

### **Spatial and temporal variability and trends in 2001-2016 global fire activity**

[www.nrfirescience.org/resource/17432](http://www.nrfirescience.org/resource/17432)

Fire regimes across the globe have great spatial and temporal variability, and these are influenced by many factors including anthropogenic management, climate, and vegetation types. Here we utilize the satellite-based 'active fire' product, from Moderate Resolution Imaging Spectroradiometer (MODIS) sensors, to statistically...

Author(s): Nick Earl, Ian Simmonds

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

### **Fire frequency drives decadal changes in soil carbon and nitrogen and ecosystem productivity**

[www.nrfirescience.org/resource/17389](http://www.nrfirescience.org/resource/17389)

Fire frequency is changing globally and is projected to affect the global carbon cycle and climate. However, uncertainty about how ecosystems respond to decadal changes in fire frequency makes it difficult to predict the effects of altered fire regimes on the carbon cycle; for instance, we do not fully understand the long-term...

Author(s): Adam F. A. Pellegrini, Anders Ahlström, Sarah E. Hobbie, Peter B. Reich, Lars P. Nieradzik, A. Carla Staver, Bryant C. Scharenbroch, Ari A. Jumpponen, William R.L. Anderegg, James T. Randerson, Robert B. Jackson

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

### **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

### **Visualizing Individual Tree Differences in Tree-Ring Studies**

[www.nrfirescience.org/resource/17649](http://www.nrfirescience.org/resource/17649)

Averaging tree-ring measurements from multiple individuals is one of the most common procedures in dendrochronology. It serves to filter out noise from individual differences between trees, such as competition, height, and micro-site effects, which ideally results in a site chronology sensitive to regional scale factors such as...

Author(s): Mario Trouillier, Marieke van der Maaten-Theunissen, Jill E. Harvey, David Wurth, Martin Schnittler, Martin Wilmking

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

### **Advancing dendrochronological studies of fire in the United States**

[www.nrfirescience.org/resource/17511](http://www.nrfirescience.org/resource/17511)

Dendroecology is the science that dates tree rings to their exact calendar year of formation to study processes that influence forest ecology (e.g., Speer 2010 [1], Amoroso et al., 2017 [2]). Reconstruction of past fire regimes is a core application of dendroecology, linking fire history to population dynamics and climate effects on...

Author(s): Grant Harley, Christopher H. Baisan, Peter M. Brown, Donald A. Falk, William T. Flatley, Henri D. Grissino-Mayer, Amy E. Hessler, Emily K. Heyerdahl, Margot W. Kaye, Charles W. Lafon, Ellis Q. Margolis, R. Stockton Maxwell, Adam T. Naito, William J. Platt, Monica T. Rother, Tom Saladyga, Rosemary L. Sherriff, Lauren A. Stachowiak, Michael C. Stambaugh, Elaine Kennedy Sutherland, Alan H. Taylor

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

### **Surface analysis as a method to reconstruct past and recent dynamics of forest ecosystems**

[www.nrfirescience.org/resource/16707](http://www.nrfirescience.org/resource/16707)

The most direct way of deciphering the dynamics of an ecosystem is to examine its biotic and abiotic components based on analysis of living and dead organisms distributed above ground. The surface analysis method presented here provides a centennial to millennial stand-scale composition and disturbance history and is applicable in...

Author(s): Vanessa Pilon, Serge Payette, Pierre-Luc Couillard, Jason Laflamme

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

### **Shifts in Forest Structure in Northwest Montana from 1972 to 2015 Using the Landsat Archive from Multispectral Scanner to Operational Land Imager**

[www.nrfirescience.org/resource/17182](http://www.nrfirescience.org/resource/17182)

There is a pressing need to map changes in forest structure from the earliest time period possible given forest management policies and accelerated disturbances from climate change. The availability of Landsat data from over four decades helps researchers study an ecologically meaningful length of time. Forest structure is most...

Author(s): Shannon L. Savage, Rick L. Lawrence, John Squires, Joseph D. Holbrook, Lucretia E. Olson, Justin D. Braaten, Warren B. Cohen

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

### **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

### **Monthly paleostreamflow reconstruction from annual tree-ring chronologies**

[www.nrfirescience.org/resource/17554](http://www.nrfirescience.org/resource/17554)

Paleoclimate reconstructions are increasingly used to characterize annual climate variability prior to the instrumental record, to improve estimates of climate extremes, and to provide a baseline for climate change projections. To date, paleoclimate records have seen limited engineering use to estimate hydrologic risks because water...

Author(s): J. H. Stagge, D. E. Rosenberg, R. Justin DeRose, T. M. Rittenour

Year Published: 2018

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

### **Evaluating a new method for reconstructing forest conditions from General Land Office survey records**

[www.nrfirescience.org/resource/16132](http://www.nrfirescience.org/resource/16132)

Historical forest conditions are often used to inform contemporary management goals because historical forests are considered to be resilient to ecological disturbances. The General Land Office (GLO) surveys of the late 19th and early 20th centuries provide regionally quasi-contiguous data sets of historical forests across much of...

Author(s): Carrie R. Levine, Charles V. Cogbill, Brandon M. Collins, Andrew J. Larson, James A. Lutz,

Malcolm P. North, Christina M. Restaino, Hugh Safford, Scott L. Stephens, John J. Battles  
Year Published: 2017  
Type: Document  
Book or Chapter or Journal Article

### **Indicators of burn severity at extended temporal scales: A decade of ecosystem response in mixed conifer forests of western Montana**

[www.nrfirescience.org/resource/15315](http://www.nrfirescience.org/resource/15315)

We collected field and remotely sensed data spanning 10 years after three 2003 Montana wildfires to monitor ecological change across multiple temporal and spatial scales. Multiple endmember spectral mixture analysis was used to create post-fire maps of: char, soil, green (GV) and non-photosynthetic (NPV) vegetation from high-...

Author(s): Sarah A. Lewis, Andrew T. Hudak, Peter R. Robichaud, Penelope Morgan, K.L. Satterberg, Eva K. Strand, Alistair M. S. Smith, J Zamudio, Leigh B. Lentile  
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

### **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

### **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

### **Ecological effects of fire**

[www.nrfirescience.org/resource/16500](http://www.nrfirescience.org/resource/16500)

Fire is an enormously influential disturbance over large areas of land in the modern world. Vegetation burns because the Earth's atmosphere contains sufficient oxygen (415%) to support combustion (Pyne, 2001). Oxygen started to accumulate in the atmosphere about 2 billion years ago and, since the appearance of plants in the...

Author(s): William J. Bond, Robert E. Keane

Year Published: 2017

Type: Document

Synthesis

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

[www.nrfirescience.org/resource/17176](http://www.nrfirescience.org/resource/17176)

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

### **Human-started wildfires expand the fire niche across the United States**

[www.nrfirescience.org/resource/15122](http://www.nrfirescience.org/resource/15122)

The economic and ecological costs of wildfire in the United States have risen substantially in recent decades. Although climate change has likely enabled a portion of the increase in wildfire activity, the direct role of people in increasing wildfire activity has been largely overlooked. We evaluate over 1.5 million government...

Author(s): Jennifer Balch, Bethany A. Bradley, John T. Abatzoglou, R. Chelsea Nagy, Emily J. Fusco, Adam L. Mahood

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Spatially varying constraints of human-caused fire occurrence in British Columbia, Canada**

[www.nrfirescience.org/resource/15088](http://www.nrfirescience.org/resource/15088)

Human-caused wildfires are controlled by human and natural influences, and determining their key drivers is critical for understanding spatial patterns of wildfire and implementing effective fire management. We examined an array of explanatory variables that account for spatial controls of human-caused fire occurrence from 1990 to...

Author(s): Philip E. Camp, Meg A. Krawchuk

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Quantifying the effect of elevation and aspect on fire return intervals in the Canadian Rocky Mountains**

[www.nrfirescience.org/resource/15032](http://www.nrfirescience.org/resource/15032)

The effect of topography on wildfire distribution in the Canadian Rockies has been the subject of

debate. We suspect the size of the study area, and the assumption fire return intervals are distributed as a Weibull distribution used in many previous studies may have obscured the real effect of topography on these fire-regulated...

Author(s): Marie-Pierre Rogeau, Glen W. Armstrong

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **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

### **Quaking aspen in the Northern Rockies: retention and restoration**

[www.nrfirescience.org/resource/15373](http://www.nrfirescience.org/resource/15373)

Specific objectives of this review are to address the current status and future outlook of aspen across a range of ecosystems in the US Northern Rockies. Specifically, we aim to answer the following questions: Is aspen declining in the Northern Rockies, and if so what are the underlying causes? Where should aspen...

Author(s): Camille Stevens-Rumann, Penelope Morgan, Eva K. Strand, Diane Abendroth

Year Published: 2017

Type: Document

Synthesis

### **Condition of Live Fire-Scarred Ponderosa Pine Twenty-one Years After Removing Partial Cross-Sections**

[www.nrfirescience.org/resource/16889](http://www.nrfirescience.org/resource/16889)

Concern over the effects of removing fire-scarred partial cross-sections may limit sampling of live ponderosa pine to reconstruct fire history. We report mortality rates for ponderosa pine trees 20 to 21 years after removing fire-scarred partial cross-sections to reconstruct fire history. In 2015, following surveys every five years...

Author(s): Emily K. Heyerdahl, Steven J. McKay

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Reburns and fire-on-fire interactions in the U.S. northern Rockies forests 1900-2014**

[www.nrfirescience.org/resource/15307](http://www.nrfirescience.org/resource/15307)

The interactions of fire on the landscape between 1900 and 2014 are explored in this master's thesis. A description of its content is not yet available from University of Idaho.

Author(s): Justin Barton Lauer

Year Published: 2017

Type: Document

**Fire history and fire-climate interactions in high elevation whitebark pine dominated forest**

[www.nrfirescience.org/resource/15767](http://www.nrfirescience.org/resource/15767)

The objectives of this study were to identify whitebark pine fire-climate interactions, and tree establishment and mortality patterns in a landscape context. Specific objectives were to : 1) develop a whitebark pine tree-ring chronology to date fire scar samples and reconstruct climate from tree rings; 2) identify fire climate...

Author(s): Alan H. Taylor, Catherine Airey Lauvaux

Year Published: 2017

Type: Document

Technical Report or White Paper

**GSD Update: Year in Review: Spotlight on 2016 Research by the Grassland, Shrubland and Desert Ecosystems Science Program**

[www.nrfirescience.org/resource/16548](http://www.nrfirescience.org/resource/16548)

In this issue of the GSD Update, we take a look back at selected studies of the Grassland, Shrubland and Desert Ecosystems Science Program (GSD) that depict its strengths and focus areas. Significant results of recent research and science delivery by GSD scientists are highlighted. We feature program research that lines up with the...

Author(s): Deborah M. Finch

Year Published: 2017

Type: Document

Management or Planning Document

**Fire-regime variability impacts forest carbon dynamics for centuries to millennia**

[www.nrfirescience.org/resource/15548](http://www.nrfirescience.org/resource/15548)

Wildfire is a dominant disturbance agent in forest ecosystems, shaping important biogeochemical processes including net carbon (C) balance. Long-term monitoring and chronosequence studies highlight a resilience of biogeochemical properties to large, stand-replacing, high-severity fire events. In contrast, the consequences of...

Author(s): Tara W. Hudiberg, Philip E. Higuera, Jeffrey A. Hicke

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

**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

### **Trend analysis of fire season length and extreme fire weather in North America between 1979 and 2015**

[www.nrfirescience.org/resource/16407](http://www.nrfirescience.org/resource/16407)

We have constructed a fire weather climatology over North America from 1979 to 2015 using the North American Regional Reanalysis dataset and the Canadian Fire Weather Index (FWI) System. We tested for the presence of trends in potential fire season length, based on a meteorological definition, and extreme fire weather using the non-...

Author(s): Piyush Jain, Xianli Wang, Michael D. Flannigan

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

### **Tree regeneration spatial patterns in ponderosa pine forests following stand-replacing fire: Influence of topography and neighbors**

[www.nrfirescience.org/resource/16295](http://www.nrfirescience.org/resource/16295)

Shifting fire regimes alter forest structure assembly in ponderosa pine forests and may produce structural heterogeneity following stand-replacing fire due, in part, to fine-scale variability in growing environments. We mapped tree regeneration in eighteen plots 11 to 15 years after stand-replacing fire in Colorado and South Dakota...

Author(s): Justin P. Ziegler, Chad M. Hoffman, Paula J. Fornwalt, Carolyn Hull Sieg, Michael A. Battaglia, Marin Chambers, Jose M. Iniguez

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Regeneration of lower-montane forests a quarter-century after the 1988 Yellowstone fires: a fire-catalyzed shift in lower treelines?**

[www.nrfirescience.org/resource/16885](http://www.nrfirescience.org/resource/16885)

Forests near the lower limit of montane tree cover are expected to be particularly vulnerable to warming climate, potentially converting to non-forest for prolonged periods if affected by canopy-removing

disturbances. Such disturbance-catalyzed shifts are by nature stochastic, offering few opportunities to test these predictions. We...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/15306](http://www.nrfirescience.org/resource/15306)

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

### **Influence of fire disturbance and biophysical heterogeneity on pre-settlement ponderosa pine and mixed conifer forests**

[www.nrfirescience.org/resource/14847](http://www.nrfirescience.org/resource/14847)

Fire frequency is assumed to have exerted a strong influence on historical forest communities in the inland Pacific Northwest. This study reconstructs forest structure and composition in the year 1890 and fire frequency from 1760 to 1890 at 10 sites spanning a broad productivity gradient in the southern Blue Mountains of eastern...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Anthropogenic influence on wildfire activity in Alberta, Canada**

[www.nrfirescience.org/resource/14702](http://www.nrfirescience.org/resource/14702)

The boreal forest of Alberta, Canada, is under pressure from a rapid expansion of the wildland–human interface driven by natural resources exploitation. The specific impact of these changes on area burned remains poorly understood. We addressed this issue by modelling area burned for the 1980–2010 period using variables...

Author(s): Francois-Nicolas Robinne, Marc-Andre Parisien, Michael D. Flannigan

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Quaking aspen in Utah: integrating recent science with management**

[www.nrfirescience.org/resource/15175](http://www.nrfirescience.org/resource/15175)

Quaking aspen is widely regarded as a key resource for humans, livestock, and wildlife with these values often competing with each other, leading to overuse of aspen in some locations and declines. We review trends in aspen science and management, particularly in Utah. Historically, research conducted here holds a prestigious place...

Author(s): Paul C. Rogers, Sam St. Clair

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **The spatially varying influence of humans on fire probability in North America**

[www.nrfirescience.org/resource/14693](http://www.nrfirescience.org/resource/14693)

Humans affect fire regimes by providing ignition sources in some cases, suppressing wildfires in others, and altering natural vegetation in ways that may either promote or limit fire. In North America, several studies have evaluated the effects of society on fire activity; however, most studies have been regional or subcontinental...

Author(s): Marc-Andre Parisien, Carol Miller, Sean A. Parks, Evan R. DeLancey, Francois-Nicolas Robinne, Michael D. Flannigan

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **A 350-million-year legacy of fire adaptation among conifers**

[www.nrfirescience.org/resource/14017](http://www.nrfirescience.org/resource/14017)

Current phylogenetic evidence shows that fire began shaping the evolution of land plants 125 Ma, although the fossil charcoal record indicates that fire has a much longer history (>350 Ma). Serotiny (on-plant seed storage) is generally accepted as an adaptation to fire among woody plants. We developed a conceptual model of the...

Author(s): Tianhua He, Claire M. Belcher, Byron B. Lamont, Sim L. Lim

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

### **The passing of the Lolo Trail, with an introduction by Andrew J. Larson**

[www.nrfirescience.org/resource/14325](http://www.nrfirescience.org/resource/14325)

In 1935, Elers Koch argued in a Journal of Forestry article that a minimum fire protection model should be implemented in the backcountry areas of national forests in Idaho, USA. As a USDA Forest Service Supervisor and Assistant Regional Forester, Koch had led many major fire-fighting campaigns in the region, beginning with...

Author(s): Elers Koch

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Quantifying the human influence on fire ignition across the western USA**

[www.nrfirescience.org/resource/14896](http://www.nrfirescience.org/resource/14896)

Humans have a profound effect on fire regimes by increasing the frequency of ignitions. Although ignition is an integral component of understanding and predicting fire, to date fire models have not been able to isolate the ignition location, leading to inconsistent use of anthropogenic ignition proxies. Here, we identified fire...

Author(s): Emily J. Fusco, John T. Abatzoglou, Jennifer Balch, John T. Finn, Bethany A. Bradley

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Wildland fire limits subsequent fire occurrence**

[www.nrfirescience.org/resource/15303](http://www.nrfirescience.org/resource/15303)

Several aspects of wildland fire are moderated by site- and landscape-level vegetation changes caused by previous fire, thereby creating a dynamic where one fire exerts a regulatory control on subsequent fire. For example, wildland fire has been shown to regulate the size and severity of subsequent fire. However, wildland fire has...

Author(s): Sean A. Parks, Carol Miller, Lisa M. Holsinger, Scott L. Baggett, Benjamin J. Bird

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

### **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

### **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

### **Yellowstone fire history and fire ecology - Insights 27 years after the 1988 fires**

[www.nrfirescience.org/resource/14651](http://www.nrfirescience.org/resource/14651)

In 1988, fires burned 36% (about 800,000 acres) of Yellowstone National Park (YNP). At the time, the size and severity of these fires was greater than scientists and land managers were used to and they were attributed to excessive fuel loadings that were a result of past fire suppression. However, fire history and fire ecology...

Author(s): Corey L. Gucker

Year Published: 2016

Type: Document

Research Brief or Fact Sheet

### **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

### **ARCBURN: Linking field-based and experimental methods to quantify, predict, and manage fire effects on cultural resources - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/17041](http://www.nrfirescience.org/resource/17041)

Cultural resources are physical features, both natural and anthropogenic, associated with human activity. These unique and non-renewable resources include sites, structures, and objects possessing significance in history, architecture, archaeology, or human development (Fowler 1982). Wildfires can alter cultural resources through...

Author(s): Rachel A. Loehman, Bret W. Butler, Jamie Civitello, Connie Constan, Jennifer Dyer, Zander Evans, Megan Friggens, Rebekah Kneifel, James J. Reardon, Madeline Scheintaub, Anastasia Steffen  
Year Published: 2016  
Type: Document  
Technical Report or White Paper

### **A 14,000-year record of fire, climate, and vegetation from the Bear River Range, southeast Idaho, USA**

[www.nrfirescience.org/resource/14481](http://www.nrfirescience.org/resource/14481)

The vegetation and fire history of the Bear River Range (BRR), Southeast Idaho has been reconstructed from pollen, plant macrofossils, and macroscopic charcoal from lacustrine sediments. Overall, the BRR record shows independent responses of vegetation and fire regime to climate variation. The reconstructions suggest strong seasonal...

Author(s): Zachary J. Lundeen, Andrea R. Brunelle  
Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Fire-proneness as a prerequisite for the evolution of fire-adapted traits**

[www.nrfirescience.org/resource/15050](http://www.nrfirescience.org/resource/15050)

Fire as a major evolutionary force has been disputed because it is considered to lack supporting evidence. If a trait has evolved in response to selection by fire then the environment of the plant must have been fire-prone before the appearance of that trait. Using outcomes of trait assignments applied to molecular phylogenies for...

Author(s): Byron B. Lamont, Tianhua He  
Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Macroanatomy and compartmentalization of recent fire scars in three North American conifers**

[www.nrfirescience.org/resource/14329](http://www.nrfirescience.org/resource/14329)

Fire scars are initiated by cambial necrosis caused by localized lethal heating of the tree stem. Scars develop as part of the linked survival processes of compartmentalization and wound closure. The position of scars within dated tree ring series is the basis for dendrochronological reconstruction of fire history. Macroanatomical...

Author(s): Kevin T. Smith, Estelle Arbellay, Donald A. Falk, Elaine Kennedy Sutherland  
Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Wildland fire deficit and surplus in the western United States, 1984-2012**

[www.nrfirescience.org/resource/13740](http://www.nrfirescience.org/resource/13740)

Wildland fire is an important disturbance agent in the western US and globally. However, the natural role of fire has been disrupted in many regions due to the influence of human activities, which have the potential to either exclude or promote fire, resulting in a "fire deficit" or "fire surplus", respectively. In this study, we...

Author(s): Sean A. Parks, Carol Miller, Marc-Andre Parisien, Lisa M. Holsinger, Solomon Z. Dobrowski, John T. Abatzoglou  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Wildland fire as a self-regulating mechanism: the role of previous burns and weather in limiting fire progression**

[www.nrfirescience.org/resource/12770](http://www.nrfirescience.org/resource/12770)

Theory suggests that natural fire regimes can result in landscapes that are both self-regulating and resilient to fire. For example, because fires consume fuel, they may create barriers to the spread of future fires, thereby regulating fire size. Top-down controls such as weather, however, can weaken this effect. While empirical...

Author(s): Sean A. Parks, Lisa M. Holsinger, Carol Miller, Cara R. Nelson

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

### **A state-and-transition simulation modeling approach for estimating the historical range of variability**

[www.nrfirescience.org/resource/13078](http://www.nrfirescience.org/resource/13078)

Reference ecological conditions offer important context for land managers as they assess the condition of their landscapes and provide benchmarks for desired future conditions. State-and-transition simulation models (STSMs) are commonly used to estimate reference conditions that can be used to evaluate current ecosystem conditions...

Author(s): Kori Blankenship, Leonardo Frid, James L. Smith

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **American Fire History, 1960-2013**

[www.nrfirescience.org/resource/15567](http://www.nrfirescience.org/resource/15567)

With support from the U.S. Forest Service, Department of the Interior, and Joint Fire Science Program, I have written a fire history of America from 1960 to 2013. The project will result in two books. Between Two Fires: A Fire History of Contemporary America relates the basic narrative. To the Last Smoke assembles anthologies of...

Author(s): Stephen Pyne, Heidi Neeley

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Traditional fire-use, landscape transition, and the legacies of social theory past**

[www.nrfirescience.org/resource/16974](http://www.nrfirescience.org/resource/16974)

Fire-use and the scale and character of its effects on landscapes remain hotly debated in the paleo- and historical-fire literature. Since the second half of the nineteenth century, anthropology and geography have played important roles in providing theoretical propositions and testable hypotheses for advancing understandings of the...

Author(s): Michael R. Coughlan

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **The changing strength and nature of fire-climate relationships in the northern Rocky Mountains, U.S.A., 1902-2008**

[www.nrfirescience.org/resource/15636](http://www.nrfirescience.org/resource/15636)

Time-varying fire-climate relationships may represent an important component of fire-regime variability, relevant for understanding the controls of fire and projecting fire activity under global-change scenarios. We used time-varying statistical models to evaluate if and how fire-climate relationships varied from 1902-2008, in one...

Author(s): Philip E. Higuera, John T. Abatzoglou, Jeremy S. Littell, Penelope Morgan

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Collaborative fuels reduction and restoration - Experiences from the Southwestern Crown of the Continent**

[www.nrfirescience.org/resource/13064](http://www.nrfirescience.org/resource/13064)

Forests that historically burned in mixed-severity fire regimes prove difficult to manage, especially when they border homes and prized recreation areas. This management challenge was the focus of the Fuels Reduction and Restoration in Mixed-Conifer Forests of the Southwestern Crown of the Continent field trip, following the May...

Author(s): Corey L. Gucker

Year Published: 2015

Type: Document

Research Brief or Fact Sheet

### **Historical spatial patterns and contemporary tree mortality in dry mixed-conifer forests**

[www.nrfirescience.org/resource/13649](http://www.nrfirescience.org/resource/13649)

Management and restoration of the dry, frequent-fire forests of the North American west depend on sound information about both historical and contemporary conditions to adequately address repercussions of fire suppression and changing climate. The purpose of this study is to quantify historical tree spatial patterns and assess...

Author(s): Kate A. Clyatt, Justin S. Crotteau, Michael S. Schaedel, Haley L. Wiggins, Harold Kelley, Derek J. Churchill, Andrew J. Larson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Sources and implications of bias and uncertainty in a century of US wildfire activity data**

[www.nrfirescience.org/resource/13302](http://www.nrfirescience.org/resource/13302)

Analyses to identify and relate trends in wildfire activity to factors such as climate, population, land use or land cover and wildland fire policy are increasingly popular in the United States. There is a wealth of US wildfire activity data available for such analyses, but users must be aware of inherent reporting biases,...



Author(s): Karen C. Short  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Postfire shrub cover dynamics: A 70-year fire chronosequence in mountain big sagebrush communities**

[www.nrfirescience.org/resource/15422](http://www.nrfirescience.org/resource/15422)

Fire is natural in sagebrush (*Artemisia L.*) communities. In this study, we quantify effects of time since last burn (TSLB) on shrub cover over a 70-year (yr) fire chronosequence. We sampled mountain big sagebrush communities with very large-scale aerial (VLSA) imagery and measured sagebrush, antelope bitterbrush (*Purshia tridentata*...

Author(s): Corey A. Moffet, J. Bret Taylor, D. Terrance Booth  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Restoration fuels treatments in old-growth- Visiting research plots in western larch and ponderosa pine forests**

[www.nrfirescience.org/resource/12674](http://www.nrfirescience.org/resource/12674)

Mick Harrington and Steve Arno, retired research foresters with the USFS Rocky Mountain Research Station, took participants of the May 2014 Large Wildland Fires Conference through a 300-year-old stand of ponderosa pine (*Pinus ponderosa*) and western larch (*Larix occidentalis*). While there, they discussed their research, which...

Author(s): Corey L. Gucker  
Year Published: 2014  
Type: Document  
Research Brief or Fact Sheet

### **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

### **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

### **Regional projections of the likelihood of very large wildland fires under a changing climate in the contiguous western United States**

[www.nrfirescience.org/resource/13006](http://www.nrfirescience.org/resource/13006)

Seasonal changes in the climatic potential for very large wildfires (VLWF > or = 50,000 ac ~20,234 ha) across the western contiguous United States are projected over the 21st century using generalized linear models and downscaled climate projections for two representative concentration pathways (RCPs). Significant ( $p < 0.05$ )...

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

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **A spatial database of wildfires in the United States, 1992-2011**

[www.nrfirescience.org/resource/13303](http://www.nrfirescience.org/resource/13303)

The statistical analysis of wildfire activity is a critical component of national wildfire planning, operations, and research in the United States (US). However, there are multiple federal, state, and local entities with wildfire protection and reporting responsibilities in the US, and no single, unified system of wildfire record...

Author(s): Karen C. Short

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

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

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

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

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

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

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

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

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

Author(s): Penelope Morgan, Emily K. Heyerdahl, Carol Miller, Aaron M. Wilson, Carly E. Gibson

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **40 years of wilderness fire in the Selway-Bitterroot and Frank Church-River of No Return**

[www.nrfirescience.org/resource/12777](http://www.nrfirescience.org/resource/12777)

Wilderness fire, its history, challenges, teachings, and future management were the focus of discussions and presentations during the 40 Years of Wilderness Fire in the Selway-Bitterroot field trip

at the May 2014 Large Wildland Fires Conference. The trip took participants to observe recent fire patterns in the region between the...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

### **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

### **The Bitterroot Valley fires of 2000 - Revisiting experiences and fire effects 13 years later**

[www.nrfirescience.org/resource/12673](http://www.nrfirescience.org/resource/12673)

During the Fires of 2000 field trip, held as part of the May 2014 Large Wildland Fires Conference, researchers, managers, residents, and stakeholders shared their experiences around the unprecedented number and size of fires that burned in the Bitterroot Valley in the summer of 2000. Topics discussed included fire history, fire...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

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

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

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

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

Year Published: 2014

Type: Document

Technical Report or White Paper

### **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

### **Landscape-scale eco-evolutionary dynamics: selection by seed predators and fire determine a major reproductive strategy**

[www.nrfirescience.org/resource/11982](http://www.nrfirescience.org/resource/11982)

Recent work in model systems has demonstrated significant effects of rapid evolutionary change on ecological processes (eco-evolutionary dynamics). Fewer studies have addressed whether eco-evolutionary dynamics structure natural ecosystems. We investigated variation in the frequency of serotiny in lodgepole pine (*Pinus contorta*), a...

Author(s): Matt V. Talluto, Craig W. Benkman

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

### **Aboriginal precedent for active management of sagebrush-perennial grass communities in the Great Basin**

[www.nrfirescience.org/resource/12146](http://www.nrfirescience.org/resource/12146)

Until recently, most contemporary ecologists have ignored or diminished anecdotal historical accounts and anthropologists' reports about aboriginal fire in the Great Basin. Literature review shows that Indians practiced regular use of fire for many purposes, including the obvious reasons of increasing the availability of desired...

Author(s): Kent J. McAdoo, Brad W. Schultz, Sherman R. Swanson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Wilderness shapes contemporary fire size distributions across landscapes of the western United States**

[www.nrfirescience.org/resource/12682](http://www.nrfirescience.org/resource/12682)

In many U.S. federally designated wilderness areas, wildfires are likely to burn of their own accord due to favorable management policies and remote location. Previous research suggested that limitations on fire size can result from the evolution of natural fire regimes, specifically in places where fuels were...

Author(s): Sandra L. Haire, Kevin McGarigal, Carol Miller

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

**Health, reproduction, and fuels in whitebark pine in the Frank Church River of No Return Wilderness Area in central Idaho (Project INT-F-05-02)**

[www.nrfirescience.org/resource/12010](http://www.nrfirescience.org/resource/12010)

Whitebark pine (*Pinus albicaulis* Engelm.) is in serious decline across its range, largely due to the combined effects of *Cronartium ribicola* J. C. Fisch (an introduced fungal pathogen that causes white pine blister rust), replacement by late successional species, and widespread infestation of mountain pine beetle (*Dendroctonus*...

Author(s): Lauren Fins, Ben Hoppus

Year Published: 2013

Type: Document

Technical Report or White Paper

**Duff mound consumption and cambium injury for centuries-old western larch from prescribed burning in western Montana**

[www.nrfirescience.org/resource/11974](http://www.nrfirescience.org/resource/11974)

Western larch is one of the most fire-adapted conifers in western North America. Its historical perpetuation depended upon regular fire disturbances, which creates open stand conditions and mineral seedbeds. A stand of 200- to 500-year-old larch in western Montana with deep duff mounds resulting from an unusually long 150-year fire-...

Author(s): Michael G. Harrington

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

**Climate and vegetation change during the late-glacial/early Holocene transition inferred from multiple proxy records from Blacktail Pond, Yellowstone National Park, USA**

[www.nrfirescience.org/resource/13523](http://www.nrfirescience.org/resource/13523)

A series of environmental changes from late-glacial ice recession through the early Holocene are revealed in a 7000-yr-long record of pollen, charcoal, geochemistry, and stable isotopes from Blacktail Pond, a closed-basin lake in Yellowstone National Park. Prior to 11,500 cal yr BP, cool conditions dominated, fire activity was low,...

Author(s): Teresa R. Krause, Cathy L. Whitlock

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

**Does proxy uncertainty affect the relations inferred between the Pacific Decadal Oscillation and wildfire activity in the western United States?**

[www.nrfirescience.org/resource/8310](http://www.nrfirescience.org/resource/8310)

We examined a set of five proxy reconstructions of the Pacific Decadal Oscillation (PDO) to test whether the choice of reconstruction affected the association between the PDO and widespread forest fires in the western United States. Exact binomial tests suggest the PDO has little direct impact on wildfires, with a statistically-...

Author(s): Kurt F. Kipfmüller, Evan R. Larson, Scott St. George

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Holocene seasonal variability inferred from multiple proxy records from Crevice Lake, Yellowstone National Park, USA**

[www.nrfirescience.org/resource/13531](http://www.nrfirescience.org/resource/13531)

A 9400-yr-old record from Crevice Lake, a semi-closed alkaline lake in northern Yellowstone National Park, was analyzed for pollen, charcoal, geochemistry, mineralogy, diatoms, and stable isotopes to develop a nuanced understanding of Holocene environmental history in a region of northern Rocky Mountains that receives both summer...

Author(s): Cathy L. Whitlock, Walter E. Dean, Sherilyn C. Fritz, Lora R. Stevens, Jeffery R. Stone, Mitchell J. Power, Joseph R. Rosenbaum, Kenneth L. Pierce, Brandi B. Bracht-Flyr

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Changing growth response to wildfire in old-growth ponderosa pine trees in montane forests of north central Idaho**

[www.nrfirescience.org/resource/8323](http://www.nrfirescience.org/resource/8323)

North American fire-adapted forests are experiencing changes in fire frequency and climate. These novel conditions may alter post-wildfire responses of fire-adapted trees that survive fires, a topic that has received little attention. Historical, frequent, low-intensity wildfire in many fire-adapted forests is generally thought to...

Author(s): Eric G. Keeling, Anna Sala

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Climate change, forests, fire, water, and fish: building resilient landscapes, streams, and managers**

[www.nrfirescience.org/resource/11270](http://www.nrfirescience.org/resource/11270)

Fire will play an important role in shaping forest and stream ecosystems as the climate changes. Historic observations show increased dryness accompanying more widespread fire and forest die-off. These events punctuate gradual changes to ecosystems and sometimes generate stepwise changes in ecosystems. Climate vulnerability...

Author(s): Charles H. Luce, Penelope Morgan, Kathleen A. Dwire, Daniel J. Isaak, Zachary A. Holden, Bruce E. Rieman

Year Published: 2012

Type: Document

Technical Report or White Paper

### **Long-term perspective on wildfires in the western USA**

[www.nrfirescience.org/resource/8309](http://www.nrfirescience.org/resource/8309)

Understanding the causes and consequences of wildfires in forests of the western United States

requires integrated information about fire, climate changes, and human activity on multiple temporal scales. We use sedimentary charcoal accumulation rates to construct long-term variations in fire during the past 3,000 y in the American...

Author(s): Jennifer R. Marlon, Patrick J. Bartlein, Daniel G. Gavin, Colin J. Long, R. Scott Anderson, Christy E. Briles, Kendrick J. Brown, Daniele Colombaroli, Douglas J. Hallett, Mitchell J. Power, Elizabeth A. Scharf, Megan K. Walsh

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

### **Chapter 2: Fire behavior and effects: principles for archaeologists**

[www.nrfirescience.org/resource/12590](http://www.nrfirescience.org/resource/12590)

Fire is a natural component of earth's ecosystems. Fire has impacted most landscapes of the Americas, having left evidence of its passing in trees, soils, fossils, and cultural artifacts (Andreae 1991; Benton and Reardon 2006; Biswell 1989; Bowman and others 2009; Boyd and others 2005; Cochrane and others 1999; DeBano and others...

Author(s): Kevin C. Ryan, Cassandra L. Koerner

Year Published: 2012

Type: Document

Synthesis, Technical Report or White Paper

### **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

### **Fire as a dimension of historical ecology: a response to Bowman et al. (2011)**

[www.nrfirescience.org/resource/193](http://www.nrfirescience.org/resource/193)

Bowman et al. (Journal of Biogeography, 2011, 38, 2223–2236) attempt a synthesis of the current status of study into human use of fire as an ecosystem management tool and provide a framework for guiding research on the human dimensions of global fire. While we applaud this ambitious effort, we believe the proposed 'pyric phase...

Author(s): Michael R. Coughlan, Aaron M. Petty

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

**Lack of fire has limited physiological impact on old-growth ponderosa pine in dry montane forests of north-central Idaho**

[www.nrfirescience.org/resource/8299](http://www.nrfirescience.org/resource/8299)

Reduced frequency of fire in historically fire-adapted ecosystems may have adverse effects on ecosystem structure, function, and resilience. Lack of fire increases stand density and promotes successional replacement of seral dominant trees by late-successional, more shade-tolerant species. These changes are thought to increase...

Author(s): Eric G. Keeling, Anna Sala, Thomas H. DeLuca

Year Published: 2011

Type: Document  
Book or Chapter or Journal Article

**The magnificent high-elevation five-needle white pines: ecological roles and future outlook**

[www.nrfirescience.org/resource/11895](http://www.nrfirescience.org/resource/11895)

The High Five symposium is devoted to exchanging information about a small group of pines with little commercial value but great importance to the ecology of high-mountain ecosystems of the West. These High Five pines include the subalpine and treeline species-whitebark (*Pinus albicaulis*), Rocky Mountain bristlecone (*P. aristata*),...

Author(s): Diana F. Tomback, Peter Achuff, Anna W. Schoettle, John W. Schwandt, Ron J. Mastrogiuseppe

Year Published: 2011

Type: Document  
Conference Proceedings, Synthesis

**Linking tree-ring and sediment-charcoal records to reconstruct fire occurrence and area burned in subalpine forests of Yellowstone National Park, USA**

[www.nrfirescience.org/resource/13602](http://www.nrfirescience.org/resource/13602)

Reconstructing specific fire-history metrics with charcoal records has been difficult, in part because calibration data sets are rare. We calibrated charcoal accumulation in sediments from three medium (14-19 ha) and one large (4250 ha) lake with a 300 yr tree-ring-based fire-history reconstruction from central Yellowstone National...

Author(s): Philip E. Higuera, Cathy L. Whitlock, Josh A. Gage

Year Published: 2011

Type: Document  
Book or Chapter or Journal Article

**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



### **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

### **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

### **Postglacial fire, vegetation, and climate history across an elevational gradient in the Northern Rocky Mountains, USA and Canada**

[www.nrfirescience.org/resource/16884](http://www.nrfirescience.org/resource/16884)

A 13,100-year-long high-resolution pollen and charcoal record from Foy Lake in western Montana is compared with a network of vegetation and fire-history records from the Northern Rocky Mountains. New and previously published results were stratified by elevation into upper and lower and tree line to explore the role of Holocene...

Author(s): Mitchell J. Power, Cathy L. Whitlock, Patrick J. Bartlein

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Disturbance ecology of high-elevation five-needle pine ecosystems in western North America**

[www.nrfirescience.org/resource/11896](http://www.nrfirescience.org/resource/11896)

This paper synthesizes existing information about the disturbance ecology of high-elevation five-needle pine ecosystems, describing disturbances regimes, how they are changing or are expected to change, and the implications for ecosystem persistence. As it provides the context for ecosystem conservation/restoration programs, we...

Author(s): Elizabeth M. Campbell, Robert E. Keane, Evan R. Larson, Michael P. Murray, Anna W. Schoettle, Carmen Wong

Year Published: 2011

Type: Document

Conference Proceedings, Synthesis

### **Management guide to ecosystem restoration treatments: whitebark pine forests of the Northern Rocky Mountains, U.S.A.**

[www.nrfirescience.org/resource/11143](http://www.nrfirescience.org/resource/11143)

Whitebark pine is 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. This management guide summarizes the extensive data collected at whitebark pine treatment sites for three periods: (1) pre-...

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

Year Published: 2010

Type: Document

Technical Report or White Paper

### **Fire-climate interactions in the American west since 1400 CE**

[www.nrfirescience.org/resource/11992](http://www.nrfirescience.org/resource/11992)

Despite a strong anthropogenic fingerprint on 20th Century wildland fire activity in the American West, climate remains a main driver. A better understanding of the spatiotemporal variability in fire-climate interactions is therefore crucial for fire management. Here, we present annually resolved, tree-ring based fire records for...

Author(s): Valerie Trouet, Alan H. Taylor, Eugene R. Wahl, Carl N. Skinner

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Late-Holocene relationships among fire, climate and vegetation in a forest-sagebrush ecotone of southwestern Idaho, USA**

[www.nrfirescience.org/resource/11466](http://www.nrfirescience.org/resource/11466)

The forest-sagebrush ecotone is characterized by a more arid climate than forested regions; therefore, establishing fire histories using traditional methods (e.g. fire-scars from trees, charcoal in lake sediments) is problematic. This study uses radiocarbon dating of charcoal preserved in alluvial deposits to reconstruct a record of...

Author(s): Nathan A. Nelson, Jennifer L. Pierce

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

### **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

### **Mitigating old tree mortality in long-unburned, fire-dependent forests: a synthesis**

[www.nrfirescience.org/resource/12618](http://www.nrfirescience.org/resource/12618)

This report synthesizes the literature and current state of knowledge pertaining to reintroducing fire in stands where it has been excluded for long periods and the impact of these introductory fires on overstory tree injury and mortality. Only forested ecosystems in the United States that are adapted to survive frequent fire are...

Author(s): Sharon M. Hood  
Year Published: 2010  
Type: Document  
Synthesis, Technical Report or White Paper

### **Widespread increase of tree mortality rates in the western United States**

[www.nrfirescience.org/resource/8321](http://www.nrfirescience.org/resource/8321)

Persistent changes in tree mortality rates can alter forest structure, composition, and ecosystem services such as carbon sequestration. Our analyses of longitudinal data from unmanaged old forests in the western United States showed that background (noncatastrophic) mortality rates have increased rapidly in recent decades, with...

Author(s): Phillip J. van Mantgem, Nathan L. Stephenson, John C. Byrne, Lori D. Daniels, Jerry F. Franklin, Peter Z. Fule, Mark E. Harmon, Andrew J. Larson, Jeremy M. Smith, Alan H. Taylor, Thomas T. Veblen  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

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

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

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

Author(s): Eric E. Knapp, Becky L. Estes, Carl N. Skinner  
Year Published: 2009  
Type: Document  
Synthesis, Technical Report or White Paper

### **Holocene vegetation-fire-climate linkages in Northern Yellowstone National Park, USA**

[www.nrfirescience.org/resource/13519](http://www.nrfirescience.org/resource/13519)

Yellowstone National Park has been an important location for paleoecologic studies that focus on the use of charcoal data to reconstruct past fire activity and on the role of climate variations in shaping past vegetation and fire regimes. One hypothesis, which has been explored in other parts of the western U.S., is the idea that...

Author(s): Mariana A. Huerta, Cathy L. Whitlock, Jason Yale  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Climate and fire in the northern Rockies: past, present, and future**

[www.nrfirescience.org/resource/11080](http://www.nrfirescience.org/resource/11080)

The Northern Rocky Mountains have sustained wildfire for centuries. Fires are widespread throughout the region during certain years, most recently in 2000, 2003, 2006, and 2007. However, until very recently there was little understanding of whether such years of widespread fire occurred prior to the 20th century or of the role of...

Author(s): Rachel Clark

Year Published: 2009

Type: Document

Research Brief or Fact Sheet

### **Climate and wildfire area burned in western U.S. ecoprovinces, 1916-2003**

[www.nrfirescience.org/resource/8228](http://www.nrfirescience.org/resource/8228)

The purpose of this paper is to quantify climatic controls on the area burned by fire in different vegetation types in the western United States. We demonstrate that wildfire area burned (WFAB) in the American West was controlled by climate during the 20th century (1916-2003). Persistent ecosystem-specific correlations between...

Author(s): Jeremy S. Littell, Donald McKenzie, David L. Peterson, Anthony L. Westerling

Year Published: 2009

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

### **Crossdated fire histories (1650-1900) from ponderosa pine-dominated forests of Idaho and western Montana**

[www.nrfirescience.org/resource/11124](http://www.nrfirescience.org/resource/11124)

For a broader study of the climate drivers of regional-fire years in the Northern Rockies, we reconstructed a history of surface fires at 21 sites in Idaho and western Montana. We targeted sites that historically sustained frequent surface fires and were dominated or codominated by ponderosa pine (*Pinus ponderosa* P....

Author(s): Emily K. Heyerdahl, Penelope Morgan, James P. Riser

Year Published: 2008

Type: Document

Technical Report or White Paper

### **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

### **Climate change effects on historical range and variability of two large landscapes in western Montana, USA**

[www.nrfirescience.org/resource/8162](http://www.nrfirescience.org/resource/8162)

Quantifying the historical range and variability of landscape composition and structure using simulation modeling is becoming an important means of assessing current landscape condition and prioritizing landscapes for ecosystem restoration. However, most simulated time series are generated using static climate conditions which fail...

Author(s): Robert E. Keane, Lisa M. Holsinger, Russell A. Parsons, Kathy L. Gray

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

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

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

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

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

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Holocene records of Dendroctonus bark beetles in high elevation pine forests of Idaho and Montana, USA**

[www.nrfirescience.org/resource/8224](http://www.nrfirescience.org/resource/8224)

Paleoecological reconstructions from two lakes in the U.S. northern Rocky Mountain region of Idaho and Montana revealed the presence of bark beetle elytra and head capsules (cf. *Dendroctonus* spp., most likely *D. ponderosae*, mountain pine beetle). Occurrence of these macrofossils during the period of time associated with the 1920/...

Author(s): Andrea R. Brunelle, Gerald E. Rehfeldt, Barbara J. Bentz, A. Steven Munson

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Long-term relations among fire, fuel, and climate in the north-western US based on lake-sediment studies**

[www.nrfirescience.org/resource/8202](http://www.nrfirescience.org/resource/8202)

Pollen and high-resolution charcoal records from the north-western USA provide an opportunity to examine the linkages among fire, climate, and fuels on multiple temporal and spatial scales. The data suggest that general charcoal levels were low in the late-glacial period and increased steadily through the last 11 000 years with...

Author(s): Cathy L. Whitlock, Jennifer R. Marlon, Christy E. Briles, Andrea R. Brunelle, Colin J. Long, Patrick J. Bartlein

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

### **Multi-season climate synchronized forest fires throughout the 20th century, Northern Rockies, USA**

[www.nrfirescience.org/resource/8163](http://www.nrfirescience.org/resource/8163)

We inferred climate drivers of 20th-century years with regionally synchronous forest fires in the U.S. northern Rockies. We derived annual fire extent from an existing fire atlas that includes 5,038 fire polygons recorded from 12,070,086 ha, or 71% of the forested land in Idaho and Montana west of the Continental Divide. The 11...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Carly E. Gibson

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Multi-season climate synchronized historical fires in dry forests (1650-1900), Northern Rockies, USA**

[www.nrfirescience.org/resource/8388](http://www.nrfirescience.org/resource/8388)

Our objective was to infer the climate drivers of regionally synchronous fire years in dry forests of the U.S. northern Rockies in Idaho and western Montana. During our analysis period (1650-1900), we reconstructed fires from 9245 fire scars on 576 trees (mostly ponderosa pine, *Pinus ponderosa* P....

Author(s): Emily K. Heyerdahl, Penelope Morgan, James P. Riser

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Climate drivers of regionally synchronous fires in the inland northwest (1651-1900)**

[www.nrfirescience.org/resource/16892](http://www.nrfirescience.org/resource/16892)

We inferred climate drivers of regionally synchronous surface fires from 1651 to 1900 at 15 sites with existing annually accurate fire-scar chronologies from forests dominated by ponderosa pine or Douglas-fir in the inland Northwest (interior Oregon, Washington and southern British Columbia). Years with widespread fires (35 years...

Author(s): Emily K. Heyerdahl, Donald McKenzie, Lori D. Daniels, Amy E. Hessler, Jeremy S. Littell, Nathan J. Mantua

Year Published: 2008

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

### **Contingent pacific-atlantic ocean influence on multicentury wildfire synchrony over western North America**

[www.nrfirescience.org/resource/8293](http://www.nrfirescience.org/resource/8293)

Widespread synchronous wildfires driven by climatic variation, such as those that swept western North America during 1996, 2000, and 2002, can result in major environmental and societal impacts.

Understanding relationships between continental-scale patterns of drought and modes of sea surface temperatures (SSTs) such as El Niño...

Author(s): Thomas Kitzberger, Peter M. Brown, Emily K. Heyerdahl, Thomas W. Swetnam, Thomas T. Veblen

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Recovery of big sagebrush following fire in southwest Montana**

[www.nrfirescience.org/resource/8279](http://www.nrfirescience.org/resource/8279)

Fire plays a large role in structuring sagebrush ecosystems; however, we have little knowledge of how vegetation changes with time as succession proceeds from immediate postfire to mature stands. We sampled at 38 sites in southwest Montana dominated by 3 subspecies of big sagebrush (*Artemisia tridentata* Nutt.). At each site we...

Author(s): Peter Lesica, Stephen V. Cooper, Greg Kudray

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **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

### **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

### **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

### **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

### **Fire exclusion and nitrogen mineralization in low elevation forests of western Montana**

[www.nrfirescience.org/resource/8291](http://www.nrfirescience.org/resource/8291)

Little is known regarding how fire exclusion influences nitrogen (N) cycling in low elevation forests of western Montana. Nor is it clear how the change in fire frequency that has resulted from forest management has influenced ecosystem function in terms of plant-soil-microbe interactions. A fire chronosequence approach was used to...

Author(s): M. Derek MacKenzie, Thomas H. DeLuca, Anna Sala

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Fire history of a western Montana ponderosa pine grassland: a pilot study**

[www.nrfirescience.org/resource/16898](http://www.nrfirescience.org/resource/16898)

A primary goal in the management of forests and grasslands is to maintain community structure and disturbance processes within their historical range of variation. If, within a managed ecosystem, either is found to lie outside that range, restoration may be necessary. Both maintenance and restoration are currently guided by the...

Author(s): Don V. Gayton, Marc H. Weber, Michael G. Harrington, Emily K. Heyerdahl, Elaine Kennedy Sutherland, Bob Brett, Cindy Hall, Michael Hartman, Liesl Peterson, Carolynne Merrel

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

### **Frequent fire alters nitrogen transformations in ponderosa pine stands of the inland Northwest**

[www.nrfirescience.org/resource/7919](http://www.nrfirescience.org/resource/7919)

Recurrent, low-severity fire in ponderosa pine (*Pinus ponderosa*)/interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) forests is thought to have directly influenced nitrogen (N) cycling and availability. However, no studies to date have investigated the influence of natural fire intervals on soil processes in undisturbed forests...

Author(s): Thomas H. DeLuca, Anna Sala  
Year Published: 2006  
Type: Document  
Book or Chapter or Journal Article

### **Fire history of western Montana forested landscapes via tree-ring analyses**

[www.nrfirescience.org/resource/13363](http://www.nrfirescience.org/resource/13363)

Wildfire is a natural process that plays an important role in creating, shaping, and maintaining the forests, woodlands, and grasslands of our physical environment (Swetnam et al. 1999). Most forested landscapes require periodic fire to maintain the overall health of their ecosystems. Wildfires...

Author(s): Henri D. Grissino-Mayer, Christopher M. Gentry, Steve Croy, John Hiatt, Ben Osborne, Amanda Stan, Georgina DeWeese Wight  
Year Published: 2006  
Type: Document  
Technical Report or White Paper

### **Warming and earlier spring increase western U.S. forest wildfire activity**

[www.nrfirescience.org/resource/8397](http://www.nrfirescience.org/resource/8397)

Western United States forest wildfire activity is widely thought to have increased in recent decades, but surprisingly, the extent of recent changes has never been systematically documented. Nor has it been established to what degree climate may be driving regional changes in wildfire. Much of the public and scientific discussion of...

Author(s): Anthony L. Westerling, Hugo G. Hidalgo, Daniel R. Cayan, Thomas W. Swetnam  
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

### **Complex interactions shaping aspen dynamics in the Greater Yellowstone Ecosystem**

[www.nrfirescience.org/resource/7906](http://www.nrfirescience.org/resource/7906)

Loss of aspen (*Populus tremuloides*) has generated concern for aspen persistence across much of the western United States. However, most studies of aspen change have been at local scales and our understanding of aspen dynamics at broader scales is limited. At local scales, aspen loss has been attributed to fire exclusion, ungulate...

Author(s): K. Brown, Andrew J. Hansen, Robert E. Keane, Lisa Graumlich

Year Published: 2006

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

### **Climate drivers of fire and fuel in the Northern Rockies: past, present & future - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11154](http://www.nrfirescience.org/resource/11154)

This 3-year research project is identifying the climate drivers of regional fire and fuel dynamics in the Northern Rockies in the past, present, and future. We are identifying regional fire years from two sources: multicentury tree-ring reconstructions and multidecadal fire atlases. To elucidate the climate forcing of past fires, we...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Carol Miller, Matthew G. Rollins

Year Published: 2005

Type: Document

Technical Report or White Paper

### **Eighth international wildland firefighter safety summit: 10 years later**

[www.nrfirescience.org/resource/15458](http://www.nrfirescience.org/resource/15458)

These files contain the proceedings and poster papers from the International Association of Wildland Fire's Wildland Fire Safety Summit™ held in Missoula, Montana April 26-28, 2005. These proceedings contain the papers as submitted by the authors. Except for some editing to try and instill a common format, these papers are as...

Year Published: 2005

Type: Document

Conference Proceedings

### **Culturally scarred trees in the Bob Marshall Wilderness, Montana, USA- interpreting Native American historical forest use in a wilderness area**

[www.nrfirescience.org/resource/7966](http://www.nrfirescience.org/resource/7966)

Wilderness areas are primarily set aside to protect natural ecosystems and processes. However, most protected areas have a long history of native peoples' land use predating their protection. The general paucity of evidence in the form of historical records, in combination with romantic views of native peoples' effects on nature,...

Author(s): Lars Ostlund, Robert E. Keane, Stephen F. Arno, R. Andersson  
Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article

**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

**Climatic controls of fire in the western United States: from the atmosphere to ecosystems - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11155](http://www.nrfirescience.org/resource/11155)

The objective of this project is to conduct a diagnostic analysis of the variations in climate that govern the characteristics of the fire season in the western United States on intra-annual through decadal and longer time scales. We propose a retrospective, model-based analysis to understand better the role of climate as a control...

Author(s): Steven W. Hostetler, Patrick J. Bartlein, Allen M. Solomon, J. O. Holman, Richard T. Busing, Sarah L. Shafer  
Year Published: 2005  
Type: Document  
Technical Report or White Paper

**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

**Variability and convergence in stand structural development on a fire-dominated subalpine**

## **landscape**

[www.nrfirescience.org/resource/13538](http://www.nrfirescience.org/resource/13538)

The 1988 Yellowstone fires resulted in a complex mosaic within which postfire lodgepole pine seedling densities varied by over five orders of magnitude. Investigators have speculated that such postfire mosaics of vegetation structure may persist until the next large disturbance, but the fate of the initial structural variability of...

Author(s): Daniel M. Kashian, Monica G. Turner, William H. Romme, Craig G. Lorimer

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

## **Stream succession: channel changes after wildfire disturbance**

[www.nrfirescience.org/resource/11414](http://www.nrfirescience.org/resource/11414)

One concept in geomorphology is that vegetation is a fundamental control on sediment and water supplies to streams and, therefore, on downstream fluvial processes and channel morphology. Within this paradigm, wildfire has been implicated as a major driving force behind landscape erosion and changes to stream channels, periodically...

Author(s): Nicholas E. Schiedt

Year Published: 2005

Type: Document

Dissertation or Thesis

## **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

## **Fire-induced erosion and millennial-scale climate change in northern ponderosa pine forests**

[www.nrfirescience.org/resource/15763](http://www.nrfirescience.org/resource/15763)

Western US ponderosa pine forests have recently suffered extensive stand-replacing fires followed by hill slope erosion and sedimentation. These fires are usually attributed to increased stand density as a result of fire suppression, grazing and other land use, and are often considered uncharacteristic or unprecedented. Tree-ring...

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

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

## **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

### **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

### **Forest structure and organic horizon analysis along a fire chronosequence in the low elevation forests of western Montana**

[www.nrfirescience.org/resource/8271](http://www.nrfirescience.org/resource/8271)

Although fire consumes much of the forest floor, few studies have examined the change in forest floor characteristics with increasing time since fire. Mixed forests of ponderosa pine (*Pinus ponderosa* Doug. Ex. laws) and Douglas-fir (*Pseudotsuga mensizii* (Mirb.) Franco) in the inland northwest once burned with greater frequency than...

Author(s): M. Derek MacKenzie, Thomas H. DeLuca, Anna Sala  
Year Published: 2004  
Type: Document  
Book or Chapter or Journal Article

### **Role of fire in determining annual water yield in mountain watersheds**

[www.nrfirescience.org/resource/7901](http://www.nrfirescience.org/resource/7901)

This paper presents the computation procedures for estimating average annual water yields based on annual precipitation and vegetation cover types. This procedure allows for an estimation of water yields under current conditions, under various levels of vegetation management, or under historic water yield based on fire history. Two...

Author(s): Phillip E. Farnes, Ward W. McCaughey, Katherine J. Hansen  
Year Published: 2004  
Type: Document  
Book or Chapter or Journal Article

### **Vegetation dynamics under fire exclusion and logging in a Rocky Mountain watershed, 1856-1996**

[www.nrfirescience.org/resource/8264](http://www.nrfirescience.org/resource/8264)

How have changes in land management practices affected vegetation patterns in the greater Yellowstone ecosystem? This question led us to develop a deterministic, successional, vegetation model to 'turn back the clock' on a study area and assess how patterns in vegetation cover type and structure have changed through different...

Author(s): Alisa L. Gallant, Andrew J. Hansen, John S. Councilman, Duane K. Monte, David W. Betz  
Year Published: 2003  
Type: Document  
Book or Chapter or Journal Article

### **Forest entomology in Yellowstone National Park, 1923-1957: a time of discovery and learning to let live**

[www.nrfirescience.org/resource/13567](http://www.nrfirescience.org/resource/13567)

For several decades after the creation of Yellowstone National Park in 1872, protection of its biological and other resources was haphazard. For example, elk and bison were exploited to near extinction, prompting aggressive protection of them, which included extermination of the native gray wolf from the park. In those...

Author(s): Malcolm M. Furniss, Roy A. Renkin

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **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

### **Interannual to decadal drought and wildfire in the western United States**

[www.nrfirescience.org/resource/8344](http://www.nrfirescience.org/resource/8344)

Twentieth-century wildfire suppression and land management policies have promoted biomass accumulations in some ecosystems in the western United States where wildfire is a natural and necessary element. These changes have fueled large, stand-replacing crown fires in southwestern ponderosa pine forests, where they were rare under...

Author(s): Anthony L. Westerling, Thomas W. Swetnam

Year Published: 2003

Type: Document

Book or Chapter or Journal Article, Synthesis

### **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

### **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

### **Cascading effects of fire exclusion in Rocky Mountain ecosystems: a literature review**

[www.nrfirescience.org/resource/11187](http://www.nrfirescience.org/resource/11187)

The health of many Rocky Mountain ecosystems is in decline because of the policy of excluding fire in the management of these ecosystems. Fire exclusion has actually made it more difficult to fight fires, and this poses greater risks to the people who fight fires and for those who live in and around Rocky Mountain forests and...

Author(s): Robert E. Keane, Kevin C. Ryan, Thomas T. Veblen, Craig D. Allen, Jesse A. Logan, Brad C. Hawkes

Year Published: 2002

Type: Document

Synthesis, Technical Report or White Paper

### **The role of fire in riparian zones of the northern Rocky Mountains**

[www.nrfirescience.org/resource/11137](http://www.nrfirescience.org/resource/11137)

While the importance of riparian systems in the northern Rocky Mountains as sources of productivity and diversity is recognized, there is little information about the interaction between pattern and process. To sustain these areas, we need to understand the characteristics of disturbance processes and how they result in patterns in...

Author(s): Elaine Kennedy Sutherland, Kevin S. McKelvey

Year Published: 2002  
Type: Document  
Conference Proceedings, Technical Report or White Paper

### **Biogeographic, cultural, and historical setting of the Northern Rocky Mountains [Chapter 2]**

[www.nrfirescience.org/resource/17515](http://www.nrfirescience.org/resource/17515)

The Northern Rockies Adaptation Partnership (NRAP) includes diverse landscapes, ranging from high mountains to grasslands, from alpine glaciers to broad rivers (fig. 1.1). This region, once inhabited solely by Native Americans, has been altered by two centuries of settlement by Euro- Americans through extractive practices such as...

Author(s): S. Karen Dante-Wood  
Year Published: 2002  
Type: Document  
Technical Report or White Paper

### **Aspen's ecological role in the West**

[www.nrfirescience.org/resource/11883](http://www.nrfirescience.org/resource/11883)

Aspen exhibits a variety of ecological roles. In southern Colorado, the 1880 landscape mosaic contained a range of stand ages, of which half were >70 years old and half were younger. Pure aspen stands in southern Colorado are widespread and may result from previous short fire intervals that eliminated local conifer seed sources....

Author(s): William H. Romme, Lisa Floyd-Hanna, David D. Hanna, Elisabeth Bartlett  
Year Published: 2001  
Type: Document  
Conference Proceedings

### **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

### **The role of fire in juniper and pinyon woodlands: a descriptive analysis**

[www.nrfirescience.org/resource/10994](http://www.nrfirescience.org/resource/10994)

Among the most pronounced vegetation changes in past 130 years has been the increase in both distribution and density of juniper (*Juniperus* spp.) and pinyon (*Pinus* spp.) across the Intermountain West. Juniper and pinyon species between the Canadian and Mexican borders occupy over 30 million ha throughout this region. Prior to...

Author(s): Richard F. Miller, Robin J. Tausch  
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 use by whitebark pine and subalpine fir: potential consequences of fire exclusion in the Northern Rocky Mountains**

[www.nrfirescience.org/resource/8146](http://www.nrfirescience.org/resource/8146)

In subalpine forests of the northern Rocky Mountains, fire exclusion has contributed to large-scale shifts from early-successional whitebark pine (*Pinus albicaulis* Engelm.) to late-successional subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.), a species assumed to be more shade tolerant than whitebark pine and with leaf to sapwood...

Author(s): Anna Sala, Elieen V. Carey, Robert E. Keane, Ragan M. Callaway

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

## **Condition of live fire-scarred ponderosa pine trees six years after removing partial cross sections**

[www.nrfirescience.org/resource/16899](http://www.nrfirescience.org/resource/16899)

Our objective was to document the effect of fire-history sampling on the mortality of mature ponderosa pine trees in Oregon. We examined 138 trees from which fire-scarred partial cross sections had been removed five to six years earlier, and 386 similarly sized, unsampled neighbor trees, from 78 plots distributed over about 5,000 ha...

Author(s): Emily K. Heyerdahl, Steven J. McKay

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

## **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

## **Twentieth-century fire patterns in the Selway-Bitterroot Wilderness Area, Idaho/ Montana, and the Gila/Aldo Leopold Wilderness Complex, New Mexico**

[www.nrfirescience.org/resource/11001](http://www.nrfirescience.org/resource/11001)

Twentieth century fire patterns were analyzed for two large, disparate wilderness areas in the Rocky

Mountains. Spatial and temporal patterns of fires were represented as GIS-based digital fire atlases compiled from archival Forest Service data. We find that spatial and temporal fire patterns are related to landscape features and...

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

Year Published: 2000

Type: Document

Conference Proceedings

### **Fire-climate interactions in the Selway-Bitterroot Wilderness area**

[www.nrfirescience.org/resource/11887](http://www.nrfirescience.org/resource/11887)

Tree-ring reconstructed summer drought was examined in relation to the occurrence of 15 fires in the Selway-Bitterroot Wilderness Area (SBW). The ten largest fire years between 1880 and 1995 were selected from historical fire atlas data; five additional fire years were selected from a fire history completed in a subalpine forest...

Author(s): Kurt F. Kipfmüller, Thomas W. Swetnam

Year Published: 2000

Type: Document

Conference Proceedings

### **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

### **Influence of fire on native nitrogen-fixing plants and soil nitrogen status in ponderosa pine-Douglas-fir forests in western Montana**

[www.nrfirescience.org/resource/8258](http://www.nrfirescience.org/resource/8258)

Nitrogen fixing plants have been reported to play an important role in replacing N lost from soil in fire dominated ecosystems. Exclusion of fire from ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.)-Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) forests of western Montana has led to widespread changes in forest structure,...

Author(s): J. A. Newland, Thomas H. DeLuca

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

### **Variations in fire frequency and climate over the last 17,000 years in central Yellowstone National Park**

[www.nrfirescience.org/resource/13533](http://www.nrfirescience.org/resource/13533)

A 17000 yr fire history from Yellowstone National Park demonstrates a strong link between changes in climate and variations in fire frequency on millennial time scales. The fire history reconstruction is based on a detailed charcoal stratigraphy from Cygnet Lake in the rhyolite plateau region. Macroscopic charcoal particles were...

Author(s): Sarah H. Millspaugh, Cathy L. Whitlock, Patrick J. Bartlein

Year Published: 2000  
Type: Document  
Book or Chapter or Journal Article

### **Interactions between fire, grazing, and climate change at Wind Cave National Park, SD**

[www.nrfirescience.org/resource/7909](http://www.nrfirescience.org/resource/7909)

Projected changes in global climate have important ramifications for the future of national parks and other reserves set aside to conserve ecological uniqueness. We explored potential implications of climatic changes on lifeform distribution and growth at Wind Cave National Park (WCNP), South Dakota, which lies on a climatically...

Author(s): Dominique Bachelet, James M. Lenihan, Christopher Daly, Ronald P. Neilson

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

### **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

### **Comparing historic and modern forests on the Bitterroot Front**

[www.nrfirescience.org/resource/10967](http://www.nrfirescience.org/resource/10967)

A study was initiated in 1995 to measure landscape changes in forest structures between 1900 and 1995. A systematic sampling system was used to collect data on three forested faces on the Bitterroot Front. Over 1,200 tree cores were taken on 216 plots between the elevation range of 4,500 to 7,500 feet. Historic forests were...

Author(s): Michael G. Hartwell, Paul B. Alaback, Stephen F. Arno

Year Published: 2000

Type: Document

Conference Proceedings

### **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

### **Fire applications in ecosystem management**

[www.nrfirescience.org/resource/10965](http://www.nrfirescience.org/resource/10965)

Decades of fire absence from ponderosa pine/Douglas fir forests has resulted in overstocked, unhealthy, and severe fireprone stands requiring management attention. Prescribed fire can be used in three general situations during restoration management. First is when fuel loadings are excessive from

either natural accumulation or...  
Author(s): Michael G. Harrington  
Year Published: 2000  
Type: Document  
Conference Proceedings

### **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

### **Landscape trends (1753-1993) of whitebark pine (*Pinus albicaulis*) forests in the west big hole range of Idaho/Montana**

[www.nrfirescience.org/resource/7965](http://www.nrfirescience.org/resource/7965)

*Pinus albicaulis* (whitebark pine) is an important tree species in subalpine forests of the Northern Rocky Mountains. Populations have been declining at unprecedented rates due to the introduction of an exotic pathogen and fire suppression. We initiated this study to evaluate historical trends in *Pinus albicaulis* abundance along with...

Author(s): Michael P. Murray, Stephen C. Bunting, Michael P. Murray  
Year Published: 2000  
Type: Document  
Book or Chapter or Journal Article

### **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

### **Flumes, historic water yield and climatological data for Tenderfoot Creek Experimental Forest, Montana**

[www.nrfirescience.org/resource/11275](http://www.nrfirescience.org/resource/11275)

The objectives of this Research Joint Venture Agreement were to install and calibrate three flumes on the Tenderfoot Creek Experimental Forest (TCEF) in central Montana; check calibration of the existing seven flumes on TCEF; estimate the influence of fire on water yields over the 400-year fire history period; and estimate back...

Author(s): Phillip E. Farnes, Ward W. McCaughey, Katherine J. Hansen  
Year Published: 1999  
Type: Document  
Technical Report or White Paper

### **Response of shrubs in big sagebrush habitats to fire on the northern Yellowstone winter range**

[www.nrfirescience.org/resource/15443](http://www.nrfirescience.org/resource/15443)

A wildfire on the Northern Yellowstone Winter Range (NYWR) was studied 19 years after burning to compare relative re-establishment of three big sagebrush (*Artemisia tridentata* Nutt.) and three rabbitbrush (*Chrysothamnus* Nutt.) taxa. Recovery was minimal for all three subspecies of big sagebrush, while rabbitbrush abundance was much...

Author(s): Carl L. Wambolt, Trista L. Hoffman, Chris A. Mehus

Year Published: 1999

Type: Document

Conference Proceedings

### **Historical and modern roles of fire in pinyon-juniper**

[www.nrfirescience.org/resource/15391](http://www.nrfirescience.org/resource/15391)

Fire history investigations were carried out in three widely separated Great Basin pinyon-juniper woodlands in east-central Nevada, southeastern Oregon and northwestern Nevada, and western Nevada. Study results suggested frequent fires on deep soils that produced an abundance of fine fuels and infrequent fires on shallow soils and...

Author(s): George E. Gruell

Year Published: 1999

Type: Document

Book or Chapter or Journal Article

### **White pine in the American West: a vanishing species - can we save it?**

[www.nrfirescience.org/resource/13112](http://www.nrfirescience.org/resource/13112)

Forest scientists ask that everyone, from the home gardener to the forest manager, help revive western white pine by planting it everywhere, even in nonforest environments such as our neighborhood streets, parks, and backyards. White pine, long ago considered the "King Pine," once dominated the moist inland forests of the Northwest...

Author(s): Leon F. Neuenschwander, James W. Byler, Alan E. Harvey, GERAL I. McDONALD, Denise S. Ortiz, Harold L. Osborne, Gerry C. Snyder, Arthur Zack

Year Published: 1999

Type: Document

Technical Report or White Paper

### **Ecology and management of pinyon-juniper communities within the Interior West: Overview of the "Ecological Session" of the Symposium**

[www.nrfirescience.org/resource/11885](http://www.nrfirescience.org/resource/11885)

Categories of papers in the "Ecological Session" were history and ecological change, distribution, classification, ecology, and physiology, succession and diversity, and disease. Substantial changes have taken place in pinyon-juniper woodlands over the past 150 years. Coinciding with and following early extensive localized...

Author(s): W. A. Laycock

Year Published: 1999

Type: Document

Conference Proceedings

### **80 years of change in a ponderosa pine forest**

[www.nrfirescience.org/resource/11515](http://www.nrfirescience.org/resource/11515)

Living things change constantly, as do communities of living things. In a forest, where individual trees

can live for centuries and new plants replace old plants, it is not easy to visualize the changes that occur over time. Luckily, we have some records and photos that illustrate how forests change. This poster shows how one stand...

Author(s): Helen Y. Smith, Stephen F. Arno

Year Published: 1999

Type: Document

Research Brief or Fact Sheet

### **Historic pinyon and juniper woodland development**

[www.nrfirescience.org/resource/12105](http://www.nrfirescience.org/resource/12105)

Climate change influences the ecological processes driving regional vegetation change. With the paleoecological and geomorphological perspective of Holocene history, it is apparent that each vegetation change interacting with the environment sets the conditions for the next vegetation change. Because of interactions between...

Author(s): Robin J. Tausch

Year Published: 1999

Type: Document

Conference Proceedings

### **Miller Creek Demonstration Forest - A forest born of fire: a field guide**

[www.nrfirescience.org/resource/11239](http://www.nrfirescience.org/resource/11239)

Miller Creek, on the Flathead National Forest in northwest Montana, is a demonstration forest, showing up to 30 years of forest change after clearcutting and a wide range of fire treatments in 1967 and 1968. Differences in tree regeneration and vegetation development are explained for units that were clearcut and prescribed burned,...

Author(s): Penelope A. Latham, Raymond C. Shearer, Kevin L. O'Hara

Year Published: 1998

Type: Document

Technical Report or White Paper

### **Fire and insects in northern and boreal forest ecosystems of North America**

[www.nrfirescience.org/resource/7945](http://www.nrfirescience.org/resource/7945)

Fire and insects are natural disturbance agents in many forest ecosystems, often interacting to affect succession, nutrient cycling, and forest species composition. We review literature pertaining to effects of fire-insect interactions on ecological succession, use of prescribed fire for insect pest control, and effects of fire on...

Author(s): Deborah G. McCullough, Richard A. Werner, David Neumann

Year Published: 1998

Type: Document

Book or Chapter or Journal Article, Synthesis

### **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

### **Fire episodes in the Inland Northwest (1540-1940) based on fire history data**

[www.nrfirescience.org/resource/11233](http://www.nrfirescience.org/resource/11233)

Presents maps of major fire episodes in the inland northwestern United States between 1540 and 1940 based on a compilation of fire history studies. Estimates annual acreage historically burned in this region and compares that with recent fire years.

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

Year Published: 1997

Type: Document

Technical Report or White Paper

### **Fire ecology of the forest habitat types of northern Idaho**

[www.nrfirescience.org/resource/11234](http://www.nrfirescience.org/resource/11234)

Provides information on fire ecology in forest habitat and community types occurring in northern Idaho. Identifies fire groups based on presettlement fire regimes and patterns of succession and stand development after fire. Describes forest fuels and suggests considerations for fire management.

Author(s): Jane Kapler Smith, William C. Fischer

Year Published: 1997

Type: Document

Synthesis, 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

### **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

### **Vegetation structure in old-growth stands in the Coram Research Natural Area in northwestern Montana**

[www.nrfirescience.org/resource/13138](http://www.nrfirescience.org/resource/13138)

Forest stand structure, understory composition, and tree seedling composition are described for eight permanent tenth-hectare plots established in Engelmann spruce/subalpine fir, western larch, and interior Douglas-fir forest cover types in northwestern Montana. Sites have been protected as examples

of old-growth stands since the...

Author(s): Caryl L. Elzinga, Raymond C. Shearer

Year Published: 1997

Type: Document

Technical Report or White Paper

### **Historic role of fire in determining annual water yield from Tenderfoot Creek Experimental Forest, Montana**

[www.nrfirescience.org/resource/11029](http://www.nrfirescience.org/resource/11029)

Water production from mountain watersheds depends on total precipitation input, the type and distribution of precipitation, the amount intercepted in tree canopies, and losses to evaporation, transpiration and groundwater. A systematic process was developed to estimate historic average annual runoff based on fire patterns, habitat...

Author(s): Ward W. McCaughey, Phillip E. Farnes, Katherine J. Hansen

Year Published: 1997

Type: Document

Conference Proceedings

### **Testing the assumptions of fire-history studies: an examination of modern charcoal accumulation in Yellowstone National Park, USA**

[www.nrfirescience.org/resource/11931](http://www.nrfirescience.org/resource/11931)

The interpretation of sedimentary charcoal in lakes rests on several assumptions that concern the source of charcoal, the timing of charcoal introduction, and the patterns of charcoal accumulation within a lake following fire. To examine empirically such assumptions, eight small lakes were sampled over a five-year period to...

Author(s): Cathy L. Whitlock, Sarah H. Millsaugh

Year Published: 1996

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, even-age 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



### **The ecological implications of fire in Greater Yellowstone, proceedings of the second biennial conference on the Greater Yellowstone Ecosystem**

[www.nrfirescience.org/resource/11989](http://www.nrfirescience.org/resource/11989)

Proceedings of the second biennial conference on the Greater Yellowstone Ecosystem.

Author(s): Jason Greenlee

Year Published: 1996

Type: Document

Conference Proceedings

### **Examples of fire restoration in Glacier National Park**

[www.nrfirescience.org/resource/11252](http://www.nrfirescience.org/resource/11252)

Covering just over 1 million acres, Glacier National Park straddles the Continental Divide in northwestern Montana. Diverse vegetation communities include moist western cedar- western hemlock (*Thuja plicata* - *Tsuga heterophylla*) old growth forests similar to those of the Pacific Coast, dry western grasslands and prairies, dense...

Author(s): Laurie L. Kurth

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Long-term recovery of Wyoming big sagebrush after four treatments**

[www.nrfirescience.org/resource/15445](http://www.nrfirescience.org/resource/15445)

Long-term recovery of Wyoming big sagebrush (*Artemisia tridentata*ssp.wyomingensis) Beetle and Young) after four treatments was investigated. Treatments at a south-western Montana site were spraying with 2,4-D, plowing and rotocutting, all applied in 1963, and burning applied in 1964. The treatments and an experimental control (no...

Author(s): Myles J. Watts, Carl L. Wambolt

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

### **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

### **Restoring fire-dependent ponderosa pine forests in western Montana**

[www.nrfirescience.org/resource/13364](http://www.nrfirescience.org/resource/13364)

Many foresters and ecologists recognize that disruption of the historic pattern of frequent fires in ponderosa pine forests has resulted in major ecological changes, including increasingly severe wildfires and insect and disease epidemics (Weaver, 1943; Covington and Moore, 1992; Mutch and others, 1993; Everett, 1994). In response...

Author(s): Stephen F. Arno, Michael G. Harrington, Carl E. Fiedler, Clinton E. Carlson

Year Published: 1995  
Type: Document  
Book or Chapter or Journal Article

### **Age-class structure of old growth ponderosa pine/Douglas-fir stands and its relationship to fire history**

[www.nrfirescience.org/resource/11268](http://www.nrfirescience.org/resource/11268)

Describes age structure of nine old growth ponderosa pine/Douglas-fir stands in western Montana. Interprets the influence of past fires and 20th century fire exclusion on stand structure. Gives implications for management to restore and maintain these forests for multiple resource values.

Author(s): Stephen F. Arno, Joe H. Scott, Michael G. Hartwell

Year Published: 1995

Type: Document

Technical Report or White Paper

### **A 750-year fire history based on lake sediment records in central Yellowstone National Park**

[www.nrfirescience.org/resource/13532](http://www.nrfirescience.org/resource/13532)

A 750-year fire history was reconstructed for the Central Plateau of Yellowstone National Park from the deep-water sediments of five lakes. The charcoal record from a large lake provided a chronology of regional fires. Data from four small lakes were used to study local and extralocal fires. The co-occurrence of abundant charcoal...

Author(s): Sarah H. Millspaugh, Cathy L. Whitlock

Year Published: 1995

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

### **Fire conditions and pre- and postoccurrence of annual grasses on the Snake River Plain**

[www.nrfirescience.org/resource/12047](http://www.nrfirescience.org/resource/12047)

Fire has been an important factor in the development of the vegetation of the Snake River Plain. Prior to Euro-American influence, fire helped determine the physiognomy and species composition of many communities. The occurrence of fire varied widely depending on the vegetation present, topography, and other factors. This impact can...

Author(s): Erin F. Peters, Stephen C. Bunting

Year Published: 1994

Type: Document

Conference Proceedings, Synthesis, Technical Report or White Paper

### **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

### **Postglacial vegetation and climate of Grand Teton and southern Yellowstone National Parks**

[www.nrfirescience.org/resource/13516](http://www.nrfirescience.org/resource/13516)

Pollen records from northern Grand Teton National Park, the Pinyon Peak Highlands, and southern Yellowstone National Park were examined to study the pattern of reforestation and climatic change following late—Pinedale Glaciation. The vegetational reconstruction was aided by analyses of associated plant macrofossils and the modern...

Author(s): Cathy L. Whitlock

Year Published: 1993

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

### **Forest structure and landscape patterns in the subalpine lodgepole pine type: a procedure for quantifying past and present conditions**

[www.nrfirescience.org/resource/11269](http://www.nrfirescience.org/resource/11269)

Presents a method of quantitatively representing the mosaic of stand types on a small landscape in the subalpine lodgepole pine forest type. The method utilizes macroplots placed systemically on a transect grid. Structure and composition of both current and past stands are inventories. Procedures for data analysis and interpretation...

Author(s): Stephen F. Arno, Elizabeth D. Reinhardt, Joe H. Scott

Year Published: 1993

Type: Document

Technical Report or White Paper

### **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

### **Increment-borer methods for determining fire history in coniferous forests**

[www.nrfirescience.org/resource/11178](http://www.nrfirescience.org/resource/11178)

Describes use of increment borers for interpreting fire history in coniferous forests. These methods are intended for use in wilderness, parks, and other natural areas where sawing cross-sections from fire-scarred trees is prohibited.

Author(s): Stephen W. Barrett, Stephen F. Arno  
Year Published: 1988  
Type: Document  
Technical Report or White Paper

### **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

### **Size class structure and tree dispersion patterns in old-growth cedar-hemlock forests of the Northern Rocky Mountains**

[www.nrfirescience.org/resource/13118](http://www.nrfirescience.org/resource/13118)

Tree population size structures and dispersion patterns were studied using stem maps in three old-growth western hemlock (*Tsuga heterophylla* Sarg.)—western redcedar (*Thuja plicata* Donn.) stands in the Rocky Mountains of northern Idaho and adjacent Washington. The two species were codominant in one stand, hemlock dominated the...

Author(s): David Turner, Eldon H. Franz  
Year Published: 1985  
Type: Document  
Book or Chapter or Journal Article

### **Fire, logging, and white-tailed deer interrelationships in the Swan Valley, northwestern Montana**

[www.nrfirescience.org/resource/11056](http://www.nrfirescience.org/resource/11056)

The historical importance of fire was investigated on the upper Swan Valley winter white-tailed deer range in northwestern Montana. The relatively recent impacts of logging on winter range quality were also included in these studies. Fire exclusion has led to successional development of once open-canopied mature seral forests, and...

Author(s): June D. Freedman, James R. Habeck  
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

### **Fire frequency reduced two orders of magnitude in the Bitterroot Canyons, Montana**

[www.nrfirescience.org/resource/8231](http://www.nrfirescience.org/resource/8231)

The fire cycle in low-elevation mesic coniferous forests of the Bitterroot Canyons, Montana, has changed from about 60 years before European settlement to about 7500 years between 1910 and 1980. The decreased fire frequency may be responsible for increased severity of western spruce bud worm outbreaks (*Choristoneura occidentalis*...

Author(s): Bruce McCune

Year Published: 1983

Type: Document

Book or Chapter or Journal Article

### **Fire and vegetative trends in the Northern Rockies: interpretations from 1871-1982 photographs**

[www.nrfirescience.org/resource/11260](http://www.nrfirescience.org/resource/11260)

Interprets changes in forest and range vegetation resulting from the absence of fire. Eighty-six matched photographs covering the period 1871-1982 provide the basis for describing how vegetation has changed in various plant communities. These scenes show that woody vegetation has increased markedly as a result of reduced wildfire....

Author(s): George E. Gruell

Year Published: 1983

Type: Document

Technical Report or White Paper

### **Fire history at the forest-grassland ecotone in southwestern Montana**

[www.nrfirescience.org/resource/15375](http://www.nrfirescience.org/resource/15375)

The history and influence of fires was studied at the forest-grassland ecotone in high valleys of southwestern Montana. Investigations were focused upon several sites having early landscape photographs and modern retakes that allow for detection of vegetational changes. Fire intervals were determined for these sites by analyzing...

Author(s): Stephen F. Arno, George E. Gruell

Year Published: 1983

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

### **Variation in estimates of fire intervals: a closer look at fire history on the Bitterroot National Forest**

[www.nrfirescience.org/resource/11958](http://www.nrfirescience.org/resource/11958)

The authors examine variation in the length of mean intervals between fires (occurring between the years 1600 and 1910) in sample units of various sizes, ranging from a point on the ground (single tree) to a large stand (200 to 800 acres; 80 to 320 hectares). Recommendations are made regarding appropriate sizes of sample units for...

Author(s): Stephen F. Arno, Terry D. Petersen

Year Published: 1982

Type: Document

Technical Report or White Paper

### **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

### **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

### **Workshop summary: who cares about fire history?**

[www.nrfirescience.org/resource/10996](http://www.nrfirescience.org/resource/10996)

Threads of continuity ran through this excellent workshop. The workshop was characterized by an abiding interest in a common terminology, concern about scale (how large, or small, an area can be represented), the resolution of data required to make effective management decisions, recognition of the limitations of fire history...

Author(s): Robert W. Mutch

Year Published: 1980

Type: Document

Conference Proceedings, Technical Report or White Paper

### **The dendrochronology of fire history**

[www.nrfirescience.org/resource/12411](http://www.nrfirescience.org/resource/12411)

Dendrochronology, the study of annual rings in woody plants, has developed into a useful tool for a number of different fields of study. Based on the interaction of trees and the climate, it is possible to use tree-rings as proxy data in reconstruction of past climates and river runoff. It has been a dating tool of archaeologists....

Author(s): Marvin A. Stokes

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

### **Fire ecology of Lolo National Forest habitat types**

[www.nrfirescience.org/resource/11913](http://www.nrfirescience.org/resource/11913)

This report summarizes available information on fire as an ecological factor for forest habitat types occurring on the Lolo National Forest. The Lolo National Forest habitat types are grouped into 10 Fire Groups based primarily on fire's role in forest succession. For each Fire Group, information is presented on (1) the relationship...

Author(s): Kathleen M. Davis, Bruce D. Clayton, William C. Fischer

Year Published: 1980

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's influence on wildlife habitat on the Bridger-Teton National Forest, Wyoming - Volume I: photographic record and analysis**

[www.nrfirescience.org/resource/12151](http://www.nrfirescience.org/resource/12151)

The Bridger-Teton National Forest in the Jackson Hole Region of Wyoming has long been recognized for its wildlife resource. Management efforts have emphasized the measurement of forage utilization by elk (*Cervus canadensis nelsoni*) and their effect on summer and winter ranges. Less consideration has been given to other biotic and...

Author(s): George E. Gruell

Year Published: 1980

Type: Document

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 fire history of Coram Experimental Forest**



[www.nrfirescience.org/resource/13148](http://www.nrfirescience.org/resource/13148)

This thesis documents the fire history and assesses the role of fire in the western larch/Douglas-fir forest of the Coram Experimental Forest in northwestern Montana. Primary attention was given to the frequency, areal spread, relative severity, and effects of fires prior to the advent of active suppression efforts in order to...

Author(s): Kathy M. Sneck

Year Published: 1977

Type: Document

Dissertation or Thesis

### **A method for determining fire history in coniferous forests in the Mountain West**

[www.nrfirescience.org/resource/11176](http://www.nrfirescience.org/resource/11176)

An improved version is presented of a method previously used [see FA 40, 169]. Instructions are given for: laying out transects; gathering stand data, including documenting fire-scarred trees; sampling fire-scarred trees; laboratory analysis of tree cross-sections; correlating fire chronologies; and calculating fire frequency. The...

Author(s): Stephen F. Arno, Kathy M. Sneck

Year Published: 1977

Type: Document

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

### **Fire ecology questions survey: candid expressions of research needs by land managers and scientists in western North America**

[www.nrfirescience.org/resource/11907](http://www.nrfirescience.org/resource/11907)

Contains 910 sets of forest fire ecology questions mailed to the authors by 302 land managers and scientists throughout the western United States and Canada. Questions were submitted in response to a survey of important research needs for understanding the effects of fire and fire exclusion in western coniferous forest ecosystems....

Author(s): Alan R. Taylor, Ronald N. Kickert, David H. Firmage, Mark J. Behan

Year Published: 1975

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

### **The ecological role of fire in natural conifer forests of western and northern North America**

[www.nrfirescience.org/resource/7940](http://www.nrfirescience.org/resource/7940)

Contains an introductory paper by the editors, and, in addition to papers separately noticed [see the next three abstracts], the following: Fire in the virgin forests of the Boundary Waters Canoe Area, Minnesota (M.L. Heinselman, 99 ref.); The importance of fire as a natural ecological factor in Itasca State Park, Minnesota (S.S....

Author(s): Miron L. Heinselman, Herbert E. Wright

Year Published: 1973

Type: Document

Book or Chapter or Journal Article

### **Forest fire history...a computer method of data analysis**

[www.nrfirescience.org/resource/11215](http://www.nrfirescience.org/resource/11215)

A series of computer programs is available to extract information from the individual Fire Reports (U.S. Forest Service Form 5100-29). The programs use a statistical technique to fit a continuous distribution to a set of sampled data. The goodness-of-fit program is applicable to data other than the fire history.

Data summaries...

Author(s): Romain Mees

Year Published: 1973

Type: Document

Technical Report or White Paper

### **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

### **Tenderfoot Creek Experimental Forest**

[www.nrfirescience.org/resource/50](http://www.nrfirescience.org/resource/50)

The Tenderfoot Creek Experimental Forest (TCEF) was established in 1961 and is representative of the vast expanses of lodgepole pine (*Pinus contorta*) found east of the Continental Divide in Montana, southwest Alberta, and Wyoming. Lodgepole pine stands on the experimental forest form a mosaic, typical of the fire-prone forests at...

Type: Demonstration Site

Experimental Forest

### **An overview of past, current, and future LANDFIRE data products and methods**

[www.nrfirescience.org/resource/14268](http://www.nrfirescience.org/resource/14268)

Since its inception in 2003, the LANDFIRE project has employed a wide range of nationally consistent methods in order to produce a large suite of vegetation and fuel and fire regime products for the fire

management community. These products have also been found to be useful for many other applications. Over this time, a number of...

Type: Media

Video

### **A science framework for assessing threats to sagebrush ecosystems and greater sage-grouse and prioritizing conservation and restoration actions**

[www.nrfirescience.org/resource/14880](http://www.nrfirescience.org/resource/14880)

On September 26, Jeanne Chambers, U.S. Forest Service Rocky Mountain Research Station, and Steve Hanser, U.S. Geological Survey, discussed the tools and methods developed as part of the Science Framework for the Conservation and Restoration Strategy of Sec. Order 3336. Department of the Interior Secretary Order 3336 called for...

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

### **Recent fire trends in Oregon**

[www.nrfirescience.org/resource/14208](http://www.nrfirescience.org/resource/14208)

This presentation was recorded during the 2016 State of the State and Forest Health Conference in Corvallis, OR.

Type: Media

Video

### **Past and future wildfire in the Interior West**

[www.nrfirescience.org/resource/13668](http://www.nrfirescience.org/resource/13668)

Speaker: Richard Guyette, Associate Research Professor, School of Natural Resources, University of Missouri. Event: Restoring the West Conference - 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

### **How long-term records of fire can inform fire ecology and management**

[www.nrfirescience.org/resource/13664](http://www.nrfirescience.org/resource/13664)

Speech Title: Are Recent Large and Severe Fires Really Extraordinary? How Long-Term Records of Fire Can Inform Fire Ecology and Management in the Western U.S. Speaker: Jen Pierce, Associate Professor, Department of Geosciences, Boise State University. Event: Restoring the West Conference 2015: Restoration and Fire in the...

Type: Media

Video

### **Fire, historical change, and resilience management in quaking aspen**

[www.nrfirescience.org/resource/13336](http://www.nrfirescience.org/resource/13336)

Utah State University Forestry Extension hosted this fifteenth "Learn at Lunch" webinar. Quaking Aspen forests are among the West's most iconic landscapes. In this month's Learn at Lunch webinar, three aspen experts will address fire regimes, ecosystem disturbances, and managing for aspen resilience. Douglas Shinneman...

Type: Media

Webinar

### **From principles to practice: restoring dry, frequent-fire forests in the face of global change**

[www.nrfirescience.org/resource/14063](http://www.nrfirescience.org/resource/14063)

From principles to practice: Restoring dry, frequent-fire forests in the face of global change along Colorado's Front Range. Rob Addington, Research Associate, Colorado Forest Restoration Institute, Colorado State University. Recorded talk from 2013 Restoring the West Conference at Utah State University. The conference focused on...

Type: Media

Video

### **Fire history and regeneration dynamics of low-elevation Douglas-fir forests in the Grand Teton area**

[www.nrfirescience.org/resource/15153](http://www.nrfirescience.org/resource/15153)

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

### **Restoring what? Pattern, process, and large longitudinal data sets**

[www.nrfirescience.org/resource/14060](http://www.nrfirescience.org/resource/14060)

Restoring what? Pattern, process, and large longitudinal data sets. James Lutz, Assistant Professor, Utah State University. Recorded talk from 2013 Restoring the West Conference at Utah State University. The conference focused on forest resilience and change agents in the West. By Utah State University Extension Forestry. www....

Type: Media

Video

### **100 years of fire research**

[www.nrfirescience.org/resource/17087](http://www.nrfirescience.org/resource/17087)

On June 1, 1915, Henry S. Graves established the Branch of Research in the Forest Service to centralize and elevate the pursuit of research throughout the agency. The Branch of Research focused on everything from silvicultural investigations conducted by the experiment stations to industrial studies

and wood product improvement at...

Type: Media

Podcast

### **Demystifying LANDFIRE's biophysical settings descriptions and models and tentative data**

[www.nrfirescience.org/resource/14489](http://www.nrfirescience.org/resource/14489)

The LANDFIRE Program collaborated with experts across the country for more than a decade to create a unique product describing the characteristics and basic ecology of hundreds of ecosystems. This product, known as the Biophysical Settings (BpS) Descriptions and Models, consists of two components: 1) a quantitative state-and-...

Type: Media

Webinar

### **Whitebark pine response to past climate change and fire activity: are we underestimating the resilience of the species?**

[www.nrfirescience.org/resource/13287](http://www.nrfirescience.org/resource/13287)

This is a video recording of a presentation from the 12th Biennial Scientific Conference on the Greater Yellowstone Ecosystem. The presentation focused on using paleoecological records to inform potential future changes in whitebark pine with climate change predictions.

Type: Media

Video

### **Whitebark Pine**

[www.nrfirescience.org/resource/16397](http://www.nrfirescience.org/resource/16397)

This seminar was presented as part of the 2017-2018 Firelab Seminar series. It covered new research on changes in Whitebark pine forests that are being conducted Montana and Idaho.

Type: Media

Seminar

### **Changes in forest structure since 1860 in ponderosa pine dominated forests in the Colorado and Wyoming Front Range, USA**

[www.nrfirescience.org/resource/17557](http://www.nrfirescience.org/resource/17557)

Management practices since the late 19th century, including fire exclusion and harvesting, have altered the structure of ponderosa pine (*Pinus ponderosa* Douglas ex P. Lawson & C. Lawson) dominated forests across the western United States. These structural changes have the potential to contribute to uncharacteristic wildfire...

Author(s): Michael A. Battaglia, Benjamin Gannon, Peter M. Brown, Paula J. Fornwalt, Anthony S. Cheng, Laurie S. Huckaby

Type: Document

Book or Chapter or Journal Article

### **Got veggies? LANDFIRE Biophysical Setting (BpS) review**

[www.nrfirescience.org/resource/13249](http://www.nrfirescience.org/resource/13249)

LANDFIRE is updating about 1500 Biophysical Settings vegetation models and descriptions. Randy Swaty, ecologist on The Nature Conservancy's LANDFIRE team, talks about how LF developed Biophysical Settings vegetation - BpS - descriptions and models, and he sets the stage for the upcoming BpS review. While this overview of features...

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

## **Catching fire: prescribed burning in Northern California**

[www.nrfirescience.org/resource/205](http://www.nrfirescience.org/resource/205)

Catching Fire tells a compelling story of how a small but committed group of local, tribal, state and federal land managers are bringing back the use of prescribed fire as a tool to protect communities and ecosystems across Northern California. It examines the use of fire by the Karuk Tribe of California, and the connection between...

Type: Media

Video

## **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

## **100 years of wildland fire research**

[www.nrfirescience.org/resource/13773](http://www.nrfirescience.org/resource/13773)

This seminar presented by Diane Smith, Research Historian with the USFS. It was presented as part of the 2015 RMRS Fire Sciences Laboratory's weekly seminar series.

Type: Media

Seminar

## **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

## **Clark's nutcracker demography and habitat selection in the face of whitebark pine decline**

[www.nrfirescience.org/resource/13734](http://www.nrfirescience.org/resource/13734)

Over five years (2009-2013), through radio tracking and conducting occupancy, fledgling and habitat surveys, I documented nutcracker reproductive success, habitat selection, movement patterns, foraging ecology, and occupancy in areas with variable WBP mortality. (1) Clark's nutcrackers at the site experienced...

Type: Media

Video

### **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

### **Quaking aspen management: a presentation by the Western Aspen Alliance**

[www.nrfirescience.org/resource/14879](http://www.nrfirescience.org/resource/14879)

On October 27, Paul Rogers of the Western Aspen Alliance discussed the impact of climate change on aspen ecosystems, with an emphasis on aspen fire types. The presentation covered the variability of aspen responses to fire and emphasized unique fire-related systems to wean practitioners from one-size-fits-all prescriptions for aspen...

Type: Media

Webinar

### **Quaking aspen: a burning desire in an 'asbestos forest'**

[www.nrfirescience.org/resource/13673](http://www.nrfirescience.org/resource/13673)

Speaker: Paul Rogers, Director, Western Aspen Alliance, Adjunct Associate Professor, Utah State University. Event: Restoring the West Conference 2015 - Restoration and Fire in the Interior West.

Type: Media

Video

### **Tree-ring reconstructions of fire and forest histories**

[www.nrfirescience.org/resource/13666](http://www.nrfirescience.org/resource/13666)

Speaker: Peter M. Brown, Director, Rocky Mountain Tree-Ring Research. Event: Restoring the West Conference 2015 - Restoration and Fire in the Interior West.

Type: Media

Video

### **The origins of forest service wildland fire research**

[www.nrfirescience.org/resource/15188](http://www.nrfirescience.org/resource/15188)

On March 27th, the Geographical Sciences Committee hosted a workshop, a Century of Wildland Fire Research: Contributions to Long-term Approaches for Wildland Fire Management. This workshop explored the history of wildland fire research in the United States, the priorities for future research and state of the science, and how to...

Type: Media

Webinar

### **Mapping evidence of historical and potential wildfire for climate change and fuels mitigation in the montane forests of the Colorado Front Range**

[www.nrfirescience.org/resource/14067](http://www.nrfirescience.org/resource/14067)

Mapping evidence of historical and potential wildfire for climate change and fuels mitigation in the montane forests of the Colorado Front Range. Rosemary Sherriff, Associate Professor, Humboldt State

University. Recorded talk from 2013 Restoring the West Conference at Utah State University. The conference focused on forest...

Type: Media

Video

### **2016 Season Summary**

[www.nrfirescience.org/resource/15166](http://www.nrfirescience.org/resource/15166)

A summary of the 2016 US Fire Season.

Type: Media

Video

### **Bitterroot Valley history: the fuel landscape**

[www.nrfirescience.org/resource/13307](http://www.nrfirescience.org/resource/13307)

In this video, Steve Arno describes the fire history of Montana's Bitterroot Valley. This was filmed on a bus ride through the Bitterroot Valley during the Fires of 2000 field trip that was part of the Large Wildland Fires Conference in Missoula from May 19-23, 2014.

Type: Media

Video

### **Restoring frequent-fire forests and landscapes**

[www.nrfirescience.org/resource/14061](http://www.nrfirescience.org/resource/14061)

Restoring the frequent-fire forests and landscapes: Science, pragmatism, and the critical role of collaborative groups. Jerry F. Franklin, Professor, University of Washington. Recorded talk from 2013 Restoring the West Conference at Utah State University. The conference focused on forest resilience and change agents in the West. By...

Type: Media

Video

### **Yellowstone and Grand Teton's ecological past as a tool for understanding the future**

[www.nrfirescience.org/resource/15147](http://www.nrfirescience.org/resource/15147)

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

### **Sources and implications of bias and uncertainty in a century of US wildfire activity data**

[www.nrfirescience.org/resource/12941](http://www.nrfirescience.org/resource/12941)

This seminar was presented by Karen Short of the USDA Forest Service Rocky Mountain Research Station, Missoula Fire Science Lab. It was presented as part of the 2014 RMRS Fire Sciences Laboratory's weekly seminar series.

Type: Media

Seminar

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

[www.nrfirescience.org/resource/15101](http://www.nrfirescience.org/resource/15101)

This webinar was presented as part of the 2016-2017 RMRS Fire Sciences Laboratory's weekly seminar series.



Type: Media

Seminar

### **Fire history of Jackson Hole (Grand Teton NP and Bridger Teton NF)**

[www.nrfirescience.org/resource/13286](http://www.nrfirescience.org/resource/13286)

This is a video recording of a presentation from the 12th Biennial Scientific Conference on the Greater Yellowstone Ecosystem. The presentation focused on fire history and fire regimes in Jackson Hole, which supports vegetation and topography that are different from Yellowstone NP.

Type: Media

Video

### **The big burn - the largest fire in American History**

[www.nrfirescience.org/resource/14011](http://www.nrfirescience.org/resource/14011)

In the summer of 1910, hundreds of wildfires raged across the Northern Rockies. By the time it was all over, more than three million acres had burned and at least 78 firefighters were dead. It was the largest fire in American history.

Type: Media

Video

### **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

### **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

### **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

## **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