http://www.nrfirescience.org/resource/17932)

Understanding burn severity is essential to provide an overview of the precursory conditions leading to fires as well as understanding the constraints placed on fire management services when mitigating their effects. Determining the minimum sampling frequency for ground measurements is not only essential for accurately assessing...

Author(s): Alexander W. Holmes, Christoph Rüdiger, Sarah Harris, Nigel J. Tapper

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Land surveys show regional variability of historical fire regimes and structure of dry forests of the western USA**

[www.nrfirescience.org/resource/16421](http://www.nrfirescience.org/resource/16421)

An understanding of how historical fire and structure in dry forests (ponderosa pine, dry mixed conifer) varied across the western USA remains incomplete. Yet, fire strongly affects ecosystem services, and forest restoration programs are underway. We used General Land Office survey reconstructions from the late-1800s across 11...

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **High severity fire: evaluating its key drivers and mapping its probability across western US forests**

[www.nrfirescience.org/resource/17224](http://www.nrfirescience.org/resource/17224)

Wildland fire is a critical process in forests of the western United States (US). Variation in fire behavior, which is heavily influenced by fuel loading, terrain, weather, and vegetation type, leads to heterogeneity in fire severity across landscapes. The relative importance of these factors in driving fire severity, however, is...

Author(s): Sean A. Parks, Lisa M. Holsinger, Matthew Panunto, William Matt Jolly, Solomon Z. Dobrowski, Gregory K. Dillon

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Cross-scale occupancy dynamics of a postfire specialist in response to variation across a fire regime**

[www.nrfirescience.org/resource/18083](http://www.nrfirescience.org/resource/18083)

Fire creates challenges and opportunities for wildlife through rapid destruction, modification and creation of habitat. Fire has spatially variable effects on landscapes; however, for species that benefit from the ephemeral resource patches created by fire, it is critical to understand characteristics of fires that promote postfire...

Author(s): Morgan W. Tingley, Andrew N. Stillman, Robert L. Wilkerson, Christine A. Howell, Sarah C. Sawyer, Rodney B. Siegel

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Land surveys show regional variability of historical fire regimes and dry forest structure of the western United States**

[www.nrfirescience.org/resource/17218](http://www.nrfirescience.org/resource/17218)

An understanding of how historical fire and structure in dry forests (ponderosa pine, dry mixed conifer) varied across the western United States remains incomplete. Yet, fire strongly affects ecosystem services, and forest restoration programs are underway. We used General Land Office survey reconstructions from the late 1800s...

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Plant community responses to historical wildfire in a shrubland–grassland ecotone reveal hybrid disturbance response**

[www.nrfirescience.org/resource/18067](http://www.nrfirescience.org/resource/18067)

Most ecotones include structural and taxonomic elements from both adjacent communities, but it remains unclear how these elements function and interact within ecotones. We investigated long-term plant community responses to wildfire in a 7000 km<sup>2</sup> ecotone between mixed-grass prairie and sagebrush steppe ecosystems, which have...

Author(s): Lauren M. Porensky, Justin D. Derner, David W. Pellatz

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

## **Potential Climate Feedbacks of Changing Fire regimes in the U.S.: A review - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/17024](http://www.nrfirescience.org/resource/17024)

Wildland fire is a disturbance that can profoundly impact the environment and human health and welfare. While climate is generally a critical driving factor shaping the occurrence and impacts of fire, fire can also play a role in shaping climate. With an increasing trend in wildland fire occurrence and extent, it is important to...

Author(s): Anping Chen, Richard A. Birdsey

Year Published: 2017

Type: Document

Synthesis

## **Multidecadal trends in area burned with high severity in the Selway-Bitterroot Wilderness Area 1880-2012**

[www.nrfirescience.org/resource/16279](http://www.nrfirescience.org/resource/16279)

Multidecadal trends in areas burned with high severity shape ecological effects of fires, but most assessments are limited to ,30 years of satellite data. We analysed the proportion of area burned with high severity, the annual area burned with high severity, the probability areas burned with high severity and also the area reburned...

Author(s): Penelope Morgan, Andrew T. Hudak, Ashley Wells, Sean A. Parks, Scott L. Baggett, Benjamin C. Bright, Patricia Green

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Characterizing historical fire patterns as a guide for harvesting planning using landscape metrics derived from long term satellite imagery**

[www.nrfirescience.org/resource/16683](http://www.nrfirescience.org/resource/16683)

Forest managers across the Canadian boreal require detailed fire pattern information to support disturbance-based management. However, there are no consistent classifications of post-fire patterns, and those that exist rely on field-data that is both expensive and lacking in spatial representation. As a result, across the managed...

Author(s): Ignacio San-Miguel, David W. Andison, Nicholas C. Coops

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Climatic influences on interannual variability in regional burn severity across western US forests**

[www.nrfirescience.org/resource/15202](http://www.nrfirescience.org/resource/15202)

Interannual variability in burn severity is assessed across forested ecoregions of the western United States to understand how it is influenced by variations in area burned and climate during 1984–2014. Strong correlations ( $|r| > 0.6$ ) between annual area burned and climate metrics were found across many of the studied...

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Spatial patterns of ponderosa pine regeneration in high-severity burn patches**

[www.nrfirescience.org/resource/16541](http://www.nrfirescience.org/resource/16541)

Contemporary wildfires in southwestern US ponderosa pine forests can leave uncharacteristically large patches of tree mortality, raising concerns about the lack of seed-producing trees, which can prevent or significantly delay ponderosa pine regeneration. We established 4-ha plots in high-severity burn patches in two Arizona...

Author(s): Suzanne M. Owen, Carolyn Hull Sieg, Andrew Sanchez Meador, Peter Z. Fule, Jose M. Iniguez, Scott L. Baggett, Paula J. Fornwalt, Michael A. Battaglia

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

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Alternative characterization of forest fire regimes: incorporating spatial patterns**

[www.nrfirescience.org/resource/15536](http://www.nrfirescience.org/resource/15536)

Context The proportion of fire area that experienced stand-replacing fire effects is an important attribute of individual fires and fire regimes in forests, and this metric has been used to group forest types into characteristic fire regimes. However, relying on proportion alone ignores important spatial characteristics of stand-...

Author(s): Brandon M. Collins, Jens T. Stevens, Jay D. Miller, Scott L. Stephens, Peter M. Brown, Malcolm P. North

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Fire regimes of ponderosa pine communities in the Black Hills and surrounding areas**

[www.nrfirescience.org/resource/16433](http://www.nrfirescience.org/resource/16433)

Wildfire is an important disturbance in ponderosa pine communities in the Black Hills and surrounding areas. Effective management of these communities requires an understanding of historical fire regimes. This review provides a synthesis of the available scientific literature on historical patterns and contemporary changes in fuels...

Author(s): Shannon K. Murphy

Year Published: 2017

Type: Document

Synthesis

### **Evidence of fuels management and fire weather influencing fire severity in an extreme fire event**

[www.nrfirescience.org/resource/17228](http://www.nrfirescience.org/resource/17228)

Following changes in vegetation structure and pattern, along with a changing climate, large wildfire incidence has increased in forests throughout the western United States. Given this increase, there is great interest in whether fuels treatments and previous wildfire can alter fire severity patterns in large

wildfires. We assessed...

Author(s): Jamie M. Lydersen, Brandon M. Collins, Matthew L. Brooks, John R. Matchett, Kristen L. Shive, Nicholas A. Povak, Van R. Kane, Douglas F. Smith

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Analog-based fire regime and vegetation shifts in mountainous regions of the western US**

[www.nrfirescience.org/resource/15521](http://www.nrfirescience.org/resource/15521)

Climate change is expected to result in substantial ecological impacts across the globe. These impacts are uncertain but there is strong consensus that they will almost certainly affect fire regimes and vegetation. In this study, we evaluated how climate change may influence fire frequency, fire severity, and broad classes of...

Author(s): Sean A. Parks, Lisa M. Holsinger, Carol Miller, Marc-Andre Parisien

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Deciphering the complexity of historical fire regimes: diversity among forests of western North America**

[www.nrfirescience.org/resource/16313](http://www.nrfirescience.org/resource/16313)

Wildfire is a key disturbance agent in forests worldwide, but recent large and costly fires have raised urgent questions about how different current fire regimes are from those of the past. Dendroecological reconstructions of historical fire frequency, severity, spatial variability, and extent, corroborated by other lines of...

Author(s): Lori D. Daniels, Larissa L. Yocom Kent, Rosemary L. Sherriff, Emily K. Heyerdahl

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Temporal trends in burn severity in Selway Bitterroot Wilderness 1880-2012**

[www.nrfirescience.org/resource/17662](http://www.nrfirescience.org/resource/17662)

Multidecadal trends in areas burned with high severity shape ecological effects of fires, but most assessments are limited to ~30 years of satellite data. We analysed the proportion of area burned with high severity, the annual area burned with high severity, the probability areas burned with high severity and also the area...

Author(s): Penelope Morgan, Andrew T. Hudak, Ashley Wells, Sean A. Parks, Scott L. Baggett, Benjamin C. Bright, Patricia Green

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Effects of accelerated wildfire on future fire regimes and implications for the United States federal fire policy**

[www.nrfirescience.org/resource/16267](http://www.nrfirescience.org/resource/16267)

Wildland fire suppression practices in the western United States are being widely scrutinized by policymakers and scientists as costs escalate and large fires increasingly affect social and ecological values. One potential solution is to change current fire suppression tactics to intentionally increase the area burned under...

Author(s): Alan A. Ager, Ana M. G. Barros, Haiganoush K. Preisler, Michelle A. Day, Thomas A. Spies, John D. Bailey, John P. Bolte

Year Published: 2017  
Type: Document  
Book or Chapter or Journal Article

### **Tamm Review: Shifting global fire regimes: Lessons from reburns and research needs**

[www.nrfirescience.org/resource/15305](http://www.nrfirescience.org/resource/15305)

Across the globe, rising temperatures and altered precipitation patterns have caused persistent regional droughts, lengthened fire seasons, and increased the number of weather-driven extreme fire events. Because wildfires currently impact an increasing proportion of the total area burned, land managers need to better understand...

Author(s): Susan J. Prichard, Camille Stevens-Rumann, Paul F. Hessburg

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **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

### **Sustainability and wildland fire: The origins of Forest Service Wildland Fire Research**

[www.nrfirescience.org/resource/15768](http://www.nrfirescience.org/resource/15768)

On June 1, 2015, the Forest Service, an agency of the U.S. Department of Agriculture (USDA), celebrated the 100th anniversary of the Branch of Research. Established in 1915 to centralize and elevate the pursuit of research throughout the agency, the Branch of Research focused on everything from silvicultural investigations conducted...

Author(s): Diane M. Smith

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Disturbance regimes and the historical range and variation in terrestrial ecosystems**

[www.nrfirescience.org/resource/16549](http://www.nrfirescience.org/resource/16549)

Picture a tranquil landscape with undulating topography, idyllic streams, scenic glades, and verdant vegetation. Left to its own devices, this landscape would eventually become dominated by late successional communities that would slowly shift in composition and structure in response to climate fluctuations over long time periods....

Author(s): Robert E. Keane

Year Published: 2017

Type: Document

Synthesis



### **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

### **Network analysis of wildfire transmission and implications for risk governance**

[www.nrfirescience.org/resource/16507](http://www.nrfirescience.org/resource/16507)

We characterized wildfire transmission and exposure within a matrix of large land tenures (federal, state, and private) surrounding 56 communities within a 3.3 million ha fire prone region of central Oregon US. Wildfire simulation and network analysis were used to quantify the exchange of fire among land tenures and communities and...

Author(s): Alan A. Ager, Cody Evers, Michelle A. Day, Haiganoush K. Preisler, Ana M. G. Barros, Max W. Nielsen-Pincus

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Spatial interpolation and mean fire interval analyses quantify historical mixed-severity fire regimes**

[www.nrfirescience.org/resource/15005](http://www.nrfirescience.org/resource/15005)

Tree-age data in combination with fire scars improved inverse-distance-weighted spatial modelling of historical fire boundaries and intervals for the Darkwoods, British Columbia, Canada. Fire-scarred trees provided direct evidence of fire. The presence of fire-sensitive trees at sites with no fire scars indicated fire-free periods...

Author(s): Gregory A. Greene, Lori D. Daniels

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **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

### **Analog?based fire regime and vegetation shifts in mountainous regions of the western US**

[www.nrfirescience.org/resource/17773](http://www.nrfirescience.org/resource/17773)

Climate change is expected to result in substantial ecological impacts across the globe. These impacts

are uncertain but there is strong consensus that they will almost certainly affect fire regimes and vegetation. In this study, we evaluated how climate change may influence fire frequency, fire severity, and broad classes of...

Author(s): Sean A. Parks, Lisa M. Holsinger, Carol Miller, Marc-Andre Parisien

Year Published: 2017

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

### **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

### **Sensitivity of reconstructed fire histories to detection criteria in mixed-severity landscapes**

[www.nrfirescience.org/resource/14818](http://www.nrfirescience.org/resource/14818)

In heterogeneous forest landscapes prone to wildfires, accurate classification of the fire regime beyond direct observations and records is difficult. This is in part due to the methods used to reconstruct historical fires in complex, heterogeneous landscapes with varying fire severities. Mixed-severity fire regimes, defined as...

Author(s): Vanessa Stretch, Ze'ev Gedalof, Jacklyn Cockburn, Michael F. Pisaric

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Fire severity and cumulative disturbance effects in the post-mountain pine beetle lodgepole pine forests of the Pole Creek Fire**

[www.nrfirescience.org/resource/14007](http://www.nrfirescience.org/resource/14007)

Recent large scale mountain pine beetle (*Dendroctonus ponderosae* Hopkins, MPB) outbreaks have created concern regarding increased fuel loadings and exacerbated fire behavior and have prompted a desire to understand the effects of sequential disturbances on the landscape. However, previous research has focused on quantifying fuel...

Author(s): Michelle Agne, Travis J. Woolley, Stephen A. Fitzgerald

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

### **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

### **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

### **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

### **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

### **Fire regimes of Northern Rocky Mountain ponderosa pine communities**

[www.nrfirescience.org/resource/14602](http://www.nrfirescience.org/resource/14602)

Hundreds of articles are published about wildland fires in Northern Rocky Mountain ponderosa pine communities. The author of this FEIS synthesis reviewed over 300 publications on historical and contemporary fuel loads, stand structure, and fire regimes in ponderosa pine communities. Most studies found that prior to fire exclusion,...

Author(s): Janet L. Fryer

Year Published: 2016

Type: Document

Synthesis, Technical Report or White Paper

### **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

### **Altered mixed-severity fire regime has homogenised montane forests of Jasper National Park**

[www.nrfirescience.org/resource/14201](http://www.nrfirescience.org/resource/14201)

Fire suppression has altered the historical mixed-severity fire regime and homogenised forest structures in Jasper National Park, Canada. We used dendrochronology to reconstruct fire history and assess forest dynamics at 29 sites in the montane forests. Based on fire scars and even-aged post-fire cohorts, we determined 18 sites had...

Author(s): Raphael D. Chavardes, Lori D. Daniels

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

### **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

### **Fire weather conditions and fire-atmosphere interactions observed during low-intensity prescribed fires - Rxcadre 2012**

[www.nrfirescience.org/resource/16908](http://www.nrfirescience.org/resource/16908)

The goal of this paper is to describe the overall meteorological measurement campaign design and methods and present some initial results from analyses of two burn experiments.

Author(s): Craig B. Clements, Neil Lareau, Daisuke Seto, Jonathan Contezac, Braniff Davis, Casey Teske, Thomas J. Zajkowski, Andrew T. Hudak, Benjamin C. Bright, Matthew B. Dickinson, Bret W. Butler, Daniel M. Jimenez, J. Kevin Hiers

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Average stand age from forest inventory plots does not describe historical fire regimes in ponderosa pine and mixed-conifer forests of western North America**

[www.nrfirescience.org/resource/14438](http://www.nrfirescience.org/resource/14438)

Quantifying historical fire regimes provides important information for managing contemporary forests. Historical fire frequency and severity can be estimated using several methods; each method has strengths and weaknesses and presents challenges for interpretation and verification. Recent efforts to quantify the timing of historical...

Author(s): Jens T. Stevens, Hugh Safford, Malcolm P. North, Jeremy S. Fried, Andrew N. Gray, Peter M. Brown, Christopher R. Dolanc, Solomon Z. Dobrowski, Donald A. Falk, Calvin A. Farris, Jerry F. Franklin, Peter Z. Fule, R. Keala Hagmann, Eric E. Knapp, Alan H. Taylor, Jay D. Miller, Douglas F. Smith, Thomas W. Swetnam

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Tamm Review: Management of mixed-severity fire regime forests in Oregon, Washington, and Northern California**

[www.nrfirescience.org/resource/13976](http://www.nrfirescience.org/resource/13976)

Increasingly, objectives for forests with moderate- or mixed-severity fire regimes are to restore successional diversity landscapes that are resistant and resilient to current and future stressors. Maintaining native species and characteristic processes requires this successional diversity, but methods to achieve it are poorly...

Author(s): Paul F. Hessburg, Thomas A. Spies, David A. Perry, Carl N. Skinner, Alan H. Taylor, Peter M. Brown, Scott L. Stephens, Andrew J. Larson, Derek J. Churchill, Nicholas A. Povak, Peter H. Singleton, Brenda McComb, William J. Zielinski, Brandon M. Collins, R. Brion Salter, Jerry F. Franklin, Gregg M. Riegel

Year Published: 2016

Type: Document

Book or Chapter or Journal Article, Synthesis



### **Spatial and temporal variations of fire regimes in the Canadian Rocky mountains and foothills of southern Alberta**

[www.nrfirescience.org/resource/14701](http://www.nrfirescience.org/resource/14701)

Like many fire-adapted ecosystems, decades of fire exclusion policy in the Rocky Mountains and Foothills natural regions of southern Alberta, Canada are raising concern over the loss of ecological integrity. Departure from historical conditions is evaluated using median fire return intervals (MdFRI) based on fire history data from...

Author(s): Michael D. Flannigan, Brad C. Hawkes, Marc-Andre Parisien, Marie-Pierre Rogeau, Rick Arthur

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

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

### **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

### **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

### **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

### **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

### **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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **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

### **Impacts of changing fire regimes in the alpine treeline ecotone**

[www.nrfirescience.org/resource/15577](http://www.nrfirescience.org/resource/15577)

We studied the effects of a shift in the fire regime of an ecosystem that is very sensitive to climate change: the ecotone from closed forest to open alpine tundra, hereafter the alpine treeline ecotone (ATE). Results suggest that ATEs will become more complex spatially in a warming climate, rather than moving up or down en masse....

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

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Temporal fuel dynamics following high-severity fire in dry mixed conifer forests of the eastern Cascades, Oregon, USA**

[www.nrfirescience.org/resource/12889](http://www.nrfirescience.org/resource/12889)

Fire-resilient landscapes require the recurrent use of fire, but successful use of fire in previously burned areas must account for temporal fuel dynamics. We analysed factors influencing temporal fuel dynamics across a 24-year spatial chronosequence of unmanipulated dry mixed conifer forests following high-severity fire. Duff and...

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

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **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

### **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

## **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

## **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

## **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

## **Are high-severity fires burning at much higher rates recently than historically in dry-forest**

### **landscapes of the western USA?**

[www.nrfirescience.org/resource/13487](http://www.nrfirescience.org/resource/13487)

Dry forests at low elevations in temperate-zone mountains are commonly hypothesized to be at risk of exceptional rates of severe fire from climatic change and land-use effects. Their setting is fire-prone, they have been altered by land-uses, and fire severity may be increasing. However, where fires were excluded, increased fire...

Author(s): William L. Baker

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **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

### **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

### **Climate change impacts on fire regimes and key ecosystem services in Rocky Mountain forests**

[www.nrfirescience.org/resource/16832](http://www.nrfirescience.org/resource/16832)

Forests and woodlands in the central Rocky Mountains span broad gradients in climate, elevation, and other environmental conditions, and therefore encompass a great diversity of species, ecosystem productivities, and fire regimes. The objectives of this review are: (1) to characterize the likely short- and longer-term effects of...

Author(s): Monique E. Rocca, Peter M. Brown, Lee H. MacDonald, Christian M. Carrico

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

### **High-severity fire corroborated in historical dry forests of the western United States: response to Fule et al.**

[www.nrfirescience.org/resource/13490](http://www.nrfirescience.org/resource/13490)

Accurate assessment of changing fire regimes is important, since climatic change and people may be promoting more wildfires. Government wildland fire policies and restoration programmes in dry western US forests are based on the hypothesis that high-severity fire was rare in historical fire regimes, modern fire severity is...

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

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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

**Historical fire regimes, reconstructed from land-survey data, led to complexity and fluctuation in sagebrush landscapes**

[www.nrfirescience.org/resource/11972](http://www.nrfirescience.org/resource/11972)

Sagebrush landscapes provide habitat for Sage-Grouse and other sagebrush obligates, yet historical fire regimes and the structure of historical sagebrush landscapes are poorly known, hampering ecological restoration and management. To remedy this, General Land Office Survey (GLO) survey notes were used to reconstruct over two...

Author(s): Beth E. Bukowski, William L. Baker

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

**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

**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

**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

### **Fire regimes of quaking aspen in the mountain west**

[www.nrfirescience.org/resource/11975](http://www.nrfirescience.org/resource/11975)

Quaking aspen (*Populus tremuloides* Michx.) is the most widespread tree species in North America, and it is found throughout much of the Mountain West (MW) across a broad range of bioclimatic regions. Aspen typically regenerates asexually and prolifically after fire, and due to its seral status in many western conifer forests, aspen...

Author(s): Douglas J. Shinneman, William L. Baker, Paul C. Rogers, Dominik Kulakowski

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Fuel treatments and fire severity: a meta-analysis**

[www.nrfirescience.org/resource/18721](http://www.nrfirescience.org/resource/18721)

We employed meta-analysis and information theory to synthesize findings reported in the literature on the effects of fuel treatments on subsequent fire intensity and severity. Data were compiled from 19 publications that reported observed fire responses from 62 treated versus untreated contrasts. Effect sizes varied widely and the...

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

Year Published: 2013

Type: Document

Technical Report or White Paper

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **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

### **Landscape composition in aspen woodlands under various modeled fire regimes**

[www.nrfirescience.org/resource/12114](http://www.nrfirescience.org/resource/12114)

Quaking aspen (*Populus tremuloides*) is declining across the western United States. Aspen habitats are diverse plant communities in this region and loss of these habitats can cause shifts in biodiversity, productivity, and hydrology across spatial scales. Western aspen occurs on the majority of sites seral to conifer species, and...

Author(s): Eva K. Strand, Stephen C. Bunting, Lee A. Vierling

Year Published: 2012

Type: Document  
Conference Proceedings

### **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

### **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

### **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

### **The human dimension of fire regimes on Earth**

[www.nrfirescience.org/resource/190](http://www.nrfirescience.org/resource/190)

Humans and their ancestors are unique in being a fire-making species, but 'natural' (i.e. independent of humans) fires have an ancient, geological history on Earth. Natural fires have influenced biological evolution and global biogeochemical cycles, making fire integral to the functioning of some biomes. Globally, debate rages...

Author(s): David M. J. S. Bowman

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

### **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

### **The ecology of mixed severity fire regimes in Washington, Oregon, and Northern California**

[www.nrfirescience.org/resource/13580](http://www.nrfirescience.org/resource/13580)

Forests characterized by mixed-severity fires occupy a broad moisture gradient between lower elevation forests typified by low-severity fires and higher elevation forests in which high-severity, stand replacing fires are the norm. Mixed-severity forest types are poorly documented and little understood but likely occupy significant...

Author(s): David A. Perry, Paul F. Hessburg, Carl N. Skinner, Thomas A. Spies, Scott L. Stephens, Alan H. Taylor, Jerry F. Franklin, Brenda McComb, Gregg M. Riegel

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **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

### **Synthesis of knowledge: fire history and climate change**

[www.nrfirescience.org/resource/12582](http://www.nrfirescience.org/resource/12582)

This report synthesizes available fire history and climate change scientific knowledge to aid managers with fire decisions in the face of ongoing 21st Century climate change. Fire history and climate change (FHCC) have been ongoing for over 400 million years of Earth history, but increasing human influences during the Holocene epoch...

Author(s): William T. Sommers, Stanley G. Coloff, Susan G. Conard

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

### **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

### **Continued warming could transform Greater Yellowstone fire regimes by mid-21st century**

[www.nrfirescience.org/resource/8358](http://www.nrfirescience.org/resource/8358)

Climate change is likely to alter wildfire regimes, but the magnitude and timing of potential climate-driven changes in regional fire regimes are not well understood. We considered how the occurrence, size, and spatial location of large fires might respond to climate projections in the Greater Yellowstone ecosystem (GYE) (Wyoming),...

Author(s): Anthony L. Westerling, Monica G. Turner, Erica A. H. Smithwick, William H. Romme, Michael G. Ryan

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

### **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

### **Multi-scale controls of historical forest-fire regimes: new insights from fire-scar networks**

[www.nrfirescience.org/resource/8298](http://www.nrfirescience.org/resource/8298)

Anticipating future forest-fire regimes under changing climate requires that scientists and natural resource managers understand the factors that control fire across space and time. Fire scars-proxy records of fires, formed in the growth rings of long-lived trees-provide an annually accurate window into past low-severity fire...

Author(s): Donald A. Falk, Emily K. Heyerdahl, Peter M. Brown, Calvin A. Farris, Peter Z. Fule, Donald McKenzie, Thomas W. Swetnam, Alan H. Taylor, Megan L. Van Horne  
Year Published: 2011  
Type: Document  
Book or Chapter or Journal Article, Synthesis

**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

**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 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

**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

### **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

### **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

### **The myth of "catastrophic" wildfire - a new ecological paradigm of forest health**

[www.nrfirescience.org/resource/16302](http://www.nrfirescience.org/resource/16302)

Every fire season in the western United States, we see on television the predictable images of 100-foot flames spreading through tree crowns, while grim-faced news anchors report how many acres of forest were "destroyed" by the latest "catastrophic" fire. The reaction is understandable. For decades, countless Smokey the Bear...

Author(s): Chad T. Hanson

Year Published: 2010

Type: Document

Technical Report or White Paper

### **Burn severity mapping using simulation modelling and satellite imagery**

[www.nrfirescience.org/resource/8205](http://www.nrfirescience.org/resource/8205)

Although burn severity maps derived from satellite imagery provide a landscape view of fire impacts, fire effects simulation models can provide spatial fire severity estimates and add a biotic context in which to interpret severity. In this project, we evaluated two methods of mapping burn severity in the context of rapid post-fire...

Author(s): Eva C. Karau, Robert E. Keane

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

### **Fire and climate variation in western North America from fire-scar and tree-ring networks**

[www.nrfirescience.org/resource/8221](http://www.nrfirescience.org/resource/8221)

Fire regimes (i.e., the pattern, frequency and intensity of fire in a region) reflect a complex interplay of bottom-up and top-down controls (Lertzman et al., 1998; McKenzie et al., in press). Bottom-up controls include local variations in topographic, fuel and weather factors at the time of a burn (e.g., fuel moisture and...

Author(s): Donald A. Falk, Emily K. Heyerdahl, Peter M. Brown, Thomas W. Swetnam, Elaine Kennedy Sutherland, Ze'ev Gedalof, Larissa L. Yocom, Timothy J. Brown

Year Published: 2010

Type: Document

Book or Chapter or Journal Article, Synthesis

### **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

### **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

### **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. Lehmkühl, David S. Pilliod, Donald F. Potts, Robert F. Powers, John D. Stuart

Year Published: 2009

Type: Document



**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

**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

**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

**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

**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

### **Living artifacts: the ancient ponderosa pines of the West**

[www.nrfirescience.org/resource/8160](http://www.nrfirescience.org/resource/8160)

Until late in the nineteenth century, magnificent ponderosa pine forests blanketed much of the inland West. They covered perhaps 30 million acres, an area the size of New York state, spreading across the mountains of New Mexico, Arizona, and California and flourishing throughout the eastern Cascades, the intermountain Pacific...

Author(s): Stephen F. Arno, Lars Ostlund, Robert E. Keane

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

### **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

### **Long-term fire history from alluvial fan sediments: the role of drought and climate variability, and implications for management of Rocky Mountain forests**

[www.nrfirescience.org/resource/8203](http://www.nrfirescience.org/resource/8203)

Alluvial fan deposits are widespread and preserve millennial-length records of fire. We used these records to examine changes in fire regimes over the last 2000 years in Yellowstone National Park mixed-conifer forests and drier central Idaho ponderosa pine forests. In Idaho, frequent, small, fire-related erosional events occurred...

Author(s): Jennifer L. Pierce, Grant A. Meyer

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

### **Large fire locations by Fire Regime Condition Classes 2 and 3 for all historical natural fire regimes**

[www.nrfirescience.org/resource/11510](http://www.nrfirescience.org/resource/11510)

A map of large fires across the western United States.

Author(s): Wendel J. Hann

Year Published: 2008

Type: Document

Research Brief or Fact Sheet

### **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

### **Comparison of fire scars, fire atlases, and satellite data in the northwestern United States**

[www.nrfirescience.org/resource/11427](http://www.nrfirescience.org/resource/11427)

We evaluated agreement in the location and occurrence of 20th century fires recorded in digital fire atlases with those inferred from fire scars that we collected systematically at one site in Idaho and from existing fire-scar reconstructions at four sites in Washington. Fire perimeters were similar for two of three 20th century...

Author(s): Lauren B. Shapiro, Emily K. Heyerdahl, Penelope Morgan

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **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

### **Cross-scale analysis of fire regimes**

[www.nrfirescience.org/resource/11415](http://www.nrfirescience.org/resource/11415)

Cross-scale spatial and temporal perspectives are important for studying contagious landscape

disturbances such as fire, which are controlled by myriad processes operating at different scales. We examine fire regimes in forests of western North America, focusing on how observed patterns of fire frequency change across spatial scales...

Author(s): Donald A. Falk, Carol Miller, Donald McKenzie, Anne E. Black

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **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

### **Fire, fuels and restoration of ponderosa pine-Douglas fir forests in the Rocky Mountains, USA**

[www.nrfirescience.org/resource/8223](http://www.nrfirescience.org/resource/8223)

Forest restoration in ponderosa pine and mixed ponderosa pine-Douglas fir forests in the US Rocky Mountains has been highly influenced by a historical model of frequent, low-severity surface fires developed for the ponderosa pine forests of the Southwestern USA. A restoration model, based on this low-severity fire model, focuses on...

Author(s): William L. Baker, Thomas T. Veblen, Rosemary L. Sherriff

Year Published: 2007  
Type: Document  
Book or Chapter or Journal Article

### **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

### **Simulation of the consequences of different fire regimes to support wildland fire use decisions**

[www.nrfirescience.org/resource/11429](http://www.nrfirescience.org/resource/11429)

The strategy known as wildland fire use, in which lightning-ignited fires are allowed to burn, is rapidly gaining momentum in the fire management community. Managers need to know the consequences of an increase in area burned that might result from an increase in wildland fire use. One concern of land managers as they consider...

Author(s): Carol Miller

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Forest fire and climate change in western North America: insights from sediment charcoal records**

[www.nrfirescience.org/resource/7930](http://www.nrfirescience.org/resource/7930)

Millennial-scale records of forest fire provide important baseline information for ecosystem management, especially in regions with too few recent fires to describe the historical range of variability. Charcoal records from lake sediments and soil profiles are well suited for reconstructing the incidence of past fire and its...

Author(s): Daniel G. Gavin, Douglas J. Hallett, Feng S. Hu, Kenneth P. Lertzman, Susan J. Prichard, Kendrick J. Brown, Jason A. Lynch, Patrick J. Bartlein, David L. Peterson

Year Published: 2007

Type: Document

Book or Chapter or Journal Article, Synthesis

### **CCE fire regimes and their management**

[www.nrfirescience.org/resource/8369](http://www.nrfirescience.org/resource/8369)

A spectacular forest in the center of the Crown of the Continent Ecosystem (CCE) cuts a 15- by 5-km swath along the Flathead River's South Fork around Big Prairie in the middle of the Bob Marshall Wilderness Area in Montana (Figure 13- 1). This wide valley bottom, which contains two patches (of about 1,000 ha each) of the last...

Author(s): Robert E. Keane, Carl H. Key

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 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

### **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

### **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

### **The complexity of managing fire-dependent ecosystems in wilderness: relict ponderosa pine in the Bob Marshall Wilderness**

[www.nrfirescience.org/resource/7953](http://www.nrfirescience.org/resource/7953)

Isolated wilderness ecosystems with a history of frequent, low-severity fires have been altered due to

many decades of fire exclusion and, as a result, are difficult to restore for philosophical and logistical reasons. In this paper, we describe the successional conditions of ponderosa pine (*Pinus ponderosa*) communities along the...

Author(s): Robert E. Keane, Stephen F. Arno, Laura J. Dickinson

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

### **History of fire and Douglas-fir establishment in a savanna and sagebrush-grassland mosaic, southwestern Montana, USA**

[www.nrfirescience.org/resource/7942](http://www.nrfirescience.org/resource/7942)

Over the past century, trees have encroached into grass- and shrublands across western North America. These include Douglas-fir trees (*Pseudotsuga menziesii* (Mirb.) Franco var. *glauca* (Beissn.) Franco) encroaching into mountain big sagebrush *Nutt. ssp. vaseyana* (Rydb.) Beetle) from stable islands of savanna in southwestern Montana....

Author(s): Emily K. Heyerdahl, Richard F. Miller, Russell A. Parsons

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Ecological science relevant to management policies for fire-prone forests of the western United States, Society for Conservation Biology scientific panel of fire in western U.S. forests**

[www.nrfirescience.org/resource/11190](http://www.nrfirescience.org/resource/11190)

Fire is a primary natural disturbance in most forests of western North America and has shaped their plant and animal communities for millions of years. Native species and fundamental ecological processes are dependent on conditions created by fire. However, many western forests have experienced shifts in wildfire regimes and forest...

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

Year Published: 2006



Type: Document  
Technical Report or White Paper

**Restoration of ponderosa pine forests in the interior western U.S. after logging, grazing, and fire suppression**

[www.nrfirescience.org/resource/8195](http://www.nrfirescience.org/resource/8195)

No description entered.

Author(s): Merrill R. Kaufmann, Kevin C. Ryan, Peter Z. Fule, William H. Romme

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

**Cumulative effects of fuel management on landscape-scale fire behavior and effects - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11157](http://www.nrfirescience.org/resource/11157)

The project is concerned with modeling the long-term effects of landscape fuel treatment patterns on wildfire sizes and severity. The work was initiated based on theoretical fuel treatment patterns that appeared effective at changing fire growth across large landscapes, thus reducing the acreage burned and the chances that large...

Author(s): Mark A. Finney

Year Published: 2005

Type: Document

Technical Report or White Paper

**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

**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

**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

### **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

### **Dry forests and wildland fires of the inland Northwest USA: contrasting the landscape ecology of the pre-settlement and modern eras**

[www.nrfirescience.org/resource/7941](http://www.nrfirescience.org/resource/7941)

Prior to Euro-American settlement, dry ponderosa pine and mixed conifer forests (hereafter, the 'dry forests') of the Inland Northwest were burned by frequent low- or mixed-severity fires. These mostly surface fires maintained low and variable tree densities, light and patchy ground fuels, simplified forest structure, and favored...

Author(s): Paul F. Hessburg, James K. Agee, Jerry F. Franklin

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

### **Sagebrush steppe and pinyon-juniper ecosystems - effects of changing fire regimes, increased fuel loads, and invasive species - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11152](http://www.nrfirescience.org/resource/11152)

Pinyon-juniper woodlands and Wyoming big sagebrush ecosystems have undergone major changes in vegetation structure and composition since settlement by European Americans. These changes are resulting in dramatic shifts in fire frequency, size and severity. Effective management of these systems has been hindered by lack of information...

Author(s): Jeanne C. Chambers, E. Durant McArthur, Stephen B. Monsen, Susan E. Meyer, Nancy L. Shaw, Robin J. Tausch, Robert R. Blank, Stephen C. Bunting, Richard R. Miller, Michael L. Pellant, Bruce A. Roundy, Scott C. Walker  
Year Published: 2005  
Type: Document  
Technical Report or White Paper

### **Variation in fire regimes of the Rocky Mountains: implications for avian communities and fire management**

[www.nrfirescience.org/resource/8144](http://www.nrfirescience.org/resource/8144)

Information about avian responses to fire in the U.S. Rocky Mountains is based solely on studies of crown fires. However, fire management in this region is based primarily on studies of low-elevation ponderosa pine (*Pinus ponderosa*) forests maintained largely by frequent understory fires. In contrast to both of these trends, most...

Author(s): Victoria A. Saab, Hugh D. W. Powell, Natasha B. Kotliar, Karen R. Newlon  
Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article, Synthesis

### **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

### **Fire ecology of ponderosa pine and the rebuilding of fire-resilient ponderosa pine ecosystems**

[www.nrfirescience.org/resource/11074](http://www.nrfirescience.org/resource/11074)

The ponderosa pine ecosystems of the West have change dramatically since Euro-American settlement 140 years ago due to past land uses and the curtailment of natural fire. Today, ponderosa pine forests contain overabundance of fuel, and stand densities have increased from a range of 49-124 trees ha<sup>-1</sup> (20-50 trees acre<sup>-1</sup>) to a range...

Author(s): Stephen A. Fitzgerald  
Year Published: 2005  
Type: Document  
Conference Proceedings, Synthesis

### **Restoring dry and moist forests of the inland northwestern U. S.**

[www.nrfirescience.org/resource/7903](http://www.nrfirescience.org/resource/7903)

The complex topography of the inland northwestern U.S. (58.4 million ha) interacts with continental and maritime air masses to create a highly variable climate, which results in a variety of forest settings. Historically (1850 to 1900), approximately 20% of the area was covered by dry forests (*Pinus ponderosa*, *Pseudotsuga menziesii*...

Author(s): Theresa B. Jain, Russell T. Graham  
Year Published: 2005  
Type: Document

Book or Chapter or Journal Article

### **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

### **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 interaction of fire, fuels, and climate across Rocky Mountain forests**

[www.nrfirescience.org/resource/13583](http://www.nrfirescience.org/resource/13583)

Understanding the relative influence of fuels and climate on wildfires across the Rocky Mountains is necessary to predict how fires may respond to a changing climate and to define effective fuel management approaches to controlling wildfire in this increasingly populated region. The idea that decades of fire suppression have...

Author(s): Tania L. Schoennagel, Thomas T. Veblen, William H. Romme

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **Spatial heterogeneity of lodgepole pine sapling densities following the 1988 fires in Yellowstone National Park, Wyoming, USA**

[www.nrfirescience.org/resource/8255](http://www.nrfirescience.org/resource/8255)

Large disturbances create spatial heterogeneity in vegetation re-establishment, and documenting such variability is critical for understanding and predicting succession. We quantified the spatial heterogeneity of lodgepole pine sapling densities 10 years after the 1988 fires in Yellowstone National Park using color infrared...

Author(s): Daniel M. Kashian, Daniel B. Tinker, Monica G. Turner, Frank L. Scarpace

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

### **Mapping relative fire regime condition class for the western United States**

[www.nrfirescience.org/resource/10991](http://www.nrfirescience.org/resource/10991)

In 1999, a coarse-scale map of Fire Regime Condition Classes (FRCC) was developed for the conterminous United States (US) to help address contemporary fire management issues and to quantify changes in fuels from historical conditions. This map and its associated data have been incorporated into national policies (National Fire Plan...

Author(s): James P. Menakis, Melanie Miller, Thomas Thompson

Year Published: 2004

Type: Document

Conference Proceedings

### **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

### **The role of climate and vegetation change in shaping past and future fire regimes in the northwestern U.S. and the implications for ecosystem management**

[www.nrfirescience.org/resource/8382](http://www.nrfirescience.org/resource/8382)

Fire is an important part of the disturbance regimes of northwestern US forests and its role in maintaining and altering forest vegetation is evident in the paleoecological record of the region. Long-

term reconstructions of Holocene fire regimes, provided by the analysis of charcoal, pollen, and other fire proxies in a network of...

Author(s): Cathy L. Whitlock, Sarah L. Shafer, Jennifer R. Marlon

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Uncertainty in fire history and restoration of ponderosa pine forests in the western United States**

[www.nrfirescience.org/resource/11026](http://www.nrfirescience.org/resource/11026)

Fire-history data for ponderosa pine forests in the western U.S. have uncertainties and biases. Targeting multiple-scarred trees and using recorder trees when sampling for fire history may lead to incomplete records. For most of the western U.S., research is insufficient to conclude that high-severity fires did or did not occur in...

Author(s): William L. Baker, Donna S. Ehle

Year Published: 2003

Type: Document

Conference Proceedings

### **Climatic controls on fire-induced sediment pulses in Yellowstone National Park and central Idaho: a long-term perspective**

[www.nrfirescience.org/resource/7962](http://www.nrfirescience.org/resource/7962)

Fire management addressing postfire erosion and aquatic ecosystems tends to focus on short-term effects persisting up to about a decade after fire. A longer perspective is important in understanding natural variability in postfire erosion and sedimentation, the role of these processes in structuring habitat, and future expectations...

Author(s): Grant A. Meyer, Jennifer L. Pierce

Year Published: 2003

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Mapping the cheatgrass-caused departure from historical natural fire regimes in the Great Basin, USA**

[www.nrfirescience.org/resource/11490](http://www.nrfirescience.org/resource/11490)

Cheatgrass (*Bromus tectorum*) is an exotic grass that has increased fire hazard on millions of square kilometers of semi-arid rangelands in the western United States. Cheatgrass aggressively out competes native vegetation after fire and significantly enhances fire size and frequency. To evaluate the effect of cheatgrass on historical...

Author(s): James P. Menakis, Dianne Osborne, Melanie Miller

Year Published: 2003

Type: Document

Conference Proceedings

### **Key issues in fire regime research for fuels management and ecological restoration**

[www.nrfirescience.org/resource/11025](http://www.nrfirescience.org/resource/11025)

The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific...

Author(s): Thomas T. Veblen

Year Published: 2003

Type: Document  
Conference Proceedings

### **The influence of fire interval and serotiny on postfire lodgepole pine density in Yellowstone National Park**

[www.nrfirescience.org/resource/8259](http://www.nrfirescience.org/resource/8259)

The time interval between stand-replacing fires can influence patterns of initial postfire succession if the abundance of postfire propagules varies with prefire stand age. We examined the effect of fire interval on initial postfire lodgepole pine (*Pinus contorta* var. *latifolia* Engelm.) density in Yellowstone National Park (YNP)...

Author(s): Tania L. Schoennagel, Monica G. Turner, William H. Romme

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **An environmental narrative of Inland Northwest United States forests, 1800-2000**

[www.nrfirescience.org/resource/18561](http://www.nrfirescience.org/resource/18561)

Fire was arguably the most important forest and rangeland disturbance process in the Inland Northwest United States for millennia. Prior to the Lewis and Clark expedition, fire regimes ranged from high severity with return intervals of one to five centuries, to low severity with fire-free periods lasting three decades or less....

Author(s): Paul F. Hessburg, James K. Agee

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **Using simulation to map fire regimes: an evaluation of approaches, strategies, and limitations**

[www.nrfirescience.org/resource/7951](http://www.nrfirescience.org/resource/7951)



Spatial depictions of fire regimes are indispensable to fire management because they portray important characteristics of wildland fire, such as severity, intensity, and pattern, across a landscape that serves as important reference for future treatment activities. However, spatially explicit fire regime maps are difficult and...

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

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **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

### **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 effects 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

### **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

### **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

### **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

### **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

### **Landscape-scale controls over 20th century fire occurrence in two large Rocky Mountain (USA) wilderness areas**

[www.nrfirescience.org/resource/8140](http://www.nrfirescience.org/resource/8140)

Topography, vegetation, and climate act together to determine the spatial patterns of fires at landscape scales. Knowledge of landscape-fire-climate relations at these broad scales (1,000s ha to 100,000s ha) is limited and is largely based on inferences and extrapolations from fire histories reconstructed from finer scales. In this...

Author(s): Matthew G. Rollins, Penelope Morgan

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **Uncertainty in surface-fire history: the case of ponderosa pine forests in the western United States**

[www.nrfirescience.org/resource/8257](http://www.nrfirescience.org/resource/8257)

Present understanding of fire ecology in forests subject to surface fires is based on fire-scar evidence. We present theory and empirical results that suggest that fire-history data have uncertainties and biases when used to estimate the population mean fire interval (FI) or other parameters of the fire regime. First, the population...

Author(s): William L. Baker, Donna S. Ehle

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **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

### **Evaluating a century of fire patterns in two Rocky Mountain wilderness areas using digital fire atlases**

[www.nrfirescience.org/resource/8139](http://www.nrfirescience.org/resource/8139)

Changes in fire size, shape, and frequency under different fire-management strategies were evaluated using time series of fire perimeter data (fire atlases) and mapped potential vegetation types (PVTs) in the Gila-Aldo Leopold Wilderness Complex (GALWC) in New Mexico and the Selway-Bitterroot Wilderness Complex (SBWC) in Idaho and...

Author(s): Matthew G. Rollins, Thomas W. Swetnam, Penelope Morgan

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **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

### **Mixed-severity fire regimes in the Northern Rocky Mountains: consequences of fire exclusion and options for the future**

[www.nrfirescience.org/resource/8426](http://www.nrfirescience.org/resource/8426)

Findings from fire history studies have increasingly indicated that many forest ecosystems in the northern Rocky Mountains were shaped by mixed-severity fire regimes, characterized by fires of variable severities at intervals averaging between about 30 and 100 years. Perhaps because mixed-severity fire regimes and their resulting...

Author(s): Stephen F. Arno, David J. Parsons, Robert E. Keane  
Year Published: 2000  
Type: Document  
Conference Proceedings, Synthesis

### **Fire in western forest ecosystems**

[www.nrfirescience.org/resource/11115](http://www.nrfirescience.org/resource/11115)

Description not entered

Author(s): Stephen F. Arno

Year Published: 2000

Type: Document

Technical Report or White Paper

### **Associated riparian communities**

[www.nrfirescience.org/resource/10962](http://www.nrfirescience.org/resource/10962)

Some 100 years of fire exclusion in the Interior Northwest has resulted in riparian areas dominated by dense thickets of shade-tolerant trees. If former, more open conditions could be restored, these habitats could once more support a more diverse bird community. Efforts toward this at two study sites are described.

Author(s): Colin C. Hardy, Robert E. Keane, Michael G. Harrington

Year Published: 2000

Type: Document

Conference Proceedings

### **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

### **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 2: Fire autecology**

[www.nrfirescience.org/resource/12597](http://www.nrfirescience.org/resource/12597)

Fire is a key ecological process within most ecosystems in the United States and Canada. An understanding of factors controlling the initial response of vegetation to fire is essential to its

management. Fire effects on plants can vary significantly among fires on different areas of the same fire. Fire behavior, fire duration, the...

Author(s): Melanie Miller

Year Published: 2000

Type: Document

Synthesis, Technical Report or White Paper

### **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

### **Fire in western shrubland, woodland, and grassland ecosystems**

[www.nrfirescience.org/resource/11116](http://www.nrfirescience.org/resource/11116)

This state-of-knowledge review about the effects of fire on flora and fuels can assist land managers with ecosystem and fire management planning and in their efforts to inform others about the ecological role of fire. Chapter topics include fire regime classification, autecological effects of fire, fire regime characteristics and...

Author(s): Timothy E. Paysen, R. James Ansley, James K. Brown, Gerald J. Gottfried, Sally M. Haase, Michael G. Harrington, Marcia G. Narog, Stephen S. Sackett, Ruth C. Wilson

Year Published: 2000

Type: Document

Synthesis, Technical Report or White Paper

### **Native burning in western North America: implications for hardwood forest management**

[www.nrfirescience.org/resource/11062](http://www.nrfirescience.org/resource/11062)

It is now widely acknowledged that frequent low-intensity fires once structured many western forests. What is not generally recognized, however, is that most of those fires were purposefully set by native people, not started by lightning. Data from the Rocky Mountains attest to the widespread use of fire by native people, as does...

Author(s): Charles E. Kay

Year Published: 2000

Type: Document

Conference Proceedings

### **Fire, competition, and forest pests: landscape treatment to sustain ecosystem function**

[www.nrfirescience.org/resource/10988](http://www.nrfirescience.org/resource/10988)

Fire, competition for light and water, and native forest pests have interacted for millennia in western forests to produce a countryside dominated by seral species of conifers. These conifer-dominated ecosystems exist in six kinds of biotic communities. We divided one of these communities, the Rocky Mountain Montane Conifer Forest,...

Author(s): GERAL I. McDONALD, ALAN E. HARVEY, JONALEA R. TONN

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

### **Fire history of an isolated subalpine mountain range of the intermountain region, United States**

[www.nrfirescience.org/resource/11438](http://www.nrfirescience.org/resource/11438)

Fire has historically been an important ecological component of forests in the Intermountain Region of the northwestern United States. This study is set in a small biogeographically disjunct mountain range. Our research objectives were to (1) investigate the historical frequency, severity, size, and spatial pattern of fire; (2)...

Author(s): Michael P. Murray, Stephen C. Bunting, Penelope Morgan

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

### **Mapping historic fire regimes for the western United States: integrating remote sensing and biophysical data**

[www.nrfirescience.org/resource/7937](http://www.nrfirescience.org/resource/7937)

We have developed a spatial database of historic natural fire regimes for the eleven western States to

provide information in support of expected national increases in prescribed burning. Fire regimes are described in terms both of frequency and severity, and we have classified five distinct fire regimes:  
Author(s): Colin C. Hardy, James P. Menakis, Donald G. Long, James K. Brown, David L. Bunnell  
Year Published: 1998  
Type: Document  
Conference Proceedings

### **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

### **Old-growth ponderosa pine and western larch stand structures: influences of pre-1900 fires and fire exclusion**

[www.nrfirescience.org/resource/11967](http://www.nrfirescience.org/resource/11967)

Presents detailed age structure for two western larch stands that historically experienced frequent fires. Compares age structures of eleven ponderosa pine and western larch stands representing a broad range of sites that had frequent fires. Interprets causal factors possibly linked to variations in stand age structures.

Author(s): Stephen F. Arno, Helen Y. Smith, Michael A. Krebs  
Year Published: 1997  
Type: Document  
Technical Report or White Paper

### **Restoring fire in lodgepole pine forests of the Intermountain West**

[www.nrfirescience.org/resource/8347](http://www.nrfirescience.org/resource/8347)

We are developing new management treatments for regenerating and sustaining lodgepole pine (*Pinus contorta*) forests through emulation of natural disturbance processes. Lodgepole pine is the principal forest cover on over 26 million hectares in western North America. While infrequent, stand replacing fires following mountain pine...

Author(s): Colin C. Hardy, Ward W. McCaughey  
Year Published: 1997  
Type: Document  
Book or Chapter or Journal Article

### **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



### **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

### **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

### **Reestablishing fire-adapted communities to riparian forests in the ponderosa pine zone**

[www.nrfirescience.org/resource/11248](http://www.nrfirescience.org/resource/11248)

Ecological research has implicated the practice of fire exclusion as a major contributor to forest health problems in the semiarid ponderosa pine (*Pinus ponderosa*) zone of the Inland West (Mutch and others 1993; Sampson and others 1994). Prior to 1900, frequent, low-intensity fires occurred on upland forests in this forest zone at...

Author(s): Matthew K. Arno

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Restoring recreational and residential forests**

[www.nrfirescience.org/resource/11249](http://www.nrfirescience.org/resource/11249)

Several decades of fire suppression following logging around the turn-of-the-century has produced dense, evenage stands of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). They contrast with the original forests where frequent, low-intensity fires gave rise to open, parklike,

and often uneven-age stands of...

Author(s): Joe H. Scott

Year Published: 1996

Type: Document

Technical Report or White Paper

### **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

### **The concept: restoring ecological structure and process in ponderosa pine forests**

[www.nrfirescience.org/resource/11245](http://www.nrfirescience.org/resource/11245)

Elimination of the historic pattern of frequent low-intensity fires in ponderosa pine and pine-mixed conifer forests has resulted in major ecological disruptions. Prior to 1900, open stands of large, long-lived, fire-resistant ponderosa pine were typical. These were accompanied in some areas by other fire-dependent species such as...

Author(s): Stephen F. Arno

Year Published: 1996

Type: Document

Technical Report or White Paper

### **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

### **Comparing the prescribed natural fire program with presettlement fires in the Selway-Bitterroot Wilderness**

[www.nrfirescience.org/resource/8217](http://www.nrfirescience.org/resource/8217)

The severity and extent of recent fires (1979-1990) were compared with that of presettlement fires (pre-1935) by eight major forest types in the Selway-Bitterroot Wilderness (SBW) in Idaho and Montana. Presettlement fire intervals were determined for estimating area burned. Presettlement annual area burned for the entire SBW was 4,...

Author(s): James K. Brown, Stephen F. Arno, Stephen W. Barrett, James P. Menakis

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

### **Fire regimes on andesitic mountain terrain in northeastern Yellowstone National Park, Wyoming**

[www.nrfirescience.org/resource/8196](http://www.nrfirescience.org/resource/8196)

A fire history investigation was conducted for three forest community types in the Absaroka Mountains of Yellowstone National Park, Wyoming. Master fire chronologies were based on fire-initiated age classes and tree fire scars. The area's major forest type, lodgepole pine (*Pinus contorta* Dougl. var. *latifolia*) ecosystems, revealed a...

Author(s): Stephen W. Barrett

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

### **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

### **Effects of fire on landscape heterogeneity in Yellowstone National Park, Wyoming**

[www.nrfirescience.org/resource/18422](http://www.nrfirescience.org/resource/18422)

A map of Yellowstone National Park (YNP) was derived from Landsat Thematic Mapper (TM) imagery and used to assess the isolation of burned areas, the heterogeneity that resulted from fires burning under moderate and severe burning conditions, and the relationship between heterogeneity and fire size. The majority of severely burned...

Author(s): Monica G. Turner, William W. Hargrove, Robert H. Gardner, William H. Romme

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

### **Fire history of Tenderfoot Creek Experimental Forest Lewis and Clark National Forest**

[www.nrfirescience.org/resource/13158](http://www.nrfirescience.org/resource/13158)

The landscape and stand-level fire history of lodgepole pine dominated forest in Tenderfoot Creek Experimental Forest is assessed. Primary objective were to: 1) determine pre-1900 fire periodicities, severities, and burning patterns in the area's lodgepole pine dominated stands, and 2) document and map the forest age class mosaic,...

Author(s): Stephen W. Barrett

Year Published: 1993

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

### **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

### **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

### **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

### **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

### **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

### **Forest fire frequency and western spruce budworm outbreaks in western Montana**

[www.nrfirescience.org/resource/7908](http://www.nrfirescience.org/resource/7908)

Duration and intensity of western spruce budworm (*Christoneura occidentalis* Freeman) outbreaks have increased with the decrease in forest fire frequency in Montana since 1910. Frequency of budworm outbreaks, however, was not affected. Feeding activity and fire occurrence were measured in 20 mixed Douglas-fir (*Pseudotsuga menziesii*...

Author(s): Leslie Anderson, Clinton E. Carlson, Ronald H. Wakimoto

Year Published: 1987

Type: Document

Book or Chapter or Journal Article

### **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'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

### **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

### **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

### **Indian fires as an ecological influence in the Northern Rockies**

[www.nrfirescience.org/resource/7910](http://www.nrfirescience.org/resource/7910)

The importance of fire as an ecological disturbance in the Northern Rockies is well accepted. Lightning is generally thought to have been the main source of ignition prior to settlement by Europeans. But writings of explorers and pioneers mention deliberate burning by Indians frequently enough to warrant an investigation of its...

Author(s): Stephen W. Barrett, Stephen F. Arno

Year Published: 1982

Type: Document

Book or Chapter or Journal Article

### **Fire intensity and frequency as factors in the distribution and structure of northern ecosystems**

[www.nrfirescience.org/resource/8406](http://www.nrfirescience.org/resource/8406)

Most presettlement Canadian and Alaskan boreal forests and Rocky Mountain subalpine forests had lightning fire regimes of large-scale crown fires and high-intensity surface fires, causing total stand replacement on fire rotations (or cycles) to 50 to 200 years. Cycles and fire size varied with latitude, elevation, and topographic...

Author(s): Miron L. Heinselman

Year Published: 1981

Type: Document

Conference Proceedings

### **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

### **Fire history terminology: report of the ad hoc committee**

[www.nrfirescience.org/resource/12410](http://www.nrfirescience.org/resource/12410)

It is often quite difficult to compare fire history studies conducted by different investigators because different terms may be used to refer to the same concept and the same term may be used to refer to different concepts. To help resolve this difficulty, an ad hoc committee was formed early in the course of the workshop with the...

Author(s): William H. Romme

Year Published: 1980

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Fire history of western redcedar/hemlock forests in northern Idaho**

[www.nrfirescience.org/resource/12041](http://www.nrfirescience.org/resource/12041)

Evidence of fire history over the past few centuries was gathered in two areas (totaling 30,000 acres; 6000 ha) for fire management planning. Findings are some of the first detailed data for western redcedar-hemlock forests. On upland habitat types fires of variable intensities generally occurred at 50-to-150-year intervals, often...

Author(s): Stephen F. Arno, Dan H. Davis

Year Published: 1980

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Fire history of a western larch/Douglas-fir forest type in northwestern Montana**

[www.nrfirescience.org/resource/12044](http://www.nrfirescience.org/resource/12044)

Mean frequencies were about 120 years for valleys and montane slopes and 150 years for subalpine slopes in this western larch/Douglas-fir forest from 1735 to 1976. Fires were small and moderately intense with occasional high intensity runs. Single burns thinned the overstory favoring mixed conifer regeneration. Multiple burns...

Author(s): Kathleen M. Davis

Year Published: 1980

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Forest fire history in the Northern Rockies**

[www.nrfirescience.org/resource/13121](http://www.nrfirescience.org/resource/13121)

Recent fire-scar studies in the northern Rocky Mountains have documented forest fire history over the past few centuries. They reveal that in some forest types fire maintained many-aged open stands of seral trees. In other types, major fires caused replacement of the stands. Often, however, fires burned



at variable intensities,...

Author(s): Stephen F. Arno

Year Published: 1980

Type: Document

Book or Chapter or Journal Article

### **Indian fires in the pre-settlement forests of western Montana**

[www.nrfirescience.org/resource/12043](http://www.nrfirescience.org/resource/12043)

Presents preliminary results of a two-year study examining the pattern of Indian fires in western Montana's lower elevation forests. Interviews and historic journals were used to reconstruct the characteristics of aboriginal burning. Fire scar data from paired stands indicate substantial differences in fire frequency between Indian...

Author(s): Stephen W. Berrett

Year Published: 1980

Type: Document

Conference Proceedings

### **Fire frequency in subalpine forests of Yellowstone National Park**

[www.nrfirescience.org/resource/12042](http://www.nrfirescience.org/resource/12042)

Dead woody fuels were sampled in 16 upland forest stands representing a chronosequence of forest successional stages. Different fuel components show different temporal patterns, but adequate levels of all components necessary for an intense crown fire are not present simultaneously until stand age 300-400 yr. Therefore, the average...

Author(s): William H. Romme

Year Published: 1980

Type: Document

Conference Proceedings, Technical Report or White Paper

### **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

### **The historical role of fire on the Bitterroot National Forest**

[www.nrfirescience.org/resource/11175](http://www.nrfirescience.org/resource/11175)

Presents frequencies, intensities, and influences of fire on stand structure and composition on the Bitterroot National Forest in west-central Montana. Three study areas were established, each having a wide range of elevations and forest types. Findings are based upon study of nearly 900 individual fire scars on living trees, and on...

Author(s): Stephen F. Arno

Year Published: 1976

Type: Document

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

### **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

### **Fire-dependent forests in the Northern Rocky Mountains**

[www.nrfirescience.org/resource/7935](http://www.nrfirescience.org/resource/7935)

One objective of wilderness and parkland fire ecology research is to describe the relationships between fire and unmanaged ecosystems, so that strategies can be determined that will provide a more nearly natural incidence of fire. More than 50 years of efforts directed toward exclusion of wildland fires in the Northern Rocky...

Author(s): James R. Habeck, Robert W. Mutch

Year Published: 1973

Type: Document

Book or Chapter or Journal Article

### **Wildfires in northern Yellowstone National Park**

[www.nrfirescience.org/resource/15398](http://www.nrfirescience.org/resource/15398)

A sample of 40 fire-scarred trees was used to reconstruct the frequency and size of fires during the past 300-400 years in northern Yellowstone National Park. Best estimates of frequency suggested mean intervals of about 20-25 years between fires, after adjustments had been made for the recent influence of modern man. Agreement in...

Author(s): Douglas B. Houston

Year Published: 1973

Type: Document

Book or Chapter or Journal Article

### **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 un aspirated 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

### **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

### **Moritz Lab - Fire regimes and Ecosystem Management**

[www.nrfirescience.org/resource/18359](http://www.nrfirescience.org/resource/18359)

Our research is focused on understanding the dynamics of fire regimes at relatively broad scales, and our extension work involves applying this information to ecosystem management. Students and staff in the lab work and publish on a wide variety of projects related to fire and are involved in both field and lab analyses, including...

Type: Website

Website

### **As wildfires burn, will the forests of Yellowstone remain?**

[www.nrfirescience.org/resource/18048](http://www.nrfirescience.org/resource/18048)

The fires that ravaged Yellowstone National Park in 1988 were large and severe, but they were still within the normal limits of fire patterns in the West. Following those fires 30 years ago, University of Wisconsin–Madison Professor of Integrative Biology, Monica Turner, immediately got to work studying the recovery of the forests...

Type: Media

Video

### **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

Webinar

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

[www.nrfirescience.org/resource/14343](http://www.nrfirescience.org/resource/14343)

The Flathead Indian Reservation spreads over 1.3 million acres of western Montana valleys and mountains; over 780,000 acres of these lands are managed as forest resources by the Confederated Salish and Kootenai Tribes (CSKT). Tribal Forestry has been, especially since the 1999-2000 Forest Management Plan and Fire...

Type: Media

Webinar

### **Finding the best available science on fire effects and fire regimes in northwestern and Northern Rockies ecosystems**

[www.nrfirescience.org/resource/13953](http://www.nrfirescience.org/resource/13953)

The Northern Rockies Fire Science Network and Northwest Fire Science Consortium teamed up with Fire Effects Information System (FEIS) staff to introduce new fire regime products and demonstrate new search functions to inform fire management planning and decision-making in the Northwest and Northern Rocky Mountain regions. ...

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

### **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

### **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

### **LANDFIRE**

[www.nrfirescience.org/resource/18009](http://www.nrfirescience.org/resource/18009)

LANDFIRE is an ongoing research project and database that contains geospatial data products that describe existing vegetation composition and structure, potential vegetation, surface and canopy fuel characteristics, historical fire regimes, and fire regime condition class. LANDFIRE provides fire and land managers with the...

Type: Website

Website

### **LANDFIRE fire regime products**

[www.nrfirescience.org/resource/14264](http://www.nrfirescience.org/resource/14264)

LANDFIRE fire regime products characterize reference fire frequency and severity and vegetation departure for the entire U.S. The datasets in this product suite include Biophysical Settings, Succession Class, Fire Regime Group, Mean Fire Return Interval, Reference Fire Severity, Vegetation Departure and Vegetation Condition Class...

Type: Media

Video

### **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

### **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

### **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

### **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 regimes, stand structure, and fuel loads in current and reconstructed riparian and upland forests**

[www.nrfirescience.org/resource/14085](http://www.nrfirescience.org/resource/14085)

Fire history, stand structure, and fuel loads in adjacent riparian and upland forests were measured in the Sierra Nevada and southern Cascades. Historic stand structure and fuel loads were then reconstructed using fire history and current stand data. Current and reconstructed riparian and upland forests were compared to determine if...

Type: Media

Webinar

### **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

### **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

### **Fires in the West may be changing the future of forests**

[www.nrfirescience.org/resource/18047](http://www.nrfirescience.org/resource/18047)

The fires that ravaged Yellowstone National Park in 1988 were large and severe, but they were still within the normal limits of fire regimes in the West. Following those fires 30 years ago, University of Wisconsin–Madison Professor of Integrative Biology, Monica Turner, immediately got to work studying the recovery of the forests...

Type: Media

Video

### **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

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

[www.nrfirescience.org/resource/15808](http://www.nrfirescience.org/resource/15808)

Studying the causes and ecosystem consequences of wildfire and shifting fire regimes is challenging, because of the slowly varying (centennial-scale) processes involved. This is particularly true in stand-replacing fire regimes, where mean return intervals exceed 100 years. Advances in paleoecology continue to improve our...

Type: Media

Seminar

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

[www.nrfirescience.org/resource/14341](http://www.nrfirescience.org/resource/14341)

This webinar was presented as part of the 2015-2016 RMRS Fire Sciences Laboratory's weekly seminar series.

Type: Media

Seminar

### **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

### **Monitoring Trends in Burn Severity (MTBS)**

[www.nrfirescience.org/resource/18010](http://www.nrfirescience.org/resource/18010)

Monitoring Trends in Burn Severity (MTBS) is a multi-year project designed to consistently map the burn severity and perimeters of fires across all lands of the United States from 1984 and beyond. The data generated by MTBS will be used to identify national trends in burn severity, providing information necessary to monitor the...

Type: Website

Website

### **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

### **Post-fire conifer regeneration in ponderosa pine forests of the southern Rocky Mountains, USA**

[www.nrfirescience.org/resource/18172](http://www.nrfirescience.org/resource/18172)

Wildfires in the southern Rocky Mountain region have increased in size, frequency, and severity over the past three decades, but forest recovery following high severity wildfire events is uncertain in this region. We studied conifer regeneration in 11 fires in Colorado, South Dakota, and Wyoming in unburned, low-to-moderately burned...

Type: Media

Webinar

### **Fire Severity and Regeneration Strategy Influence Shrub Patch Size and Structure**

[www.nrfirescience.org/resource/17969](http://www.nrfirescience.org/resource/17969)

Shrub species demonstrate flexible responses to wildfire disturbance severity that are reflected in shrub patch dynamics at small and intermediate scales. Prior research has examined the dynamics and persistence of large shrub patches on the landscape; our work focuses on individuals or groups of individual shrubs. Shrub patches...

Type: Media

Video



## **Techniques for Wildfire Detection and Monitoring Part 1**

[www.nrfirescience.org/resource/18086](http://www.nrfirescience.org/resource/18086)

Certain areas are experiencing longer fire seasons, with more frequent and severe droughts. Wildfire detection, monitoring, and mitigation is increasingly important in these regions. Satellite remote sensing data is useful for identifying active fires, evaluating burned areas, and assessing fire emissions. This advanced training...

Type: Media

Webinar

## **The pyrogeography of western North America: how climate has affected fire regimes and fire history across the west, and where we may be going in the future**

[www.nrfirescience.org/resource/12870](http://www.nrfirescience.org/resource/12870)

A recent surge of scientific knowledge and interest in fire climatology derives from two factors: increasing understanding of broad-scale ocean-atmosphere climate forcings, such as the El Niño-Southern Oscillation, and their teleconnections to regional and local patterns of droughts and wildfires, and mounting evidence that global...

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 these forests, where the frequency, severity, and effects of...

Type: Media

Webinar

## **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

## **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

## **Herbivory in aspen forests: ecological context and mechanisms of defense**

[www.nrfirescience.org/resource/13719](http://www.nrfirescience.org/resource/13719)

The pressures facing quaking aspen (*Populus tremuloides*) forests in the Intermountain West are multifaceted. Fire suppression, climate change and browsing pressure by ungulates are just several of the factors that threaten the health of this foundation species. Here we present two leading scientists in North America who study aspen...

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