

Walking on two legs: a pathway of Indigenous restoration and reconciliation in fire-adapted landscapes

www.nrfirescience.org/resource/24516

Worldwide, Indigenous peoples are leading the revitalization of their/our cultures through the restoration of ecosystems in which they are embedded, including in response to increasing “megafires.”

Concurrently, growing Indigenous-led movements are calling for governments to implement Indigenous rights, titles and treaties, and...

Author(s): Sarah Dickson-Hoyle, Ronald E. Ignace, Marianne B. Ignace, Shannon M. Hagerman, Lori D. Daniels

Year Published: 2022

Type: Document

Book or Chapter or Journal Article

Past and future of wildfires in Northern Hemisphere’s boreal forests

www.nrfirescience.org/resource/24244

The boreal forests of the Northern Hemisphere (i.e., covering the USA, Canada and Russia) are the grandest carbon sinks of the world. A significant increase in wildfires could cause disequilibrium in the Northern boreal forest’s capacity as a carbon sink and cause significant impacts on wildlife and people worldwide. That is why...

Author(s): Victor M. Velasco Herrera, Willie Soon, César Pérez-Moreno, Graciela Velasco Herrera, Raúl Martell-Dubois, Laura Rosique-de la Cruz, Valery M. Fedorov, Sergio Cerdeira-Estrada, Eric Bongelli, Emmanuel Zúñiga

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Book or Chapter or Journal Article

Review of Fire ecology and management: past, present, and future of US forested ecosystems

www.nrfirescience.org/resource/24629

Background: Fire is a multifaceted force. Fire activity and risk of fire incidence across US forested ecosystems have accelerated over the last two decades. At the same time, human land-use choices and climate change interacted with fire, in an era we are called to meet specific sustainability goals of reducing CO2 emissions and...

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Book or Chapter or Journal Article

Effects of fire history on animal communities: a systematic review

www.nrfirescience.org/resource/24348

Fire is a natural agent with a paramount role in ecosystem functioning and biodiversity maintenance. Still, it can also act as a negative force against many ecosystems. Despite some knowledge of the interactions of fire and vegetation, there is no clear understanding of how different components of fire regimes (i.e., severity,...

Author(s): Tania Marisol González, Juan David González-Trujillo, Alberto Muñoz, Dolores Armenteras

Year Published: 2022

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Book or Chapter or Journal Article

Emerging palaeoecological frameworks for elucidating plant dynamics in response to fire and other disturbance

www.nrfirescience.org/resource/24217

Motivation: Rapid climate change is altering plant communities around the globe fundamentally. Despite

progress in understanding how plants respond to these climate shifts, accumulating evidence suggests that disturbance could not only modify expected plant responses but, in some cases, have larger impacts on compositional shifts...

Author(s): Joseph D. Napier, Melissa L. Chipman

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Book or Chapter or Journal Article

Contrasting the role of human- and lightning-caused wildfires on future fire regimes on a Central Oregon landscape

www.nrfirescience.org/resource/23379

Climate change is expected to increase fire activity in many regions of the globe, but the relative role of human vs. lightning-caused ignitions on future fire regimes is unclear. We developed statistical models that account for the spatiotemporal ignition patterns by cause in the eastern slopes of the Cascades in Oregon, USA....

Author(s): Ana M. G. Barros, Michelle A. Day, Haiganoush K. Preisler, John T. Abatzoglou, Meg A. Krawchuk, Rachel M. Houtman, Alan A. Ager

Year Published: 2021

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Book or Chapter or Journal Article

Plant species richness at archaeological sites suggests ecological legacy of Indigenous subsistence on the Colorado Plateau

www.nrfirescience.org/resource/23279

Humans have both intentional and unintentional impacts on their environment, yet identifying the enduring ecological legacies of past small-scale societies remains difficult, and as such, evidence is sparse. The present study found evidence of an ecological legacy that persists today within an semiarid ecosystem of western North...

Author(s): Bruce M. Pavlik, Lisbeth A. Louderback, Kenneth B. Vernon, Peter M. Yaworsky, Cynthia Wilson, Arnold Clifford, Brian F. Coddling

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Type: Document

Book or Chapter or Journal Article

Introduction to the article by Harold Biswell: Prescribed Burning in Georgia and California Compared

www.nrfirescience.org/resource/23075

Harold Biswell first learned about the benefits of prescribed fire in forest management when he was a Forest Service researcher in Georgia, USA. After he accepted a professorship in the School of Forestry at the University of California, Berkeley, USA, he was surprised to find out that prescribed fire was not an accepted practice in...

Author(s): Scott L. Stephens, Jan W. van Wagtendonk, James K. Agee, Ronald H. Wakimoto

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

US wildfire potential: a historical view and future projection using high-resolution climate data

www.nrfirescience.org/resource/22898

Recent wildfires in the western United States have led to substantial economic losses and social stresses. There is a great concern that the new climatic state may further increase the intensity, duration, and frequency of wildfires. To examine temporal and spatial features of historical wildfire

trends and future changes, a common...

Author(s): Emily K. Brown, Jiali Wang, Yan Feng

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

Early Ponderosa Pine Forests: Notes on Fire Ecology

www.nrfirescience.org/resource/23950

Wildland fire shaped the historical ponderosa pine and mixed-conifer forest landscapes throughout the West. Fire was also a controlling force in most of the drier vegetation types, ranging from shortgrass prairie to chaparral, scrub oak, and pinyon–juniper woodlands. It is therefore no surprise that wildland fire suppression in...

Author(s): Stephen F. Arno

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Book or Chapter or Journal Article

Fifty years of wildland fire science in Canada

www.nrfirescience.org/resource/22674

We celebrate the 50th anniversary of the Canadian Journal of Forest Research by reflecting on the considerable progress accomplished in select areas of Canadian wildland fire science over the past half century. Specifically, we discuss key developments and contributions in the creation of the Canadian Forest Fire Danger Rating...

Author(s): Sean C. P. Coogan, Lori D. Daniels, Den Boychuk, Philip J. Burton, Michael D. Flannigan, Sylvie Gauthier, Victor G. Kafka, Jane Park, B. Mike Wotton

Year Published: 2021

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Book or Chapter or Journal Article

A modern analogue matching approach to characterize fire temperatures and plant species from charcoal

www.nrfirescience.org/resource/23709

Charcoal identification and the quantification of its abundance in sedimentary archives is commonly used to reconstruct fire frequency and the amounts of biomass burning. There are, however, limited metrics to measure past fire temperature and fuel type (i.e. the types of plants that comprise the fuel load), which are important for...

Author(s): S. Yoshi Maezumi, William D. Gosling, Judith Kirschner, Manuel Chevalier, Henk L. Cornelissen, Thilo Heinecke, Crystal H. McMichael

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

Resilience of terrestrial and aquatic fauna to historical and future wildfire regimes in western North America

www.nrfirescience.org/resource/23674

Wildfires in many western North American forests are becoming more frequent, larger, and severe, with changed seasonal patterns. In response, coniferous forest ecosystems will transition toward dominance by fire-adapted hardwoods, shrubs, meadows, and grasslands, which may benefit some faunal communities, but not others. We describe...

Author(s): Henriette I. Jager, Jonathan Long, Rachel L. Malison, Brendan P. Murphy, Ashley J. Rust, Luiz G. M. Silva, Rahel Sollmann, Zachary L. Steel, Mark D. Bowen, Jason B. Dunham, Joseph L.

Ebersole, Rebecca L. Flitcroft
Year Published: 2021
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Book or Chapter or Journal Article

Wetter environment and increased grazing reduced the area burned in northern Eurasia from 2002 to 2016

www.nrfirescience.org/resource/23370

Northern Eurasia is currently highly sensitive to climate change. Fires in this region can have significant impacts on regional air quality, radiative forcing and black carbon deposition in the Arctic which can accelerate ice melting. Using a MODIS-derived burned area dataset, we report that the total annual area burned in this...

Author(s): Wei Min Hao, Matthew C. Reeves, L. Scott Baggett, Yves Balkanski, Philippe Ciais, Bryce L. Nordgren, Alexander P. Petkov, Rachel E. Corley, Florent Mouillot, Shawn P. Urbanski, Chao Yue
Year Published: 2021
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Book or Chapter or Journal Article

Summer air temperature for the Greater Yellowstone Ecoregion (770-2019 CE) over 1,250 years

www.nrfirescience.org/resource/23120

Projected warming of global surface air temperatures will further exacerbate droughts, wildfires, and other agents of ecosystem stress. We use latewood blue intensity from high-elevation *Picea engelmannii* to reconstruct late-summer maximum air temperature for the Greater Yellowstone Ecoregion (GYE) spanning 770-2019 CE. Using a...

Author(s): Karen J. Heeter, Maegen L. Rochner, Grant Harley
Year Published: 2021
Type: Document
Book or Chapter or Journal Article

Fire history as a key determinant of grassland soil CO₂ flux

www.nrfirescience.org/resource/22943

Aims: Fire regimes are key drivers of ecosystem dynamics and are changing worldwide. Uncertainty about how fire history affects responses to individual fires hampers predictions of fire impacts on important ecosystem functions such as C cycling. Thus, we assessed how fire and fire history affect soil CO₂ flux and aboveground net...

Author(s): Ingrid J. Slette, Alannah Liebert, Alan K. Knapp
Year Published: 2021
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Book or Chapter or Journal Article

Small fires, frequent clouds, rugged terrain and no training data: a methodology to reconstruct fire history in complex landscapes

www.nrfirescience.org/resource/22685

An automated burned area extraction routine that attempts to overcome the particular difficulties of remote sensing applications in complex landscapes is presented and tested in the mountainous region of northwest Yunnan, China. In particular, the lack of burned samples to use for training and testing, the rugged relief, the small...

Author(s): David Fornacca, Guopeng Ren, Wen Xiao
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Book or Chapter or Journal Article

The 1910 Wildfire Debacle*

www.nrfirescience.org/resource/23949

In August 1910, wildfires swept through 3 million acres (1.6 million ha) of heavily forested mountain country in northern Idaho and adjacent Montana. About 85 people perished in the flames, and the Forest Service's fire protection program was caught short. DISASTER AND HEROISM In 1910, the fledgling Forest Service— established in...

Author(s): Stephen F. Arno

Year Published: 2021

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Book or Chapter or Journal Article

Seeing the Big Picture: Long Term Studies at Lick Creek Demonstrate How Fuel Treatments Impact a Changing Forest

www.nrfirescience.org/resource/22670

A long-term study at Lick Creek demonstrates how fuel treatments in dry forests provide benefits beyond mitigating the chance of a high-severity fire.

Author(s): Nehalem C. Clark

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Research Brief or Fact Sheet

Advancing fire ecology in 21st century rangelands

www.nrfirescience.org/resource/23685

Fire ecology has a long history of empirical investigation in rangelands. However, the science is inconclusive and incomplete, sparking increasing interest on how to advance the discipline. Here, we introduce a new framework for qualitatively and quantitatively understanding the ranges of variability in fire regimes typical of...

Author(s): Dirac Twidwell, Christine H. Bielski, Rheinhardt Scholtz, Samuel D. Fuhlendorf

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

Fire and land cover change in the Palouse Prairie–forest ecotone, Washington and Idaho, USA

www.nrfirescience.org/resource/22381

Background: Prairie-forest ecotones are ecologically important for biodiversity and ecological processes. While these ecotones cover small areas, their sharp gradients in land cover promote rich ecological interaction and high conservation value. Our objective was to understand how historical and current fire occurrences and human...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Eva K. Strand, Stephen C. Bunting, James P. Riser, John T. Abatzoglou, Max W. Nielsen-Pincus, Mara Johnson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Reconstruction of paleofire emissions over the past millennium from measurements of ice core acetylene

www.nrfirescience.org/resource/20831

Acetylene is a short-lived trace gas produced during combustion of fossil fuels, biomass, and biofuels. Biomass burning is likely the only major source of acetylene in the preindustrial atmosphere, making ice

core acetylene a powerful tool for reconstructing paleofire emissions. Here we present a 2,000-year atmospheric record of...

Author(s): Melinda R. Nicewonger, Murat Aydin, Michael J. Prather, Eric S. Saltzman

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Warmer and drier fire seasons contribute to increases in area burned at high severity in western US forests from 1985-2017

www.nrfirescience.org/resource/22316

Increases in burned area across the western US since the mid-1980's have been widely documented and linked partially to climate factors, yet evaluations of trends in fire severity are lacking. Here, we evaluate fire severity trends and their interannual relationships to climate for western US forests from 1985-2017....

Author(s): Sean A. Parks, John T. Abatzoglou

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Are plant community responses to wildfire contingent upon historical disturbance regimes?

www.nrfirescience.org/resource/22134

Background: Ecological disturbance is a major driver of ecosystem structure and evolutionary selection, and theory predicts that the frequency and/or intensity of disturbance should determine its effects on communities. However, adaptations of species pools to different historical disturbance regimes are rarely considered in the...

Author(s): Jesse E. D. Miller, Hugh Safford

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire and land cover change in the Palouse Prairie-forest ecotone, Washington and Idaho, USA

www.nrfirescience.org/resource/22094

Background: Prairie-forest ecotones are ecologically important for biodiversity and ecological processes. While these ecotones cover small areas, their sharp gradients in land cover promote rich ecological interaction and high conservation value. Our objective was to understand how historical and current fire occurrences and human...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Eva K. Strand, Stephen C. Bunting, James P. Riser, John T. Abatzoglou, Max W. Nielsen-Pincus, Mara Johnson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire data

www.nrfirescience.org/resource/21700

The statistical analysis of wildland fire activity is integral to wildland fire planning, operations, and research across the globe. Historical fire records are inputs to fire danger rating applications, fire-potential forecast models, geospatial fire modeling systems, and other tools for risk assessment, planning, budgeting, and...

Author(s): Karen C. Short, Marty Ahrens, Sarah Harris, Jesus San-Miguel-Ayanz

Year Published: 2020

Type: Document

Arctic and boreal paleofire records reveal drivers of fire activity and departures from Holocene variability

www.nrfirescience.org/resource/23031

Boreal forest and tundra biomes are key components of the Earth system because the mobilization of large carbon stocks and changes in energy balance could act as positive feedbacks to ongoing climate change. In Alaska, wildfire is a primary driver of ecosystem structure and function, and a key mechanism coupling high?latitude...

Author(s): Tyler J. Hoecker, Philip E. Higuera, Ryan Kelly, Feng Sheng Hu

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Riparian and adjacent upland forests burned synchronously during dry years in eastern Oregon (1650–1900 CE), USA

www.nrfirescience.org/resource/21588

Riparian forests link terrestrial and freshwater communities and therefore understanding the landscape context of fire regimes in these forests is critical to fully understanding the landscape ecology. However, few direct studies of fire regimes exist for riparian forests, especially in the landscape context of adjacent upland...

Author(s): Grant Harley, Emily K. Heyerdahl, James D. Johnston, Diana L. Olson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Forest restoration treatments in a ponderosa pine forest enhance physiological activity and growth under climatic stress

www.nrfirescience.org/resource/21446

As the climate warms, drought will increasingly occur under elevated temperatures, placing forest ecosystems at growing risk of extensive dieback and mortality. In some cases, increases in tree density following early 20th-century fire suppression may exacerbate this risk. Treatments designed to restore historical stand structure...

Author(s): Alan J. Tepley, Sharon M. Hood, Christopher R. Keyes, Anna Sala

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Millennial-scale climate and human drivers of environmental change and fire activity in a dry, mixed-conifer forest of northwestern Montana

www.nrfirescience.org/resource/21138

Warm summer temperatures and longer fire seasons are promoting larger, and in some cases, more fires that are severe in low- and mid-elevation, dry mixed-conifer forests of the Northern Rocky Mountains (NRM). Long-term historical fire conditions and human influence on past fire activity are not well understood for these...

Author(s): Dave McWethy, Mio Alt, Elena Argiriadis, Dario Battistel, Richard G. Everett, Gregory T. Pederson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Warmer and drier fire seasons contribute to increases in area burned at high severity in western US forests from 1985 to 2017

www.nrfirescience.org/resource/22500

Increases in burned area across the western US since the mid-1980's have been widely documented and linked partially to climate factors, yet evaluations of trends in fire severity are lacking. Here, we evaluate fire severity trends and their interannual relationships to climate for western US forests from 1985-2017....

Author(s): Sean A. Parks, John T. Abatzoglou

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Book or Chapter or Journal Article

Seeing the Light, Feeling the Heat - An essay by Stephen Pyne

www.nrfirescience.org/resource/20873

FIRE PHOTOGRAPHY BEGAN EARLY. As soon as photographs could replace lithographs in magazines and newspapers, photos of firefights, the aftermath of bad burns, and occasionally even flame and smoke appeared. When Harper's Weekly covered the 1871 and 1894 fires in Wisconsin and Minnesota, it relied on artists' drawings. The 1903...

Author(s): Stephen Pyne

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Pleistocene to Pyrocene: fire replaces ice

www.nrfirescience.org/resource/22321

Fire offers a special perspective by which to understand the Earth being remade by humans. Fire is integrative, so intrinsically interdisciplinary. Fire use is unique to humans, so a tracer of humanity's ecological impacts. Anthropogenic fire history shows the long influence of humans on Earth and even climate; in particular, it...

Author(s): Stephen Pyne

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire and land cover change in the Palouse Prairie-forest ecotone, Washington and Idaho, USA

www.nrfirescience.org/resource/20656

Background: Prairie-forest ecotones are ecologically important for biodiversity and ecological processes. While these ecotones cover small areas, their sharp gradients in land cover promote rich ecological interaction and high conservation value. Our objective was to understand how historical and current fire occurrences and human...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Eva K. Strand, Stephen C. Bunting, James P. Riser, John T. Abatzoglou, Max W. Nielsen-Pincus, Mara Johnson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Vegetation response to wildfire and climate forcing in a Rocky Mountain lodgepole pine forest over the past 2500 years

www.nrfirescience.org/resource/22282

Wildfire is a ubiquitous disturbance agent in subalpine forests in western North America. Lodgepole

pine (*Pinus contorta* var. *latifolia*), a dominant tree species in these forests, is largely resilient to high-severity fires, but this resilience may be compromised under future scenarios of altered climate and fire activity. We...

Author(s): Barrie V. Chileen, Kendra K. McLaughlan, Philip E. Higuera, Meredith Parish, Bryan N. Shuman

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Discovering Douglas-fir woodlands in the historical forests of the Umatilla National Forest, eastern Oregon and Washington

www.nrfirescience.org/resource/22118

We discovered unique Douglas-fir open woodlands in the Umatilla National Forest using historical surveys. Historical ponderosa pine forests of the western United States are transitioning to denser forests comprised of a greater proportion of fire-sensitive species, including true firs. We used historical (1879 to 1887) surveys to...

Author(s): Brice B. Hanberry, Donald Justice, David Powell

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire and land cover change in the Palouse Prairie-forest ecotone, Washington and Idaho, USA

www.nrfirescience.org/resource/21830

Background: Prairie-forest ecotones are ecologically important for biodiversity and ecological processes. While these ecotones cover small areas, their sharp gradients in land cover promote rich ecological interaction and high conservation value. Our objective was to understand how historical and current fire occurrences and human...

Author(s): Penelope Morgan, Emily K. Heyerdahl, Eva K. Strand, Stephen C. Bunting, James P. Riser, John T. Abatzoglou, Max W. Nielsen-Pincus, Mara Johnson

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Influence of topography and fuels on fire refugia probability under varying fire weather conditions in forests of the Pacific Northwest, USA

www.nrfirescience.org/resource/21597

Fire refugia—locations that burn less severely or less frequently than surrounding areas—support late-successional and old-growth forest structure and function. This study investigates the influence of topography and fuels on the probability of forest fire refugia under varying fire weather conditions. We focused on recent large...

Author(s): Garrett W. Meigs, Christopher J. Dunn, Sean A. Parks, Meg A. Krawchuk

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Disjunct and decoupled? The persistence of a fire-sensitive conifer species in a historically frequent-fire landscape

www.nrfirescience.org/resource/21483

Local and regional species extirpations may become more common as changing climate and disturbance regimes accelerate species' in situ range contractions. Identifying locations that function as both climate and disturbance refugia is critical for biodiversity conservation. Here, we investigate the

persistence of a disjunct, fire-...

Author(s): William M. Downing, James D. Johnston, Meg A. Krawchuk, Andrew G. Merschel, Joseph H. Rausch

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Disturbance history modulates how litter and herbaceous cover influence conifer regeneration after fire

www.nrfirescience.org/resource/21417

Climate-driven increases in disturbance frequency and extent augment the potential for compounded disturbances. Drawing on well-studied forests that experienced successive disturbances, we asked: (1) how does post-fire cover of litter, herbaceous cover and bare ground vary between stands affected by combinations of blow-down, insect...

Author(s): Nathan S. Gill, Daniel Jarvis, John Rogan, Dominik Kulakowski

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire history of the unique high-elevation Snowmastodon (Ziegler Reservoir) site during MIS 6-4, with comparisons of TII to TI in the southern Colorado Rockies

www.nrfirescience.org/resource/20929

Paleoecological records detailing fire and vegetation histories during previous interglacials are extremely rare. We present a unique, high-resolution, 10-m long record of fire from a high elevation conifer-dominated site - the Snowmastodon (Ziegler Reservoir) site - in the southern Rocky Mountains, USA, for the period spanning MIS...

Author(s): R. Scott Anderson, Gonzalo Jiménez-Moreno, Monique Belanger, Christy E. Briles

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Frequent and intense fires in the final coals of the Paleozoic indicate elevated atmospheric oxygen levels at the onset of the End-Permian Mass Extinction Event

www.nrfirescience.org/resource/19515

During the End-Permian mass extinction event (EPME) there is extensive evidence for depletion of oxygen in the marine realm. Atmospheric models based upon biogeochemical cycling predict a comparable decline leading up to this event and have been postulated as a possible driver for marine depletion. However, these models contrast...

Author(s): Zhiming Yan, Longyi Shao, I. J. Glasspool, Xuétian Wang, Juan Wang, Hao Wang

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Historical patterns of fire severity and forest structure and composition in a landscape structured by frequent large fires: Pumice Plateau ecoregion, Oregon, USA

www.nrfirescience.org/resource/19358

Context: Lack of quantitative observations of extent, frequency, and severity of large historical fires constrains awareness of departure of contemporary conditions from those that demonstrated resistance and resilience to frequent fire and recurring drought. Objectives: Compare historical and contemporary fire and forest...

Author(s): R. Keala Hagmann, Andrew G. Merschel, Matthew J. Reilly

Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Climate, environment, and disturbance history govern resilience of western North American forests

www.nrfirescience.org/resource/20622

Before the advent of intensive forest management and fire suppression, western North American forests exhibited a naturally occurring resistance and resilience to wildfires and other disturbances. Resilience, which encompasses resistance, reflects the amount of disruption an ecosystem can withstand before its structure or...

Author(s): Paul F. Hessburg, Carol Miller, Sean A. Parks, Nicholas A. Povak, Alan H. Taylor, Philip E. Higuera, Susan J. Prichard, Malcolm P. North, Brandon M. Collins, Matthew D. Hurteau, Andrew J. Larson, Craig D. Allen, Scott L. Stephens, Hiram Rivera-Huerta, Camille Stevens-Rumann, Lori D. Daniels, Ze'ev Gedalof, Robert W. Gray, Van R. Kane, Derek J. Churchill, R. Keala Hagmann, Thomas A. Spies, C. Alina Cansler, R. Travis Belote, Thomas T. Veblen, Michael A. Battaglia, Chad M. Hoffman, Carl N. Skinner, Hugh Safford, R. Brion Salter

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Repeated fires reduce plant diversity in low?elevation Wyoming big sagebrush ecosystems (1984–2014)

www.nrfirescience.org/resource/19047

Sagebrush is one of the most imperiled ecosystems in western North America, having lost about half of its original 62 million hectare extent. Annual grass invasions are known to be increasing wildfire occurrence and burned area, but the lasting effects (greater than five years post?fire) that the resulting reburns have on these...

Author(s): Adam L. Mahood, Jennifer Balch

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Spatiotemporal variability of human-fire interactions on the Navajo Nation

www.nrfirescience.org/resource/20437

Unraveling the effects of climate and land use on historical fire regimes provides important insights into broader human–fire–climate dynamics, which are necessary for ecologically based forest management. We developed a spatial human land?use model for Navajo Nation forests across which we sampled a network of tree?ring...

Author(s): Christopher H. Guiterman, Ellis Q. Margolis, Christopher H. Baisan, Donald A. Falk, Craig D. Allen, Thomas W. Swetnam

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A multi-century history of fire regimes along a transect of mixed-conifer forests in central Oregon, U.S.A.

www.nrfirescience.org/resource/18826

Dry mixed-conifer forests are widespread in the interior Pacific Northwest, but their historical fire regimes are poorly characterized, in particular the relative mix of low- and high-severity fire. We reconstructed a multi-century history of fire from tree rings in dry mixed-conifer forests in central

Oregon. These forests are...

Author(s): Emily K. Heyerdahl, Rachel A. Loehman, Donald A. Falk

Year Published: 2019

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

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: 2019

Type: Document

Synthesis

Resilience and fire management in the Anthropocene

www.nrfirescience.org/resource/20183

Fire management around the world is now undergoing extensive review, with a move toward fire management plans that maintain biodiversity and other ecosystems services, while at the same time mitigating the negative impacts to people and property. There is also increasing recognition of the historical and anthropogenic dimensions...

Author(s): Lindsey Gillson, Cathy L. Whitlock, Glynis Humphrey

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Smokey's legacy

www.nrfirescience.org/resource/20008

Like many of us at the Forest Service, I started my career in fire, and I have always relied on Smokey Bear. Fire prevention is part of our cultural DNA.

Author(s): Vicki Christiansen

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

The night we buried Smokey Bear

www.nrfirescience.org/resource/20006

The national symbol of forest fire prevention, Smokey Bear, and the slogan, 'Only you can prevent forest fires!' already existed when a group of firefighters on the Capitan Gap Fire found an orphaned bear cub clinging to a tree after a flareup. The May 1950 fire, in the Capitan Mountains on the Lincoln National Forest in New Mexico...

Author(s): Larry S. Allen

Year Published: 2019

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Book or Chapter or Journal Article

Terrestrial plant microfossils in palaeoenvironmental studies, pollen, microcharcoal and phytolith. Towards a comprehensive understanding of vegetation, fire and climate changes over

the past one million years

www.nrfirescience.org/resource/19785

The Earth has experienced large changes in global and regional climates over the past one million years. Understanding processes and feedbacks that control those past environmental changes is of great interest for better understanding the nature, direction and magnitude of current climate change, its effect on life, and on the...

Author(s): Anne Laure Daniau, Stéphanie Desprat, Julie C. Aleman, Laurent Bremond, Basil A. S. Davis, William Fletcher, Jennifer R. Marlon, Laurent Marquer, Vincent Montade, César Morales-Molino, Filipa Naughton, Damien Rius, Dunia H. Urrego

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Fire deficits have increased drought sensitivity in dry conifer forests: Fire frequency and tree?ring carbon isotope evidence from Central Oregon

www.nrfirescience.org/resource/19508

A century of fire suppression across the Western United States has led to more crowded forests and increased competition for resources. Studies of forest thinning or stand conditions after mortality events have provided indirect evidence for how competition can promote drought stress and predispose forests to severe fire and/or bark...

Author(s): Steven L. Voelker, Andrew G. Merschel, Frederick C. Meinzer, Danielle E. M. Ulrich, Thomas A. Spies, Christopher J. Still

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Post-fire carbon dynamics in subalpine forests of the Rocky Mountains

www.nrfirescience.org/resource/20552

Forests store a large amount of terrestrial carbon, but this storage capacity is vulnerable to wildfire. Combustion, and subsequent tree mortality and soil erosion, can lead to increased carbon release and decreased carbon uptake. Previous work has shown that non-constant fire return intervals over the past 4000 years strongly...

Author(s): Kristina J. Bartowitz, Philip E. Higuera, Bryan N. Shuman, Kendra K. McLauchlan, Tara W. Hudiburg

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Post-fire vegetation and climate dynamics in low-elevation forests over the last three millennia in Yellowstone National Park

www.nrfirescience.org/resource/23049

Conifer forests of the western US are historically well adapted to wildfires, but current warming is creating novel disturbance regimes that may fundamentally change future forest dynamics. Stand?replacing fires can catalyze forest reorganization by providing periodic opportunities for establishment of new tree cohorts that set...

Author(s): M. Allison Stegner, Monica G. Turner, Virginia Iglesias, Cathy L. Whitlock

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Comparative methods for reconstructing fire histories at the stand scale using charcoal records

in peat and mineral soils

www.nrfirescience.org/resource/19012

Analysis and ¹⁴C dating of charcoal fragments >2 mm buried in mineral soils make it possible to obtain a stand-scale portrait of Holocene fires that occurred in well-drained, fire-prone environments, as well as changes in forest stand composition over time, based on botanical identification of charcoals.

However, it is not...

Author(s): Pierre-Luc Couillard, Joanie Tremblay, Martin Lavoie, Serge Payette

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Consequences of climatic thresholds for projecting fire activity and ecological change

www.nrfirescience.org/resource/23035

Aim: Ecological properties governed by threshold relationships can exhibit heightened sensitivity to climate, creating an inherent source of uncertainty when anticipating future change. We investigated the impact of threshold relationships on our ability to project ecological change outside the observational record (e.g., the 21st...

Author(s): Adam M. Young, Philip E. Higuera, John T. Abatzoglou, Paul A. Duffy, Feng Sheng Hu

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Century-Scale Fire Dynamics in a Savanna Ecosystem

www.nrfirescience.org/resource/20135

(1) Background: Frequent fire, climate variability, and human activities collectively influence savanna ecosystems. The relative role of these three factors likely varies on interannual, decadal, and centennial timescales. Here, we tested if Euro-American activities uncoupled drought and fire frequencies relative to previous...

Author(s): Berangere Leys, Daniel Griffin, Evan R. Larson

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Smokey Bear - he's just doing his job, well

www.nrfirescience.org/resource/20007

This year, Smokey Bear turns 75. Think about that for a second-a public service announcement campaign just turned three-quarters of a century old! The Smokey program is the longest running public service announcement campaign in U.S. history and is still running strong. The campaign's simple fire prevention message, delivered by an...

Author(s): Lincoln Bramwell

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Is Anthropogenic Pyrodiversity Invisible in Paleofire Records?

www.nrfirescience.org/resource/19885

Paleofire studies frequently discount the impact of human activities in past fire regimes. Globally, we know that a common pattern of anthropogenic burning regimes is to burn many small patches at high frequency, thereby generating landscape heterogeneity. Is this type of anthropogenic pyrodiversity necessarily obscured in paleofire...

Author(s): Christopher I. Roos, Grant J. Williamson, David M. J. S. Bowman

Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Post-fire vegetation and climate dynamics in low-elevation forests over the last three millennia in Yellowstone National Park

www.nrfirescience.org/resource/19772

Conifer forests of the western US are historically well adapted to wildfires, but current warming is creating novel disturbance regimes that may fundamentally change future forest dynamics. Stand-replacing fires can catalyze forest reorganization by providing periodic opportunities for establishment of new tree cohorts that set...

Author(s): M. Allison Stegner, Monica G. Turner, Virginia Iglesias, Cathy L. Whitlock

Year Published: 2019

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

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

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

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

www.nrfirescience.org/resource/18037

Early U.S. Forest Service timber inventories began around 1907–1908. By 1911–1916, underestimation and unreliability were commonly known, by 1926 abandonment was suggested, and by the 1930s they were replaced by better methods. Haggmann et al. Comment (2018; “Haggmann et al.” hereafter) and other recent users of these data...

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

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

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

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

www.nrfirescience.org/resource/18031

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

Author(s): William L. Baker

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Visualizing Individual Tree Differences in Tree-Ring Studies

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

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

Human influences superseded climate to disrupt the 20th century fire regime in Jasper National Park, Canada

www.nrfirescience.org/resource/18402

To enhance understanding of how climate and humans influenced historical fire occurrence in the montane forests of Jasper National Park, we crossdated fire-scar and tree age samples from 172 plots. We tested effects of drought and climatic variation driven by the El Niño-Southern Oscillation (ENSO) and Pacific North American (PNA)...

Author(s): Raphael D. Chavardes, Lori D. Daniels, Ze'ev Gedalof, David W. Anderson

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

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. Hessl, 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

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

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

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

www.nrfirescience.org/resource/18317

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

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

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

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

Testing the efficacy of tree-ring methods for detecting past disturbances

www.nrfirescience.org/resource/18295

The retrospective study of abrupt and sustained increases in the radial growth of trees (hereinafter 'releases') by tree-ring analysis is an approach widely used for reconstructing past forest disturbances. Despite the range of dendrochronological methods used for release-detection, a lack of in-depth comparison between them can...

Author(s): Volodymyr Trotsiuk, Neil Pederson, Daniel L. Druckenbrod, David A. Orwig, Daniel A. Bishop, Audrey Barker-Plotkin, Shawn Fraver, Dario Martin-Benito

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

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

Tribal fire and forest management: Confederated Salish-Kootenai fire history, philosophy, and resource management strategies

www.nrfirescience.org/resource/19687

Within the ancestral homelands of the Confederated Salish Kootenai Tribes (CSKT), the Fire Continuum Conference (May 2018) discussed the complexity of wildland fire and fuels research and management. The CSKT fieldtrip took place on the Flathead Reservation (figure 1), about 20 miles north of Missoula, and the presenters addressed...

Author(s): Monique D. Wynecoop

Year Published: 2018

Type: Document

Research Brief or Fact Sheet

Three Fires

www.nrfirescience.org/resource/18154

This article covers the history of fire activities since 1910 and how recovery can depend on one of three

methods in the forest - resistance, restoration, and resilience.

Author(s): Stephen Pyne

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

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

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

www.nrfirescience.org/resource/18036

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

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

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

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

Smokey Bear from idea to icon

www.nrfirescience.org/resource/20222

Smokey Bear's story begins with World War II. In spring 1942, a few months after Japanese planes had attacked Pearl Harbor, an enemy submarine fired shells that exploded near an oil field close to the Los Padres National Forest. U.S. Forest Service personnel feared that future attacks could ignite forest fires and cause disastrous...

Author(s): James G. Lewis
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Monthly paleostreamflow reconstruction from annual tree-ring chronologies

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

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

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

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

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

A Global Analysis of Hunter-Gatherers, Broadcast Fire Use, and Lightning-Fire-Prone Landscapes

www.nrfirescience.org/resource/18298

We examined the relationships between lightning-fire-prone environments, socioeconomic metrics, and documented use of broadcast fire by small-scale hunter-gatherer societies. Our approach seeks to reassess human-fire dynamics in biomes that are susceptible to lightning-triggered fires. We quantify global lightning-fire-prone...

Author(s): Michael R. Coughlan, Brian I. Magi, Kelly M. Derr

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

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

Ecological effects of fire

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

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

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

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

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

Long-term impacts of wildfire on fuel loads, vegetation composition, and potential fire behavior and management in sagebrush-dominated ecosystems - Final Report to the Joint Fire Science

Program

www.nrfirescience.org/resource/17010

An understanding of the long-term vegetation structure, patterns of fuel succession, and potential for reburn in sagebrush-dominated ecosystems is important for managing the landscape at a temporal scale that is appropriate for the ecological interactions in these systems. Our overarching research objective was to fill existing...

Author(s): Lisa M. Ellsworth, J. Boone Kauffman

Year Published: 2017

Type: Document

Technical Report or White Paper

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

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

Quaking aspen in the Northern Rockies: retention and restoration

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

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

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

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

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

Dissertation or Thesis

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Slow awakening: ecology's role in shaping forest fire policy

www.nrfirescience.org/resource/19236

Soon after its inception in the early 1900s the U.S. Forest Service adopted a policy that can be described as “fire exclusion,” based on the view that forest fires were unnecessary and a menace.¹ In the late 1970s, however, the agency was compelled by facts on the ground to begin transitioning to managing fire as an inherent...

Author(s): Stephen F. Arno

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/17662

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

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

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

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

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

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

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

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

Disturbance regimes and the historical range and variation in terrestrial ecosystems

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

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

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 human influence on fire ignition across the western USA

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

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

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

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

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

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

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

Introduction to the article by Elers Koch: the passing of the Lolo Trail

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

Toward a more ecologically informed view of severe forest fires

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

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

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

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

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

Influence of fire disturbance and biophysical heterogeneity on pre-settlement ponderosa pine

and mixed conifer forests

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

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

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

Anthropogenic influence on wildfire activity in Alberta, Canada

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

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

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

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

Wildland fire limits subsequent fire occurrence

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

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

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

Quaking aspen in Utah: integrating recent science with management

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

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

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

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

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

Between two fires: a fire history of contemporary America

www.nrfirescience.org/resource/18284

From a fire policy of prevention at all costs to today's restored burning, *Between Two Fires* is America's history channeled through the story of wildland fire management. Stephen J. Pyne tells of a fire revolution that began in the 1960s as a reaction to simple suppression and single-agency hegemony, and then matured into more...

Author(s): Stephen Pyne

Year Published: 2015

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

High-severity fire corroborated in historical dry forests of the western United States: response

to Fule et al.

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

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

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

Northern Rockies pyrogeography: an example of fire atlas utility

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

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

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

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

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

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

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

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

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

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

Postfire changes in forest carbon storage over a 300-year chronosequence of Pinus contorta-dominated forests

www.nrfirescience.org/resource/18457

A warming climate may increase the frequency and severity of stand-replacing wildfires, reducing carbon (C) storage in forest ecosystems. Understanding the variability of post-fire C cycling on heterogeneous landscapes is critical for predicting changes in C storage with more frequent disturbance. We measured C pools and fluxes...

Author(s): Daniel M. Kashian, William H. Romme, Daniel B. Tinker, Monica G. Turner, Michael G. Ryan
Year Published: 2013
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

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

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

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

Fire regimes of quaking aspen in the mountain west

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

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

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

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

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

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

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

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

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

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

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

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-Flyer
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

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

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

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

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

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

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

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

Chapter 2: Fire behavior and effects: principles for archaeologists

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

The human dimension of fire regimes on Earth

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

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

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

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

www.nrfirescience.org/resource/11896

This paper synthesizes existing information about the disturbance ecology of high-elevation five-needle pine ecosystems, describing disturbance 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

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

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

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

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

Synthesis of knowledge: fire history and climate change

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

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

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

Beyond fire behavior and fuels: learning from the past to help guide us in the future

www.nrfirescience.org/resource/18397

The third IAWF Fire Behavior and Fuels Conference was held in Spokane, Washington, October 25-29, 2010, and commemorated the 100th anniversary of the 1910 fires in the Northern Rocky Mountains.

The theme of the conference was appropriately titled 'Beyond Fire Behavior and Fuels: Learning from the Past to Help Guide Us in the...

Year Published: 2011

Type: Document

Conference Proceedings

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

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

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

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

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

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

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

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

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

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

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

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

Widespread increase of tree mortality rates in the western United States

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

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

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

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

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

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

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

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

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

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

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. Hessel, Jeremy S. Littell, Nathan J. Mantua

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

Living artifacts: the ancient ponderosa pines of the West

www.nrfirescience.org/resource/8160

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

www.nrfirescience.org/resource/7942

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

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

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/11190

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

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

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 western Montana forested landscapes via tree-ring analyses

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

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

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 a western Montana ponderosa pine grassland: a pilot study

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

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

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

Complex interactions shaping aspen dynamics in the Greater Yellowstone Ecosystem

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

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

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

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

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⁻¹ (20-50 trees acre⁻¹) to a range...

Author(s): Stephen A. Fitzgerald

Year Published: 2005

Type: Document

Conference Proceedings, Synthesis

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

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

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

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

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

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

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

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

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

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

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

Stream succession: channel changes after wildfire disturbance

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

Eighth international wildland firefighter safety summit: 10 years later

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

Mapping relative fire regime condition class for the western United States

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

The interaction of fire, fuels, and climate across Rocky Mountain forests

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

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

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

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

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

Role of fire in determining annual water yield in mountain watersheds

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

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

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* Dougl. 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Fire as a coarse filter for snags and logs

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

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

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

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

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

Aspen's ecological role in the West

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

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

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

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

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

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

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

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

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

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 in western shrubland, woodland, and grassland ecosystems

www.nrfirescience.org/resource/111116

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

Associated riparian communities

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

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

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

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

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

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

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

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

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 lead 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

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

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

Fire applications in ecosystem management

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

Comparing historic and modern forests on the Bitterroot Front

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

Description not entered

Author(s): Stephen F. Arno

Year Published: 2000

Type: Document

Technical Report or White Paper

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

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

Fire-climate interactions in the Selway-Bitterroot Wilderness area

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

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

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

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

Historic pinyon and juniper woodland development

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

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

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

Historical and modern roles of fire in pinyon-juniper

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

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

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

80 years of change in a ponderosa pine forest

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

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

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

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

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

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

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

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

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

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

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

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

Predicting late-successional fire refugio pre-dating European settlement in the Wenatchee Mountains

www.nrfirescience.org/resource/18515

Fires occur frequently in dry forests of the Inland West. Fire effects vary across the landscape, reflecting topography, elevation, aspect, slope, soils, and vegetation attributes. Patches minimally affected by successive fires may be thought of as 'refugia', islands of older forest in a younger forest matrix. Refugia support...

Author(s): Ann Camp, Chad Oliver, Paul F. Hessburg, Richard L. Everett

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

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

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

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

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

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

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

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

Restoring recreational and residential forests

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

Long-term recovery of Wyoming big sagebrush after four treatments

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

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

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

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

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

Restoring fire-dependent ponderosa pine forests in western Montana

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

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

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

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

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

www.nrfirescience.org/resource/8217

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

Author(s): James K. Brown, Stephen F. Arno, Stephen W. Barrett, James P. Menakis
Year Published: 1994
Type: Document
Book or Chapter or Journal Article

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

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

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

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

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

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

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

Influence of fire on factors that affect site productivity

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

Historical Perspective on the Yellowstone Fires of 1988: A reconstruction of prehistoric fire history reveals that comparable fires occurred in the early 1700s

www.nrfirescience.org/resource/18403

Maintaining an ecosystem shaped primarily by natural geological and ecological processes is a primary goal in Yellowstone National Park (YNP) (Housteri 1971). Thus, one important question about the fires of 1988 is whether they were really natural: Did they behave as they would have if Europeans had never entered the area? The park...

Author(s): William H. Romme, Don G. Despain

Year Published: 1989

Type: Document

Book or Chapter or Journal Article

Increment-borer methods for determining fire history in coniferous forests

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

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

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

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

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

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 history at the forest-grassland ecotone in southwestern Montana

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

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

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

Indian fires as an ecological influence in the Northern Rockies

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

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

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

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

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

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

Forest fire history in the Northern Rockies

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

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

The dendrochronology of fire history

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

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

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

Fire history terminology: report of the ad hoc committee

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

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

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

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

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 fire history of Coram Experimental Forest

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

The historical role of fire on the Bitterroot National Forest

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

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

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

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

Year Published: 1973

Type: Document

Book or Chapter or Journal Article

Wildfires in northern Yellowstone National Park

www.nrfirescience.org/resource/15398

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

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

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

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

Millennial scale climate-fire-vegetation interactions in a mid-elevation mixed coniferous forest, Mission Range, northwestern Montana

www.nrfirescience.org/resource/23048

Mixed coniferous forests are widespread at middle elevations in the Northern Rocky Mountains, yet relatively little is known about their long-term vegetation and fire history. Pollen and charcoal records from Twin Lakes, in the Mission Range of northwestern Montana provide information on mixed-coniferous forest development and fire...

Author(s): Mio Alt, Dave McWethy, Rick G. Everett, Cathy L. Whitlock
Type: Document
Book or Chapter or Journal Article

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

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