

Interactions between wind and fire disturbance in forests: Competing amplifying and buffering effects

www.nrfirescience.org/resource/19280

Many studies of ecological disturbance highlight the unexpected impact that compounded disturbances have on communities. One of the well-studied mechanisms by which forest wind and fire disturbances interact is that wind damage increases flammable fuels-amplifying the effects of fire-leading to unexpected changes in vegetation...

Author(s): Jeffery B. Cannon, Suzanne K. Henderson, Michael H. Bailey, Chris J. Peterson

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Firefighting on trees

www.nrfirescience.org/resource/19151

In the Firefighter problem, introduced by Hartnell in 1995, a fire spreads through a graph while a player chooses which vertices to protect in order to contain it. In this paper, we focus on the case of trees and we consider as well the Fractional Firefighter game where the amount of protection allocated to a vertex lies between 0...

Author(s): Pierre Coupechoux, Marc Demange, David Ellison, Bertrand Jouve

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Modelling of the Radiant Heat Flux and Rate of Spread of Wildfire within the Urban Environment

www.nrfirescience.org/resource/18806

One approach to increase community resilience to wildfire impacts is the enhancement of residential construction standards in an effort to provide protective shelters for families within their own homes. Current wildfire models reviewed in this study assume fire growth is unrestricted by vegetation fuel bed geometry; the head fire...

Author(s): Greg Penney, Steven Richardson

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Assessing and reinitializing wildland fire simulations through satellite active fire data

www.nrfirescience.org/resource/19103

Large wildfires can cover millions of hectares of forest every year worldwide, causing losses in ecosystems and assets. Fire simulation and modeling provides an analytical scheme to characterize and predict fire behavior and spread in several and complex environments. Spatial dynamics of large wildfires can be analyzed using...

Author(s): Adrián Cardil, Santiago Monedero, Joaquin Ramírez, Alberto Silva

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Inferring energy incident on sensors in low-intensity surface fires from remotely sensed radiation and using it to predict tree stem injury

www.nrfirescience.org/resource/19263

Remotely sensed radiation, attractive for its spatial and temporal coverage, offers a means of inferring energy deposition in fires (e.g. on soils, fuels and tree stems) but coordinated remote and in situ (in-flame) measurements are lacking. We relate remotely sensed measurements of fire radiative energy

density (FRED) from nadir (...)

Author(s): Matthew B. Dickinson, Bret W. Butler, Andrew T. Hudak, Benjamin C. Bright, Robert L.

Kremens, Carine Klauberg

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Flame spread and burning rates through vertical arrays of wooden dowels

www.nrfirescience.org/resource/19365

Fuel loads in real-world fire scenarios often feature discrete elements, discontinuities, or inhomogeneities; however, most models for flame spread only assume a continuous, homogeneous fuel. Because discrete fuels represent a realistic scenario not yet well-modeled, it is of interest to find simple methods to model fire growth...

Author(s): Jiang Lin, Zhao Zhao, Wei Tang, Colin H. Miller, Jin-Hua Sun, Michael J. Gollner

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Origins of abrupt change? Postfire subalpine conifer regeneration declines nonlinearly with warming and drying

www.nrfirescience.org/resource/19044

Robust tree regeneration following high-severity wildfire is key to the resilience of subalpine and boreal forests, and 21st century climate could initiate abrupt change in forests if postfire temperature and soil moisture become less suitable for tree seedling establishment. Using two widespread conifer species, lodgepole pine (...)

Author(s): Winslow D. Hansen, Monica G. Turner

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Short- and long-term hydrologic controls on smouldering fire in wetland soils

www.nrfirescience.org/resource/19258

Smouldering fire vulnerability in organic-rich, wetland soils is regulated by hydrologic regimes over short (by antecedent wetness) and long (through influences on soil properties) timescales. An integrative understanding of these controls is needed to inform fire predictions and hydrologic management to reduce fire vulnerability....

Author(s): Morgan L. Schulte, Daniel L. McLaughlin, Frederic C. Wurster, J. Morgan Varner, Ryan D. Stewart, W. Mike Aust, C. Nathan Jones, Bridget Gile

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

Modelling the fire propagation from the fuel bed to the lower canopy of ornamental species used in wildland–urban interfaces

www.nrfirescience.org/resource/18999

South-eastern France is strongly affected by wildfires mostly occurring in the wildland–urban interfaces (WUIs). A WUI fire is often initiated in dead surface fuel, then can propagate to shrubs and trees when the lower canopy is close to (or touches) the ground. Whereas a previous study assessed the fire propagation from the fuel...

Author(s): L. Terrei, Aymeric Lamorlette, Anne Ganteaume

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Season of fire influences seed dispersal by wind in a serotinous obligate seeding tree

www.nrfirescience.org/resource/19343

In temperate ecosystems, fire management involving prescribed burning and wildfire suppression often causes a shift in fire season from hot and dry summer conditions to cooler, moister conditions in spring or autumn. The effects of this change on seed dispersal by wind after fire are unknown. However, calmer wind conditions and...

Author(s): Bianca Dunker, C. Michael Bull, David A. Keith, Don A. Driscoll

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Investigating effect of wind speeds on structural firebrand generation in laboratory scale experiments

www.nrfirescience.org/resource/19208

Firebrands generated from structures are known to be a source of rapid flame spread within communities in large outdoor fires, such as wildland-urban (WUI) fires, and urban fires. It is important to better understand firebrand generation mechanism to prevent structure ignitions by firebrands. Though the wind plays an important role...

Author(s): Sayaka Suzuki, Sam Manzello

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Investigating the application of a hybrid space discretisation for urban scale evacuation simulation

www.nrfirescience.org/resource/19336

The devastating effects of wildfires cannot be overlooked; these include massive resettlement of people, destruction of property and loss of lives. The considerable distances over which wild fires spread and the rates at which these fires can spread is a major concern as this places considerable challenges on the evacuation...

Author(s): Nitish Chooramun, Peter J. Lawrence, Edwin R. Galea

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Pixel-level statistical analyses of prescribed fire spread

www.nrfirescience.org/resource/19200

Wildland fire dynamics are a complex three-dimensional turbulent process. Cellular automata (CA) is an efficient tool to predict fire dynamics, but the main parameters of the method are challenging to estimate. To overcome this challenge, we compute statistical distributions of the key parameters of a CA model using infrared images...

Author(s): Miles Currie, Kevin Speer, J. Kevin Hiers, Joseph J. O'Brien, Scott L. Goodrick, Bryan Quaife

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Adjusting the rate of spread of fire simulations in real-time

www.nrfirescience.org/resource/19327

Fire simulators allow predicting fire spread and behavior and some of which in real-time. Both strategies and tactics to suppress wildland fires depend on fire analysis which is generally based on fire simulations that need to be accurate for a proper decision making. However, limitations and assumptions of the fire models and...

Author(s): Adrián Cardil, Santiago Monedero, C. A. Silva, Joaquin Ramírez

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Climate seasonality as an essential predictor of global fire activity

www.nrfirescience.org/resource/19166

Aim: Fire is a globally important disturbance that affects nearly all vegetated biomes. Previous regional studies have suggested that the predictable seasonal pattern of a climatic time series, or seasonality, might aid in the prediction of average fire activity, but it is not known whether these findings are applicable globally....

Author(s): Michael V. Saha, Todd M. Scanlon, Paolo D'Odorico

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Spatial, Temporal and Electrical Characteristics of Lightning in Reported Lightning-Initiated Wildfire Events

www.nrfirescience.org/resource/19294

Analysis was performed to determine whether a lightning flash could be associated with every reported lightning-initiated wildfire that grew to at least 4 km². In total, 905 lightning-initiated wildfires within the Continental United States (CONUS) between 2012 and 2015 were analyzed. Fixed and fire radius search methods showed that...

Author(s): Christopher J. Schultz, Nicholas J. Nauslar, J. Brent Wachter, Christopher R. Hain, Jordan R. Bell

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Predictive modeling of wildfires: a new dataset and machine learning approach

www.nrfirescience.org/resource/19155

Wildfires, whether natural or caused by humans, are considered among the most dangerous and devastating disasters around the world. Their complexity comes from the fact that they are hard to predict, hard to extinguish and cause enormous financial losses. To address this issue, many research

efforts have been conducted in order to...

Author(s): Younes Oulad Sayad, Hajar Mousannif, Hassan Al Moatassime

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

An analysis of spotting distances during the 2017 fire season in the Northern Rockies, USA

www.nrfirescience.org/resource/19277

The wildfires that burned in the Northern Rockies region of the USA during the 2017 fire season provided an opportunity to evaluate the suitability of using broadscale and temporally limited infrared data on hot spot locations to determine the influence of several environmental variables on spotting distance. Specifically,...

Author(s): Wesley G. Page, Natalie S. Wagenbrenner, Bret W. Butler, David L. Blunck

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A Cautionary Note Regarding the Use of Cumulative Burnt Areas for the Determination of Fire Danger Index Breakpoints

www.nrfirescience.org/resource/19265

Identifying the links between fire danger metrics and fire activity is critical in various operational and research fields. A common methodology consists in analysing the relationship between cumulative burnt areas and fire danger metrics. Building on this approach, it has been proposed that fuel moisture content (FMC) drives fire...

Author(s): F. Pimont, Julien Ruffault, Nicolas K. Martin-StPaul, Jean-Luc Dupuy

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Calculation of critical water flow rates for wildfire suppression

www.nrfirescience.org/resource/19381

Predicting water suppression requirements and its impacts on firefighting strategies and logistics within the urban environment has been the subject of many previous studies, however the same level of research has yet to be applied in the realm of wildfire suppression. To work towards addressing this knowledge gap, this paper...

Author(s): Greg Penney, Daryoush Habibi, Marcus Cattani, Murray Carter

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Standardized process to generate mapping of priority areas for protection against wildfires

www.nrfirescience.org/resource/19082

In the field of geographic information systems (GIS) there are certain tasks that are performed repetitively and are thus sometimes monotonous, where it is necessary to structure, integrate and analyze a series of georeferenced information, which, however, always carries the same sequence. Therefore, we developed a sequential model...

Author(s): José G. Flores Garnica, Uri David Casillas Díaz, Alejandra Macías Muro

Year Published: 2019

Type: Document

Conference Proceedings

An examination of fuel moisture, energy release and emissions during laboratory burning of live wildland fuels

www.nrfirescience.org/resource/19261

A series of small-scale laboratory fires were conducted to study the relationship between fuel type, moisture content, energy released and emissions during the combustion process of live wildland fuels. The experimental design sought to understand the effects that varying moisture content of different fire-promoting plant species...

Author(s): Nathaniel W. May, Evan Ellicott, Michael J. Gollner

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Setting wildfire evacuation triggers by coupling fire and traffic simulation models: a spatiotemporal GIS approach

www.nrfirescience.org/resource/19361

Wildfire evacuation triggers refer to prominent geographic features used in wildfire evacuation practices, and when a fire crosses a feature, an evacuation warning is issued to the communities or firefighters in the path of the fire. The existing wildfire trigger modeling methods consider evacuation time as an input from a decision...

Author(s): Dapeng Li, Thomas J. Cova, Philip E. Dennison

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Post-fire forest regeneration shows limited climate tracking and potential for drought-induced type conversion

www.nrfirescience.org/resource/19037

Disturbance such as wildfire may create opportunities for plant communities to reorganize in response to climate change. The interaction between climate change and disturbance may be particularly important in forests, where many of the foundational plant species (trees) are long-lived and where poor initial tree establishment can...

Author(s): Derek J. N. Young, Chhaya M. Werner, Kevin R. Welch, Truman P. Young, Hugh Safford, Andrew Latimer

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Scalability of a multi-physics system for forest fire spread prediction in multi-core platforms

www.nrfirescience.org/resource/19349

Advances in high-performance computing have led to an improvement in modeling multi-physics systems because of the capacity to solve complex numerical systems in a reasonable time. WRF-SFIRE is a multi-physics system that couples the atmospheric model WRF and the forest fire spread model called SFIRE with the objective of...

Author(s): Angel Farguell, Ana Cortés, Tomàs Margalef, Josep R. Miró, J. Mercader

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A web-based wildfire simulator for operational applications

www.nrfirescience.org/resource/18996

Wildfire simulators and decision support systems can assist the incident command teams in charge of tactical wildfire suppression. This paper presents a web-based wildfire simulator developed to provide real-time support for wildfire management. The paper describes the overall software architecture, the modelling chain...

Author(s): Bachisio Arca, Tiziano Ghisu, Marcello Casula, Michele Salis, Pierpaolo Duce

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Thermal characterization of firebrand piles

www.nrfirescience.org/resource/19225

The cause of the majority of structure losses in wildland-urban interface fires is ignition via firebrands, small pieces of burning material generated from burning vegetation and structures. To understand the mechanism of these losses, small-scale experiments designed to capture heating from firebrand piles and to describe the...

Author(s): Raquel S. P. Hakes, Hamed Salehizadeh, Matthew J. Weston-Dawkes, Michael J. Gollner

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Type: Document

Book or Chapter or Journal Article

Flame temperatures saturate with increasing dead material in *Ulex europaeus*, but flame duration, fuel consumption and overall flammability continue to increase

www.nrfirescience.org/resource/19340

A key determinant of wildfire behaviour is the flammability of constituent plants. One plant trait that influences flammability is the retention of dead biomass, as the low moisture content of dead material means less energy is required to achieve combustion. However, the effect of the dead-to-live ratio of fuel on plant...

Author(s): Jennifer M. Dent, Hannah L. Buckley, Audrey Lustig, Timothy J. Curran

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Flow visualization study of stationary fire whirls just downwind of meter-scale turbulent flames

www.nrfirescience.org/resource/19203

Laboratory experiments were conducted to determine whether stationary fire whirls just downwind of a meter-scale turbulent flame are the lowest part of the counter-rotating vortex pair (CVP) of the plume from the flame. Plumes from a turbulent pool fire and air flow around the fire were visualized. There are two types of stationary...

Author(s): Masahiko Shinohara, Sanae Matsushima

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Combining optimization and simulation modelling to measure the cumulative impacts of prescribed fire and wildfire on vegetation species diversity

www.nrfirescience.org/resource/19332

Growth?stage optimization (GSO) offers a new approach to biodiversity conservation in fire?prone regions by estimating the optimal distribution of vegetation growth stages that maximize a species diversity index. This optimal growth?stage structure provides managers an operational goal explicitly linked to a positive...

Author(s): Matthew P. Chick, Alan York, Holly Sitters, Julian Di Stefano, Craig R. Nitschke

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

Wildfire detection and communication-aerospace applications-trade study

www.nrfirescience.org/resource/19177

Wildfires have increased in frequency, duration, and intensity worldwide. Climate change, drought, and other factors have not only increased susceptibility to wildfires, but have also increased the duration of the season. There are a number of factors affecting wildfires: detection, speed of communication/response time, resources/...

Author(s): Setrigo W. Crawford, Kamran Eftekhari Shahroudi

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

On the merits of sparse surrogates for global sensitivity analysis of multi-scale nonlinear problems: application to turbulence and fire-spotting model in wildland fire simulators

www.nrfirescience.org/resource/19162

Many nonlinear phenomena, whose numerical simulation is not straightforward, depend on a set of parameters in a way which is not easy to predict beforehand. Wildland fires in presence of strong winds fall into this category, also due to the occurrence of firespotting. We present a global sensitivity analysis of a new sub-model for...

Author(s): Andrea Trucchia, Vera N. Egorova, Gianni Pagnini, M. C. Rochoux

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Thermocouple probe orientation affects prescribed fire behavior estimation

www.nrfirescience.org/resource/18357

Understanding the relationship between fire intensity and fuel mass is essential information for scientists and forest managers seeking to manage forests using prescribed fires. Peak burning temperature, duration of heating, and area under the temperature profile are fire behavior metrics obtained from thermocouple-datalogger...

Author(s): Thomas Adam Coates, Alex T. Chow, Donald L. Hagan, Thomas A. Waldrop, G. Geoff Wang, William C. Bridges, Mary-Frances Rogers, James H. Dozier

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Wyoming's forest resources, 2011-2015

www.nrfirescience.org/resource/18841

This report summarizes the most recent inventory of Wyoming's forests based on field data collected between 2011 and 2015. The report includes descriptive highlights and tables of area, numbers of trees, biomass, carbon, volume, growth, mortality, and removals. Most sections and tables are organized by forest type or forest-type...

Author(s): R. Justin DeRose, John D. Shaw, Sara A. Goeking, Kate Marcille, Chelsea P. McIver, James Menlove, Todd A. Morgan, Chris Witt

Year Published: 2018

Type: Document

Research Brief or Fact Sheet

Fire spread across a sloping fuel bed: flame dynamics and heat transfers

www.nrfirescience.org/resource/17311

The complex interactions between the inclined terrain and the flow generated by the fire make the slope one of the most influencing factors on fire spread. In order to gain a deeper understanding of the mechanisms involved in wildfires spreading upslope, the investigation of flow dynamics and heat transfers is fundamental. This...

Author(s): Frederic Morandini, Xavier Silvani, Jean-Luc Dupuy, Arnaud Susset

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Wildfire fuel management: network-based models and optimization of prescribed burning

www.nrfirescience.org/resource/17866

Wildfires are a common phenomenon on most continents. They have occurred for an estimated 60 million years and are part of a regular climatic cycle. Nevertheless, wildfires represent a real and continuing problem that can have a major impact on people, wildlife and the environment. The intensity and severity of wildfires can be...

Author(s): Dmytro Matsypura, Oleg A. Prokopyev, Aizat Zahar

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Advancing the Science of Wildland Fire Dynamics Using Process-Based Models

www.nrfirescience.org/resource/18136

As scientists and managers seek to understand fire behavior in conditions that extend beyond the limits of our current empirical models and prior experiences, they will need new tools that foster a more mechanistic understanding of the processes driving fire dynamics and effects. Here we suggest that process-based models are...

Author(s): Chad M. Hoffman, Carolyn Hull Sieg, Rodman Linn, William E. Mell, Russell A. Parsons, Justin P. Ziegler, J. Kevin Hiers

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Observations and predictability of gap winds in the Salmon River Canyon of Central Idaho, USA

www.nrfirescience.org/resource/18337

This work investigates gap winds in a steep, deep river canyon prone to wildland fire. The driving mechanisms and the potential for forecasting the gap winds are investigated. The onset and strength of the gap winds are found to be correlated to the formation of an along-gap pressure gradient linked to periodic development of a...

Author(s): Natalie S. Wagenbrenner, Jason M. Forthofer, Chris Gibson, Abby Indreland, Brian K. Lamb, Bret W. Butler

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

A model-based framework to evaluate alternative wildfire suppression strategies

www.nrfirescience.org/resource/16478

The complexity and demands of wildland firefighting in the western U.S. have increased over recent decades due to factors including the expansion of the wildland-urban interface, lengthening fire

seasons associated with climate change, and changes in vegetation due to past fire suppression and timber harvest. In light of these...

Author(s): Karen L. Riley, Matthew P. Thompson, Joe H. Scott, Julie W. Gilbertson-Day

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Wildland fires behaviour: wind effect versus Byram's convective number and consequences upon the regime of propagation

www.nrfirescience.org/resource/18133

With fuel moisture content and slope, wind velocity (UW) is one of the major physical parameters that most affects the behaviour of wildland fires. The aim of this short paper was to revisit the relationship between the rate of spread (ROS) and the wind velocity, through the role played by the two forces governing the trajectory of...

Author(s): D. Morvan, N. Frangieh

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Scaling nonreactive cross flow over a heated plate to simulate forest fires

www.nrfirescience.org/resource/18331

The paper reports visualization of the flow of smoke over a flat surface inside of a low-speed wind tunnel. A heating plate flush mounted on the wind tunnel floor simulated a spreading line fire that produces uniform heat flux under constant wind speed condition. A paper-thin cloth was soaked with commercially available Vaseline and...

Author(s): Nikolay Gustenyov, Nelson K. Akafuah, Ahmad Salaimah, Mark A. Finney, Sara S. McAllister, Kozo Saito

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Human-related ignitions concurrent with high winds promote large wildfires across the USA

www.nrfirescience.org/resource/17823

Large wildfires (>40 ha) account for the majority of burned area across the contiguous United States (US) and appropriate substantial suppression resources. A variety of environmental and social factors influence wildfire growth and whether a fire overcomes initial attack efforts and becomes a large wildfire. However, little is...

Author(s): John T. Abatzoglou, Jennifer Balch, Bethany A. Bradley, Crystal A. Kolden

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fuel dynamics after a bark beetle outbreak impacts experimental fuel treatments

www.nrfirescience.org/resource/18779

Background: Fuel reduction treatments have been widely implemented across the western US in recent decades for both fire protection and restoration. Although research has demonstrated that combined thinning and burning effectively reduces crown fire potential in the few years immediately following treatment, little research has...

Author(s): Justin S. Crotteau, Christopher R. Keyes, Sharon M. Hood, David L.R. Affleck, Anna Sala

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Improving Fire Behaviour Data Obtained from Wildfires

www.nrfirescience.org/resource/17190

Organisations that manage wildfires are expected to deliver scientifically defensible decisions. However, the limited availability of high quality data restricts the rate at which research can advance. The nature of wildfires contributes to this: they are infrequent, complex events, occur with limited notice and are of relatively...

Author(s): Alexander I. Filkov, Thomas J. Duff, Trent D. Penman

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Simulation of fuel bed ignition by wildland firebrands

www.nrfirescience.org/resource/18061

A 3-D mathematical model of fuel bed (FB) ignition initiated by glowing firebrands originating during wildland fires is proposed. In order to test and verify the model, a series of experiments was conducted to determine the FB ignition time by a single pine bark and twig firebrand (*Pinus sylvestris*). Irrespective of the pine bark...

Author(s): O. V. Matvienko, Denis P. Kasymov, Alexander I. Filkov, O. I. Daneyko, D. A. Gorbatov

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Boundary layer instabilities in mixed convection and diffusion flames with an unheated starting length

www.nrfirescience.org/resource/18325

The following study examines the role of streaklike coherent structures in mixed convection via a horizontal heated boundary layer possessing an unheated starting length. The three-dimensionality of flows in this configuration, which is regularly encountered in practical scenarios, has been experimentally probed using non-invasive...

Author(s): Colin H. Miller, Wei Tang, Evan Sluder, Mark A. Finney, Sara S. McAllister, Jason M. Forthofer, Michael J. Gollner

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Data Descriptor: TerraClimate, a high-resolution global dataset of monthly climate and climatic water balance from 1958-2015

www.nrfirescience.org/resource/17794

We present TerraClimate, a dataset of high-spatial resolution ($1/24^\circ$, ~4-km) monthly climate and climatic water balance for global terrestrial surfaces from 1958–2015. TerraClimate uses climatically aided interpolation, combining high-spatial resolution climatological normals from the WorldClim dataset, with coarser resolution...

Author(s): John T. Abatzoglou, Solomon Z. Dobrowski, Sean A. Parks, Katherine C. Hegewisch

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

A comparison of the US National Fire Danger Rating System (NFDRS) with recorded fire

occurrence and final fire size

www.nrfirescience.org/resource/17126

Most previous research has assessed the ability of the National Fire Danger Rating System (NFDRS) to portray fire activity at either single sites or on small spatial scales, despite it being a nation-wide system. This study seeks to examine the relationships between a set of NFDRS fire danger indices (Fire Danger Ratings, Staffing...

Author(s): Nicholas G. Walding, Hywel T. P. Williams, Scott McGarvie, Claire M. Belcher

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Conditional Performance Evaluation: Using Wildfire Observations for Systematic Fire Simulator Development

www.nrfirescience.org/resource/17657

Faster than real-time wildland fire simulators are being increasingly adopted by land managers to provide decision support for tactical wildfire management and assist with strategic risk planning. These simulators are typically based on simple forward rate-of-spread algorithms that were predominantly developed using observations of...

Author(s): Thomas J. Duff, Jane G. Cawson, Brett Cirulis, Petter Nyman, Gary J. Sheridan, Kevin G. Tolhurst

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Quantifying wildfire growth rates using smoke plume observations derived from weather radar

www.nrfirescience.org/resource/18054

Fast-moving wildfires can result in substantial losses of infrastructure, property and life. During such events, real-time intelligence is critical for managing firefighting activities and public safety. The ability of fixed-site weather radars to detect the plumes from fires has long been recognized; however, quantitative methods...

Author(s): Thomas J. Duff, Derek M. Chong, Trent D. Penman

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Applications of the United States Forest Inventory and Analysis dataset: a review and future directions

www.nrfirescience.org/resource/18287

The United States Forest Inventory and Analysis (FIA) program has been monitoring national forest resources in the United States for over 80 years; presented here is a synthesis of research applications for FIA data. A review of over 180 publications that directly utilize FIA data is broken down into broad categories of application...

Author(s): Wade T. Tinkham, Patrick R. Mahoney, Andrew T. Hudak, Grant M. Domke, Michael J. Falkowski, Christopher W. Woodall, Alistair M. S. Smith

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fire behaviour in masticated forest fuels: lab and prescribed fire experiments

www.nrfirescience.org/resource/17949

Managers masticate fuels to reduce extreme fire hazards, but the effect on fire behaviour within the

resulting compact fuelbeds is poorly understood. We burned 54 masticated fuelbeds in laboratory experiments one and two growing seasons after mastication and 75 masticated fuelbeds in prescribed fire experiments one growing season...

Author(s): Zachary D. Lyon, Penelope Morgan, Camille Stevens-Rumann, Aaron M. Sparks, Robert F. Keefe, Alistair M. S. Smith

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Some requirements for simulating wildland fire behavior using insight from coupled weather-wildland fire models

www.nrfirescience.org/resource/17104

A newer generation of models that interactively couple the atmosphere with fire behavior have shown an increased potential to understand and predict complex, rapidly changing fire behavior. This is possible if they capture intricate, time-varying microscale airflows in mountainous terrain and fire-atmosphere feedbacks. However, this...

Author(s): Janice L. Coen

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Some Requirements for Simulating Wildland Fire Behavior Using Insight from Coupled Weather—Wildland Fire Models

www.nrfirescience.org/resource/17610

A newer generation of models that interactively couple the atmosphere with fire behavior have shown an increased potential to understand and predict complex, rapidly changing fire behavior. This is possible if they capture intricate, time-varying microscale airflows in mountainous terrain and fire-atmosphere feedbacks. However, this...

Author(s): Janice L. Coen

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

The Hot-Dry-Windy Index: A New Fire Weather Index

www.nrfirescience.org/resource/18025

Fire weather indices are commonly used by fire weather forecasters to predict when weather conditions will make a wildland fire difficult to manage. Complex interactions at multiple scales between fire, fuels, topography, and weather make these predictions extremely difficult. We define a new fire weather index called the Hot-Dry-...

Author(s): Alan F. Srock, Joseph J. Charney, Brian E. Potter, Scott L. Goodrick

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Pre-fire drought and competition mediate post-fire conifer mortality in western U.S. National Parks

www.nrfirescience.org/resource/18275

Tree mortality is an important outcome of many forest fires. Extensive tree injuries from fire may lead directly to mortality, but environmental and biological stressors may also contribute to tree death. However, there is little evidence showing how the combined effects of two common stressors, drought and competition, influence...

Author(s): Phillip J. van Mantgem, Donald A. Falk, Emma C. Williams, Adrian J. Das, Nathan L. Stephenson
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Analysis of the physical processes associated with junction fires at laboratory and field scales

www.nrfirescience.org/resource/16747

Junction fires, which involve the merging of two linear fire fronts intersecting at a small angle, are associated with very intense fire behaviour. The dynamic displacement of the intersection point of the two lines and the flow along the symmetry plane of the fire are analysed for symmetric boundary conditions. It is observed that...

Author(s): J. R. Raposo, Domingos Xavier Viegas, X. Xie, Miguel Almeida, A. R. Figueiredo, L. Porto, J. Sharples
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Simulation study of grass fire using a physics-based model: striving towards numerical rigour and the effect of grass height on the rate of spread

www.nrfirescience.org/resource/18733

Grid-independent rate of spread results from a physics-based simulation are presented. Previously, such a numerical benchmark has been elusive owing to computational restrictions. The grid-converged results are used to systematically construct correlations between the rate of spread (RoS) and both wind speed and grass height,...

Author(s): K. A. M. Moinuddin, W. Mell
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Embracing complexity to advance the science of wildland fire behavior

www.nrfirescience.org/resource/17920

Wildland fire behavior research has largely focused on the steady-state interactions between fuels and heat fluxes. Contemporary research is revealing new questions outside the bounds of this simplified approach. Here, we explore the complex interactions taking place beyond steady-state assumptions through acknowledging the...

Author(s): Kara M. Yedinak, Eva K. Strand, J. Kevin Hiers, J. Morgan Varner
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

The Rothermel surface fire spread model and associated developments: A comprehensive explanation

www.nrfirescience.org/resource/17537

The Rothermel surface fire spread model, with some adjustments by Frank A. Albini in 1976, has been used in fire and fuels management systems since 1972. It is generally used with other models including fireline intensity and flame length. Fuel models are often used to define fuel input parameters. Dynamic fuel models use equations...

Author(s): Patricia L. Andrews
Year Published: 2018
Type: Document

Technical Report or White Paper

The Haines Index – it's time to revise it or replace it

www.nrfirescience.org/resource/18014

The Haines Index is used in wildland fire management to evaluate the potential for 'large and/or erratic' fire behaviour. Published in 1988 as the Lower Atmospheric Severity Index, it was widely adopted and has become popular among fire managers, especially in the United States. Meteorologists have questioned its validity,...

Author(s): Brian E. Potter

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/18259

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

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

Year Published: 2018

Type: Document

Technical Report or White Paper

Flame-front rate of spread estimates for moderate scale experimental fires are strongly influenced by measurement approach

www.nrfirescience.org/resource/17768

Understanding wildfire rate of spread (RoS) is often a key objective of many fire behavior modelling and measurement exercises. Using instrumented moderate scale laboratory burns we provide an assessment of eight different methods of flame front RoS determination, including visible imagery (VIS) analysis techniques, use of...

Author(s): Joshua M. Johnston, Melanie J. Wheatley, Martin J. Wooster, Ronan Paugam, G. Matt Davies, Kaitlin A. DeBoer

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Random subset feature selection for ecological niche models of wildfire activity in western North America

www.nrfirescience.org/resource/17909

Variable selection in ecological niche modelling can influence model projections to a degree comparable to variations in future climate scenarios. Consequently, it is important to select feature (variable) subsets for optimizing model performance and characterizing variability. We utilize a novel random subset feature selection...

Author(s): James L. Tracy, Antonio Trabucco, A. Michelle Lawing, J. Tomasz Giermakowski, Maria D. Tchakerian, Gail M. Drus, Robert N. Coulson

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Biological and geophysical feedbacks with fire in the Earth system

www.nrfirescience.org/resource/17407

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

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

The weather conditions for desired smoke plumes at a FASMEE burn site

www.nrfirescience.org/resource/18365

Weather is an important factor that determines smoke development, which is essential information for planning smoke field measurements. This study identifies the synoptic systems that would favor to produce the desired smoke plumes for the Fire and Smoke Model Evaluation Experiment (FASMEE). Daysmoke and PB-Piedmont (PB-P) models...

Author(s): Yongqiang Liu, Scott L. Goodrick, Gary Achtemeier

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Decreasing fire season precipitation increased recent western US forest wildfire activity

www.nrfirescience.org/resource/18161

Western United States wildfire increases have been generally attributed to warming temperatures, either through effects on winter snowpack or summer evaporation. However, near-surface air temperature and evaporative demand are strongly influenced by moisture availability and these interactions and their role in regulating fire...

Author(s): Zachary A. Holden, Alan Swanson, Charles H. Luce, William Matt Jolly, Marco Maneta, Jared W. Oyler, Dyer A. Warren, Russell A. Parsons, David L.R. Affleck

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fire Control and the 2015 Canyon Creek Complex Fire

www.nrfirescience.org/resource/17757

Accordingly, the average annual risk of a wildfire destroying a home in the WUI was less than 1 onehundredth of 1 percent. Of course, the risk is much higher in fire-prone parts of the South and West, but so are expectations that government firefighters will come to the rescue (NWCG 2001; Pyne 2015; Stein and others 2013). Confident...

Author(s): Hutch Brown

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Interpolation framework to speed up near-surface wind simulations for data-driven wildfire applications

www.nrfirescience.org/resource/17889

Local wind fields that account for topographic interaction are a key element for any wildfire spread simulator. Currently available tools to generate near-surface winds with acceptable accuracy do not meet the tight time constraints required for data-driven applications. This article presents the specific problem of data-driven...

Author(s): O. Rios, W. Jahn, Elsa Pastor, M.M. Valero, E. Planas

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/18361

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

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

Year Published: 2018

Type: Document

Technical Report or White Paper

Natural Areas Association Fire Compendium 2

www.nrfirescience.org/resource/18853

The Natural Areas Association Fire Compendium 2 compiles articles published in the Natural Areas Journal from 2010 to 2017. This is a supplement to the NAA Fire Compendium that was compiled in 2010 for articles published from 1983 to 2009. Like the first compendium, articles in the Fire Compendium 2 focus on fire ecology and...

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

An improved non-equilibrium model for the ignition of living fuel

www.nrfirescience.org/resource/17342

This paper deals with the modelling of living fuel ignition, suggesting that an accurate description using a multiphase formulation requires consideration of a thermal disequilibrium within the vegetation particle, between the solid (wood) and the liquid (sap). A simple model at particle scale is studied to evaluate the flux...

Author(s): A. Lamorlette, M. El Houssami, D. Morvan

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

An Empirical Model for the Effect of Wind on Fire Spread Rate

www.nrfirescience.org/resource/18138

Predicting wind-driven rate of fire spread (RoS) has been the aim of many studies. Still, a field-tested model for general use, regardless of vegetation type, is currently lacking. We develop an empirical model for wind-aided RoS from laboratory fires (n = 216), assuming that it depends mainly on fire-

released energy and on the...

Author(s): Carlos G. Rossa, Paulo M. Fernandes

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Effect of woody debris on the rate of spread of surface fires in forest fuels in a combustion wind tunnel

www.nrfirescience.org/resource/17730

The treatment of the contribution of woody debris (WD, such as branches or small logs >6–50 mm diameter) to the rate of forward spread of a fire in current operational forest fire spread models is inconsistent. Some models do not take into account this fuel at all (i.e. only consider the combustion of fine fuels (< 6 mm...

Author(s): Andrew L. Sullivan, N. C. Surawski, Daniel A. Crawford, Richard J. Hurley, Liubov Volkova, Christopher J. Weston, Carl P. Meyer

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

Existence of solution of a forest fire spread model

www.nrfirescience.org/resource/17872

We consider a wildfire spread model represented by the system (1). We use results from the theory of Hamilton-Jacobi equations to prove that there exists a classical solution of (1) for any $(\tau, t) \in \mathbb{R} \times (0, T)$ and some $T > 0$ and satisfies particular initial conditions. We also use the method of characteristics...

Author(s): Michal Feřkan, Július Pařuta

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fire behavior in chaparral—Evaluating flame models with laboratory data

www.nrfirescience.org/resource/18347

Flame and mass loss data for chaparral, a mixture of shrub plants from the Mediterranean climate zone of southwestern North America, from five previously reported experiments were used to evaluate several published models relating flame characteristics to mass loss and heat release rates. These data are unique with fuel moisture...

Author(s): David R. Weise, Thomas H. Fletcher, Wesley Cole, Shankar M. Mahalingam, Xiangyang Zhou, Lulu Sun, Jing Li

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

A VIIRS direct broadcast algorithm for rapid response mapping of wildfire burned area in the western United States

www.nrfirescience.org/resource/18835

We present a direct broadcast (DB) rapid response burned area mapping algorithm for Visible Infrared Imaging Radiometer Suite (VIIRS) data that combines products driven by the spectral signal of fire-affected areas from both emissive and reflective spectral bands. The algorithm processes VIIRS infrared M-bands (750 m) using...

Author(s): Shawn P. Urbanski, Bryce L. Nordgren, Carl Albury, Brenna Schwert, David Peterson, Brad Quayle, Wei Min Hao

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Framework for submodel improvement in wildfire modeling

www.nrfirescience.org/resource/17259

An experimental and numerical study was carried out to assess the performance of the different submodels and parameters used to describe the burning dynamics of wildfires. A multiphase formulation was used and compared to static fires of dried pitch pine needles of different bulk densities. The samples were exposed to an external...

Author(s): M. El Houssami, A. Lamorlette, D. Morvan, Rory Hadden, Albert Simeoni

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Incorporating convective feedback in wildfire simulations using pyrogenic potential

www.nrfirescience.org/resource/19107

Modelling the dynamics of wildfires is very computationally challenging. Although three-dimensional computational fluid dynamics (CFD) models have been successfully applied to wildfires, the computational time required makes them currently impractical for operational usage. In this study, we develop a two-dimensional propagation...

Author(s): J. E. Hilton, Andrew L. Sullivan, W. Swedosh, J. Sharples, C. Thomas

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Fuel mass and stand structure 13 years after logging of a severely burned ponderosa pine forest in northeastern Oregon, U.S.A

www.nrfirescience.org/resource/18135

Stand structure and fuel mass were measured in 2011, 13 years after logging of a seasonally dry, ponderosa pine-dominated forest that had burned severely in the 1996 Summit Wildfire, Malheur National Forest, northeastern Oregon, U.S.A. Data are compared to those taken one year after post-fire logging (1999), and analyzed in the...

Author(s): James D. McIver, Roger D. Ottmar

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Modeling thinning effects on fire behavior with STANDFIRE

www.nrfirescience.org/resource/18335

Key message: We describe a modeling system that enables detailed, 3D fire simulations in forest fuels. Using data from three sites, we analyze thinning fuel treatments on fire behavior and fire effects and compare outputs with a more commonly used model. Context: Thinning is considered useful in altering fire behavior, reducing fire...

Author(s): Russell A. Parsons, F. Pimont, Lucas Wells, Greg M. Cohn, William Matt Jolly, Francois P. deColigny, Eric Rigolot, Jean-Luc Dupuy, William E. Mell, Rodman Linn

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Corrigendum 1 (published 19 Sep 2018) and Corrigendum 2 (published 11 Dec 2018) to: Wildland fires behaviour: wind effect versus Byram's convective number and consequences upon the regime of propagation

www.nrfirescience.org/resource/18783

The authors wish to acknowledge that the values of the rate of spread for the grass fires in Fig. 2 (blue circles) were extracted the following reference: Cheney NP, Gould JS, Catchpole WR (1998) Prediction of fire spread in grasslands. International Journal of Wildland Fire 8, 1–13. doi:10.1071/WF9980001

Additionally, the authors...

Author(s): D. Morvan, N. Frangieh

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

An evaluation of NDFD weather forecasts for wildland fire behavior prediction

www.nrfirescience.org/resource/18326

Wildland fire managers in the United States currently utilize the gridded forecasts from the National Digital Forecast Database (NDFD) to make fire behavior predictions across complex landscapes during large wildfires. However, little is known about the NDFDs performance in remote locations with complex topography for weather...

Author(s): Wesley G. Page, Natalie S. Wagenbrenner, Bret W. Butler, Jason M. Forthofer, Chris Gibson

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Use of ordinary kriging and Gaussian conditional simulation to interpolate airborne fire radiative energy density estimates [Corrigendum]

www.nrfirescience.org/resource/18771

Fire radiative energy density (FRED, J m⁻²) integrated from fire radiative power density (FRPD, W m⁻²) observations of landscape-level fires can present an undersampling problem when collected from fixed-wing aircraft. In the present study, the aircraft made multiple passes over the fire at ~3 min intervals, thus failing to observe...

Author(s): C. Klauberg, Andrew T. Hudak, Benjamin C. Bright, Luigi Boschetti, Matthew B. Dickinson, Robert L. Kremens, C. A. Silva

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Interactions between large high-severity fires and salvage logging on a short return interval reduce the regrowth of fire-prone serotinous forests

www.nrfirescience.org/resource/17175

New fire disturbance regimes under accelerating global environmental change can have unprecedented consequences for ecosystem resilience, lessening ecosystem natural regeneration. In the Mediterranean Basin, firedependent obligate seeder forests that are prone to increasingly frequent stand-replacing fires and then salvaged logged...

Author(s): Angela Taboada, Víctor Fernández-García, Elena Marcos, Leonor Calvo

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Modeling Fire Pathways in Montane Grassland?Forest Ecotones

www.nrfirescience.org/resource/17667

Fire plays a key role in regulating the spatial interactions between adjacent vegetation types from the stand to the landscape scale. Fire behavior modeling can facilitate the understanding of these interactions and help managers restore or maintain fire's natural role. The Valles Caldera National Preserve (VALL), in the Jemez...

Author(s): Joshua L. Conver, Donald A. Falk, Stephen R. Yool, Robert R. Parmenter

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Dimensional analysis on forest fuel bed fire spread

www.nrfirescience.org/resource/16440

A dimensional analysis was performed to correlate the fuel bed fire rate of spread data previously reported in the literature. Under wind condition, six pertinent dimensionless groups were identified, namely dimensionless fire spread rate, dimensionless fuel particle size, fuel moisture content, dimensionless fuel bed depth or...

Author(s): Jiann C. Yang

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/18056

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

Author(s): Baburam Rijal

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Surface to crown transition

www.nrfirescience.org/resource/18321

Wildland fires are generally classified into three categories: ground fires, surface fires, and crown fires (Fig. 1). Soils are described worldwide by the various layers that have formed or been deposited on top of bedrock or other parent material. In wildland areas, the layer closest to the surface is composed of organic material...

Author(s): David R. Weise, J. Cobian-Iniguez, M. Princevac

Year Published: 2018

Type: Document
Research Brief or Fact Sheet

Optimizing smoke and plume rise modeling approaches at local scales

www.nrfirescience.org/resource/17793

Heating from wildfires adds buoyancy to the overlying air, often producing plumes that vertically distribute fire emissions throughout the atmospheric column over the fire. The height of the rising wildfire plume is a complex function of the size of the wildfire, fire heat flux, plume geometry, and atmospheric conditions, which can...

Author(s): Derek V. Mallia, Adam K. Kochanski, Shawn P. Urbanski, John C. Lin

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Live Fuel Moisture Content: The 'Pea Under the Mattress' of Fire Spread Rate Modeling?

www.nrfirescience.org/resource/18760

Currently, there is a dispute on whether live fuel moisture content (FMC) should be accounted for when predicting a real-world fire-spread rate (RoS). The laboratory and field data results are conflicting: laboratory trials show a significant effect of live FMC on RoS, which has not been convincingly detected in the field. It has...

Author(s): Carlos G. Rossa, Paulo M. Fernandes

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fire behavior and ecological effects of burning masticated forest fuels

www.nrfirescience.org/resource/17950

Managers masticate fuels to redistribute fuels within a forest. They use machines to chip and shred whole trees, shrubs, and herbaceous vegetation to reduce the fuels in the canopy and move them to the forest floor. Fires burning in the dense, compact fuelbeds resulting from mastication often burn with lower intensity and shorter...

Author(s): Penelope Morgan, Alistair M. S. Smith, Aaron M. Sparks, Camille Stevens-Rumann, Pamela G. Sikkink, Zachary D. Lyon, Robert F. Keefe

Year Published: 2018

Type: Document

Research Brief or Fact Sheet

How do weather and terrain contribute to firefighter entrapments in Australia?

www.nrfirescience.org/resource/17122

Adverse weather conditions and topographic influences are suspected to be responsible for most entrapments of firefighters in Australia. A lack of temporally and spatially coherent set of data however, hinders a clear understanding of the contribution of each weather type or terrain driver on these events. We investigate coronial...

Author(s): Sébastien Lahaye, J. Sharples, Stuart Matthews, Simon Heemstra, Owen F. Price, Rachel Badlan

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

The Cooney Ridge Fire Experiment: An Early Operation to Relate Pre-, Active, and Post-Fire

Field and Remotely Sensed Measurements

www.nrfirescience.org/resource/17615

The Cooney Ridge Fire Experiment conducted by fire scientists in 2003 was a burnout operation supported by a fire suppression crew on the active Cooney Ridge wildfire incident. The fire experiment included measurements of pre-fire fuels, active fire behavior, and immediate post-fire effects. Heat flux measurements collected at...

Author(s): Andrew T. Hudak, Patrick H. Freeborn, Sarah A. Lewis, Sharon M. Hood, Helen Y. Smith, Colin C. Hardy, Robert J. Kremens, Bret W. Butler, Casey Teske, Robert G. Tissell, Lloyd P. Queen, Bryce L. Nordgren, Benjamin C. Bright, Penelope Morgan, Philip J. Riggan, Lee Macholz, Leigh B. Lentile, Jim Riddering, Edward E. Mathews

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Assessing the Influence of Roads on Fire Ignition: Does Land Cover Matter?

www.nrfirescience.org/resource/18030

In human-affected fire environments, assessing the influence of human activities on the spatial distribution of wildfire ignitions is of paramount importance for fire management planning. Previous studies have shown that roads have significant effects on fire ignition. However, since different land cover classes are subject to...

Author(s): Carlo Ricotta, Sofia Bajocco, Daniela Guglietta, Marco Conedera

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Avian demographic responses to drought and fire: a community?level perspective

www.nrfirescience.org/resource/18277

Drought stress is an important consideration for wildlife in arid and semiarid regions under climate change. Drought can impact plant and animal populations directly, through effects on their physiology, as well as indirectly through effects on vegetation productivity and resource availability, and by creating conditions conducive...

Author(s): James F. Saracco, Stephen M. Fettig, George L. San Miguel, David W. Mehlman, Brent E. Thompson, Steven K. Albert

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

It matters when you measure it: using snow-cover Normalised Difference Vegetation Index (NDVI) to isolate post-fire conifer regeneration

www.nrfirescience.org/resource/18734

Landsat Normalized Difference Vegetation Index (NDVI) is commonly used to monitor post-fire green-up; however, most studies do not distinguish new growth of conifer from deciduous or herbaceous species, despite potential consequences for local climate, carbon and wildlife. We found that dual season (growing and snow cover) NDVI...

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

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

An attacker-defender model for analyzing the vulnerability of initial attack in wildfire suppression

www.nrfirescience.org/resource/17925

Wildfire managers use initial attack (IA) to control wildfires before they grow large and become difficult to suppress. Although the majority of wildfire incidents are contained by IA, the small percentage of fires that escape IA causes most of the damage. Therefore, planning a successful IA is very important. In this article, we...

Author(s): Eghbal Rashidi, Hugh R. Medal, Aaron Hoskins

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Appropriate Sample Sizes for Monitoring Burned Pastures in Sagebrush Steppe: How Many Plots are Enough, and Can One Size Fit All?

www.nrfirescience.org/resource/18950

Statistically defensible information on vegetation conditions is needed to guide rangeland management decisions following disturbances such as wildfire, often for heterogeneous pastures. Here we evaluate sampling effort needed to achieve a robust statistical threshold using > 2 000 plots sampled on the 2015 Soda Fire that burned...

Author(s): Cara Applestein, Matthew J. Germino, David S. Pilliod, Matthew R. Fisk, Robert S. Arkle

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Corrigendum to: Use of ordinary kriging and Gaussian conditional simulation to interpolate airborne fire radiative energy density estimates

www.nrfirescience.org/resource/18023

Fire radiative energy density (FRED, $J\ m^{-2}$) integrated from fire radiative power density (FRPD, $W\ m^{-2}$) observations of landscape-level fires can present an undersampling problem when collected from fixed-wing aircraft. In the present study, the aircraft made multiple passes over the fire at ~3 min intervals, thus failing...

Author(s): C. Klauberg, Andrew T. Hudak, Benjamin C. Bright, Luigi Boschetti, Matthew B. Dickinson, Robert L. Kremens, C. A. Silva

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Tree water balance drives temperate forest responses to drought

www.nrfirescience.org/resource/18273

Intensifying drought is increasingly linked to global forest diebacks. Improved understanding of drought impacts on individual trees has provided limited insight into drought vulnerability in part because tree moisture access and depletion is difficult to quantify. In forests, moisture reservoir depletion occurs through water use by...

Author(s): A. B. Berdanier, J. S. Clark

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Characterizing fire behavior from laboratory burns of multi-aged, mixed-conifer masticated fuels in the western United States

www.nrfirescience.org/resource/17916

Mastication is the process of chipping or shredding components of the tree canopy or above-ground vegetation to reduce the canopy, alter fire spread rates, and reduce crown fire potential. Mastication as

a fuel treatment, either alone or in combination with prescribed fire, has been the subject of much research. This research has...

Author(s): Faith A. Heinsch, Pamela G. Sikkink, Helen Y. Smith, Molly L. Retzlaff

Year Published: 2018

Type: Document

Technical Report or White Paper

Optimizing precipitation thresholds for best correlation between dry lightning and wildfires

www.nrfirescience.org/resource/17429

This work examines how to adjust the definition of 'dry lightning' in order to optimize the correlation between dry lightning flash count and the climatology of large (>400 km²) lightning-ignited wildfires over the contiguous United States (CONUS). The National Lightning Detection Network™ and National Centers for...

Author(s): Brian Vant-Hull, Tollisha Thompson, William Koshak

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Evaluating the influence of prior burn mosaics on subsequent wildfire behavior, severity, and fire management options - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/18369

The Reburn Project was motivated by a need to better understand wildfires as fuel reduction treatments and to assess the impacts of decades of wildland fire suppression activities on forested landscapes. Our study examined three areas, located in the inland Pacific Northwest, central Idaho and interior British Columbia. Each area...

Author(s): Susan J. Prichard, Paul F. Hessburg, Robert W. Gray, Nicholas A. Povak, R. Brion Salter, Camille Stevens-Rumann, Penelope Morgan

Year Published: 2018

Type: Document

Technical Report or White Paper

Modeling Fire Pathways in Montane Grassland-Forest Ecotones

www.nrfirescience.org/resource/18013

Fire plays a key role in regulating the spatial interactions between adjacent vegetation types from the stand to the landscape scale. Fire behavior modeling can facilitate the understanding of these interactions and help managers restore or maintain fire's natural role. The Valles Caldera National Preserve (VALL), in the Jemez...

Author(s): Joshua L. Conner, Donald A. Falk, Stephen R. Yool, Robert R. Parmenter

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fuel and topographic influences on wildland firefighter burnover fatalities in Southern California

www.nrfirescience.org/resource/18209

Previous reviews of wildfires where a fatal firefighter burnover occurred have found that the incidents usually share similar characteristics in terms of the fire environment, such as steep slopes and complex topography (e.g. box canyons). Despite these similarities, systematic identification and communication of the locations where...

Author(s): Wesley G. Page, Bret W. Butler

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Switching on the Big Burn of 2017

www.nrfirescience.org/resource/17761

Fuel, aridity, and ignition switches were all on in 2017, making it one of the largest and costliest wildfire years in the United States (U.S.) since national reporting began. Anthropogenic climate change helped flip on some of these switches rapidly in 2017, and kept them on for longer than usual. Anthropogenic changes to the fire...

Author(s): Jennifer Balch, Tania L. Schoennagel, A. Park Williams, John T. Abatzoglou, Megan E. Cattau, Nathan Mietkiewicz, Lise A. St. Denis

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Quantitative evaluation of the Haines Index's ability to predict fire growth events

www.nrfirescience.org/resource/17897

The Haines Index is intended to provide information on how midtropospheric conditions could lead to large or erratic wildfires. Only a few studies have evaluated its performance and those are primarily single fire studies. This study looks at 47 fires that burned in the United States from 2004 to 2017, with sizes from 9000 ha up to...

Author(s): Brian E. Potter

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Defining Extreme Wildfire Events: Difficulties, Challenges, and Impacts

www.nrfirescience.org/resource/17072

Every year worldwide some extraordinary wildfires occur, overwhelming suppression capabilities, causing substantial damages, and often resulting in fatalities. Given their increasing frequency, there is a debate about how to address these wildfires with significant social impacts, but there is no agreement upon terminology to...

Author(s): Fantina Tedim, Vittorio Leone, Malik Amraoui, Christophe Bouillon, Michael R. Coughlan, Giuseppe M. Delogu, Paulo M. Fernandes, Carmen Ferreira, Sarah M. McCaffrey, Tara K. McGee, Joana Parente, Douglas Paton, Mário G. Pereira, Luís M. Ribeiro, Domingos Xavier Viegas, Gavriil Xanthopoulos

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Landscape Topoedaphic Features Create Refugia from Drought and Insect Disturbance in a Lodgepole and Whitebark Pine Forest

www.nrfirescience.org/resource/18867

Droughts and insect outbreaks are primary disturbance processes linking climate change to tree mortality in western North America. Refugia from these disturbances—locations where impacts are less severe relative to the surrounding landscape—may be priorities for conservation, restoration, and monitoring. In this study,...

Author(s): Jennifer Cartwright

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

The sensitivity of US wildfire occurrence to pre-season soil moisture conditions across ecosystems

www.nrfirescience.org/resource/17379

It is generally accepted that year-to-year variability in moisture conditions and drought are linked with increased wildfire occurrence. However, quantifying the sensitivity of wildfire to surface moisture state at seasonal lead-times has been challenging due to the absence of a long soil moisture record with the appropriate...

Author(s): Daniel Jensen, John T. Reager, Brittany Zajic, Nick Rousseau, Matthew Rodell, Everett Hinkley

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Deconstructing the King Megafire

www.nrfirescience.org/resource/17735

Hypotheses that megafires ? very large, high impact fires ? are caused by either climate effects such as drought or fuel accumulation due to fire exclusion with accompanying changes to forest structure have long been alleged and guided policy but their physical basis remains untested. Here, unique airborne observations and...

Author(s): Janice L. Coen, E. Natasha Stavros, Jo Ann Fites-Kaufman

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Lab-scale observations of flame attachment on slopes with implications for firefighter safety zones

www.nrfirescience.org/resource/17884

The Coanda effect is the phenomenon in which a jet entering quiescent fluid attaches to a nearby solid object due to inhibited entrainment of ambient fluid near the solid. Little is known about the influence of the Coanda effect on wildland fire behavior. Specifically, there is a lack of knowledge regarding how the flame attachment...

Author(s): Jonathan R. Gallacher, Brad Ripa, Bret W. Butler, Thomas H. Fletcher

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Network analysis of wildfire transmission and implications for risk governance

www.nrfirescience.org/resource/16507

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

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Hierarchical 3D fuel and consumption maps to support physics-based fire modeling - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17007

To meet the data requirements of physics-based fire models and FASMEE objectives, traditional fuel and consumption measures need to be integrated with spatially explicit, three-dimensional data. One of the challenges of traditional fuel measurement techniques is that they must either remove or alter the fuels that are a primary...

Author(s): Andrew T. Hudak, Susan J. Prichard, Robert E. Keane, E. Louise Loudermilk, Russell A. Parsons, Carl A. Seielstad, Eric Rowell, Nick Skowronski

Year Published: 2017

Type: Document

Technical Report or White Paper

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

www.nrfirescience.org/resource/17228

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

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

An improved canopy wind model for predicting wind adjustment factors and wildland fire behavior

www.nrfirescience.org/resource/16445

The ability to rapidly estimate wind speed beneath a forest canopy or near the ground surface in any vegetation is critical to practical wildland fire behavior models. The common metric of this wind speed is the "mid-flame" wind speed, UMF. However, the existing approach for estimating UMF has some significant shortcomings....

Author(s): William J. Massman, Jason M. Forthofer, Mark A. Finney

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

Simulated fire behaviour in young, postfire lodgepole pine forests

www.nrfirescience.org/resource/16291

Early-seral forests are expanding throughout western North America as fire frequency and annual area burned increase, yet fire behaviour in young postfire forests is poorly understood. We simulated fire

behaviour in 24-year-old lodgepole pine (*Pinus contorta* var. *latifolia*) stands in Yellowstone National Park, Wyoming, United States...

Author(s): Kellen N. Nelson, Monica G. Turner, William H. Romme, Daniel B. Tinker

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Human exposure and sensitivity to globally extreme wildfire events

www.nrfirescience.org/resource/15038

Extreme wildfires have substantial economic, social and environmental impacts, but there is uncertainty whether such events are inevitable features of the Earth's fire ecology or a legacy of poor management and planning. We identify 478 extreme wildfire events defined as the daily clusters of fire radiative power from MODIS,...

Author(s): David M. J. S. Bowman, Grant J. Williamson, John T. Abatzoglou, Crystal A. Kolden, Mark A. Cochrane, Alistair M. S. Smith

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

The normal fire environment—Modeling environmental suitability for large forest wildfires using past, present, and future climate normals

www.nrfirescience.org/resource/16643

We modeled the normal fire environment for occurrence of large forest wildfires (>40 ha) for the Pacific Northwest Region of the United States. Large forest wildfire occurrence data from the recent climate normal period (1971–2000) was used as the response variable and fire season precipitation, maximum temperature, slope, and...

Author(s): Raymond J. Davis, Zhiqiang Yang, Andrew Yost, Cole Belongie, Warren B. Cohen

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

An uncertainty analysis of wildfire modeling [Chapter 13]

www.nrfirescience.org/resource/14997

Before fire models can be understood, evaluated, and effectively applied to support decision making, model-based uncertainties must be analyzed. In this chapter, we identify and classify sources of uncertainty using an established analytical framework, and summarize results graphically in an uncertainty matrix. Our analysis...

Author(s): Karen L. Riley, Matthew P. Thompson

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Qualitative flow visualization of flame attachment on slopes

www.nrfirescience.org/resource/16566

Heating of unburned fuel by attached flames and plume of a wildfire can produce high spread rates that have resulted in firefighter fatalities worldwide. Qualitative flow fields of the plume of a gas burner embedded in a table tilted to 0°, 10°, 20°, and 30° above horizontal were imaged using the retroreflective shadowgraph...

Author(s): Torben Grumstrup, Sara S. McAllister, Mark A. Finney

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Climate adaption and post-fire restoration of a foundational perennial in cold desert: Insights from intraspecific variation in response to weather

www.nrfirescience.org/resource/16523

1) The loss of foundational but fire-intolerant perennials such as sagebrush due to increases in fire size and frequency in semi-arid regions has motivated efforts to restore them, often with mixed or even no success. Seeds of sagebrush *Artemisia tridentata* and related species must be moved considerable distances from seed source to...

Author(s): Martha M. Brabec, Matthew J. Germino, Bryce A. Richardson

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Modeling support for FASMEE experimental design using WRF-SFIRECHEM - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17015

Recent advancements in fire-atmosphere numerical modeling have increased the number of physical processes integrated into these coupled models. This greater complexity allows for more comprehensive representation of the coupled interactions and feedbacks between the fire and the atmosphere. However, as a consequence of these...

Author(s): Adam K. Kochanski, Jan Mandel, Aimé Fournier, Mary Ann Jenkins

Year Published: 2017

Type: Document

Technical Report or White Paper

Predicting post-fire tree mortality for 12 western US conifers using the First-Order Fire Effects Model (FOFEM)

www.nrfirescience.org/resource/16493

Accurate prediction of fire-caused tree mortality is critical for making sound land management decisions such as developing burning prescriptions and post-fire management guidelines. To improve efforts to predict post-fire tree mortality, we developed 3-year post-fire mortality models for 12 Western conifer species—white fir (...)

Author(s): Sharon M. Hood, Duncan C. Lutes

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Evaluating spatiotemporal tradeoffs under alternative fuel management and suppression policies: measuring returns on investment - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/16996

The primary theme of our study is the cost-effectiveness of fuel treatment at multiple scales, addressing the question of whether fuel treatments can be justified on the basis of saved suppression costs. Our study was designed to track the influence of a dollar invested in fuel treatments on final fire outcomes, and to quantify this...

Author(s): Matthew P. Thompson, Karen L. Riley, Dan R. Loeffler, Jessica R. Haas

Year Published: 2017

Type: Document

Technical Report or White Paper

Spatio-Temporal Linkages between Declining Arctic Sea-Ice Extent and Increasing Wildfire Activity in the Western United States

www.nrfirescience.org/resource/17201

We examined relationships between monthly Arctic sea-ice extent (ASIE) and annual wildfire activity for seven regions in the western United States during 1980-2015 to determine if spatio-temporal linkages exist between ASIE, upper-level flow, and surface climatic conditions conducive to western U.S. wildfire activity. Winter ASIE...

Author(s): Paul A. Knapp, Peter T. Soulé

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Fuel-related fire-behaviour relationships for mixed live and dead fuels burned in the laboratory

www.nrfirescience.org/resource/16452

A laboratory experimental program addressing fire spread in fuel beds composed of dead foliage litter and vertically placed quasi-live branches, representative of many natural fuel complexes, was carried out for either still-air or wind conditions. Fuel-bed characteristics, fire spread rate, flame geometry, and fuel consumption were...

Author(s): Carlos G. Rossa, Paulo M. Fernandes

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Spatiotemporal dynamics of simulated wildfire, forest management, and forest succession in central Oregon, USA

www.nrfirescience.org/resource/15134

We use the simulation model Envision to analyze long-term wildfire dynamics and the effects of different fuel management scenarios in central Oregon, USA. We simulated a 50-year future where fuel management activities were increased by doubling and tripling the current area treated while retaining existing treatment strategies in...

Author(s): Ana M. G. Barros, Alan A. Ager, Michelle A. Day, Haiganoush K. Preisler, Thomas A. Spies, Eric M. White, Robert J. Pabst, Keith A. Olsen, Emily K. Platt, John D. Bailey, John P. Bolte

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

An empirically based approach to defining wildland firefighter safety and survival zone separation distances

www.nrfirescience.org/resource/16748

Wildland firefighters in the US are mandated to identify areas that provide adequate separation between themselves and the flames (i.e. safety zones) to reduce the risk of burn injury. This study presents empirical models that estimate the distance from flames that would result in a low probability (1 or 5%) of either fatal or non-...

Author(s): Wesley G. Page, Bret W. Butler

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/16267

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

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Spatially explicit measurements of forest structure and fire behavior following restoration treatments in dry forests

www.nrfirescience.org/resource/15044

Restoration treatments in dry forests of the western US often attempt silvicultural practices to restore the historical characteristics of forest structure and fire behavior. However, it is suggested that a reliance on non-spatial metrics of forest stand structure, along with the use of wildland fire behavior models that lack the...

Author(s): J. Ziegler, Chad M. Hoffman, Michael A. Battaglia, William E. Mell

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Towards improving wildland firefighter situational awareness through daily fire behaviour risk assessments in the US Northern Rockies and Northern Great Basin

www.nrfirescience.org/resource/15489

Wildland firefighters must assess potential fire behaviour in order to develop appropriate strategies and tactics that will safely meet objectives. Fire danger indices integrate surface weather conditions to quantify potential variations in fire spread rates and intensities and therefore should closely relate to observed fire...

Author(s): William Matt Jolly, Patrick H. Freeborn

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/16674

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

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

How to generate and interpret fire characteristics charts for the U.S. fire danger rating system

www.nrfirescience.org/resource/15371

The fire characteristics chart is a graphical method of presenting U.S. National Fire Danger Rating System (NFDRS) indexes and components as well as primary surface or crown fire behavior

characteristics. Computer software has been developed to produce fire characteristics charts for both fire danger and fire behavior in a format...

Author(s): Faith A. Heinsch, Patricia L. Andrews, D. A. Tirmenstein

Year Published: 2017

Type: Document

Technical Report or White Paper

Climate change and the eco-hydrology of fire: will area burned increase in a warming western USA?

www.nrfirescience.org/resource/14916

Wildfire area is predicted to increase with global warming. Empirical statistical models and process-based simulations agree almost universally. The key relationship for this unanimity, observed at multiple spatial and temporal scales, is between drought and fire. Predictive models often focus on ecosystems in which this...

Author(s): Donald McKenzie, Jeremy S. Littell

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Effects of season on ignition of live wildland fuels using the forced ignition and flame spread test apparatus

www.nrfirescience.org/resource/16525

An understanding of what variables affect the ignition of live wildland fuels is crucial to predicting crown fire spread, the most poorly understood type of wildland fire. Ignition tests were performed over the course of an entire year for ten species (three species in year one, seven in year two) to evaluate seasonal changes in...

Author(s): Sara S. McAllister, David R. Weise

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Ecohydrological implications of drought for forests in the United States

www.nrfirescience.org/resource/14110

The relationships among drought, surface water flow, and groundwater recharge are not straightforward for most forest ecosystems due to the strong role that vegetation plays in the forest water balance.

Hydrologic responses to drought can be either mitigated or exacerbated by forest vegetation depending upon vegetation water use and...

Author(s): James M. Vose, Chelcy Ford Miniati, Charles H. Luce, Heidi Asbjornsen, Peter V. Caldwell, John L. Campbell, Gordon E. Grant, Daniel J. Isaak, Steven P. Loheide II, Ge Sun

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

Attribution of extreme weather events in the context of climate change - Report in brief

www.nrfirescience.org/resource/14069

As climate has warmed over recent years, a new pattern of more frequent and more intense weather events has unfolded across the globe. Climate models simulate such changes in extreme events, and some of the reasons for the changes are well understood. Warming increases the likelihood of extremely hot days and nights, favors...

Author(s): Committee on Extreme Weather Events and Climate Change Attribution

Year Published: 2016

Type: Document

Technical Report or White Paper

Safe separation distance score: a new metric for evaluating wildland firefighter safety zones using Lidar

www.nrfirescience.org/resource/16910

Safety zones are areas where firefighters can retreat to in order to avoid bodily harm when threatened by burnover or entrapment from wildland fire. At present, safety zones are primarily designated by firefighting personnel as part of daily fire management activities. Though critical to safety zone assessment, the effectiveness of...

Author(s): Michael J. Campbell, Philip E. Dennison, Bret W. Butler

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Near-term probabilistic forecast of significant wildfire events for the western United States

www.nrfirescience.org/resource/14704

Fire danger and potential for large fires in the United States (US) is currently indicated via several forecasted qualitative indices. However, landscape-level quantitative forecasts of the probability of a large fire are currently lacking. In this study, we present a framework for forecasting large fire occurrence – an extreme...

Author(s): Haiganoush K. Preisler, Karen L. Riley, Crystal S. Stonesifer, David E. Calkin, William Matt Jolly

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

A comparison of level set and marker methods for the simulation of wildland fire front propagation

www.nrfirescience.org/resource/13803

Simulating an advancing fire front may be achieved within a Lagrangian or Eulerian framework. In the former, independently moving markers are connected to form a fire front, whereas in the latter, values representing the moving front are calculated at points within a fixed grid. Despite a mathematical equivalence between the two...

Author(s): Anthony S. Bova, William E. Mell, Chad M. Hoffman

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

The Influence of fuel moisture and flammable monoterpenes on the combustibility of conifer fuels

www.nrfirescience.org/resource/15574

Bark beetle-caused tree mortality and its effect on both the fuels complex and potential fire behavior in affected forests, particularly lodgepole pine forests, has been a topic of much debate in recent years (Hicke et al. 2012; Jenkins et al. 2012; Black et al. 2013). Early research on the subject seemed to suggest a...

Author(s): Michael J. Jenkins, Justin B. Runyon, Martin E. Alexander, Wesley G. Page, Andrew Guinta

Year Published: 2016

Type: Document

Technical Report or White Paper

Incorporating resource protection constraints in an analysis of landscape fuel-treatment effectiveness in the northern Sierra Nevada, CA, USA

www.nrfirescience.org/resource/14012

Finding novel ways to plan and implement landscape-level forest treatments that protect sensitive wildlife and other key ecosystem components, while also reducing the risk of large-scale, high-severity fires, can prove to be difficult. We examined alternative approaches to landscape-scale fuel-treatment design for the same landscape...

Author(s): Christopher B. Dow, Brandon M. Collins, Scott L. Stephens

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/16908

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

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Burning rates of wood cribs with implications for wildland fires

www.nrfirescience.org/resource/14684

Wood cribs are often used as ignition sources for room fire tests and the well characterized burning rates may also have applications to wildland fires. The burning rate of wildland fuel structures, whether the needle layer on the ground or trees and shrubs themselves, is not addressed in any operational fire model and no simple...

Author(s): Sara S. McAllister, Mark A. Finney

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Wicked Problem, New Solutions: Our Fire, Our Problem

www.nrfirescience.org/resource/18393

This conference is being presented to bring focus to the many issues associated with fuels, fire behavior, large wildfires, and the future of fire management. Much attention is being given to wildland

fire management. It seems with each passing year we recognize escalating complexity, increasing risk, and mounting challenges....

Year Published: 2016

Type: Document

Conference Proceedings

The impact of aging on laboratory fire behaviour in masticated shrub fuelbeds of California and Oregon, USA

www.nrfirescience.org/resource/14580

Mastication of shrubs and small trees to reduce fire hazard has become a widespread management practice, yet many aspects of the fire behaviour of these unique woody fuelbeds remain poorly understood. To examine the effects of fuelbed aging on fire behaviour, we conducted laboratory burns with masticated *Arctostaphylos* spp. and...

Author(s): Jesse K. Kreye, J. Morgan Varner, Jeffrey M. Kane, Eric E. Knapp, Warren P. Reed

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

The net benefits of human-ignited wildfire forecasting: the case of tribal land units in the United States

www.nrfirescience.org/resource/14196

Research shows that some categories of human-ignited wildfires may be forecastable, owing to their temporal clustering, with the possibility that resources could be predeployed to help reduce the incidence of such wildfires. We estimated several kinds of incendiary and other human-ignited wildfire forecast models at the weekly time...

Author(s): Jeffrey P. Prestemon, David T. Butry, Douglas S. Thomas

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

A stochastic mixed integer program to model spatial wildfire behavior and suppression placement decisions with uncertain weather

www.nrfirescience.org/resource/13931

Wildfire behavior is a complex and stochastic phenomenon that can present unique tactical management challenges. This paper investigates a multistage stochastic mixed integer program with full recourse to model spatially explicit fire behavior and to select suppression locations for a wildland fire. Simplified suppression decisions...

Author(s): Erin J. Belval, Yu Wei, Michael Bevers

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

The Influence of Climate Model Biases on Projections of Aridity and Drought

www.nrfirescience.org/resource/15624

Global climate models (GCMs) have biases when simulating historical climate conditions, which in turn have implications for estimating the hydrological impacts of climate change. This study examines the differences in projected changes of aridity [defined as the ratio of precipitation (P) over potential evapotranspiration (PET)], or...

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Effects of drought on forests and rangelands in the United States: a comprehensive science synthesis

www.nrfirescience.org/resource/13910

This assessment provides input to the reauthorized National Integrated Drought Information System (NIDIS) and the National Climate Assessment (NCA), and it establishes the scientific foundation needed to manage for drought resilience and adaptation. Focal areas include drought characterization; drought impacts on forest processes...

Year Published: 2016

Type: Document

Synthesis, Technical Report or White Paper

Spatial coherence of extreme precipitation events in the Northwestern United States

www.nrfirescience.org/resource/15609

The complexity of impacts resulting from extreme precipitation events varies with the spatial extent of precipitation extremes. Characteristics of precipitation extremes, defined by the top 5% of 3-day accumulated precipitation, including their spatial coherence and relationships to two contrasting synoptic phenomena, were examined...

Author(s): Lauren E. Parker, John T. Abatzoglou

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Topographic and fire weather controls of contemporary fire refugia in forested ecosystems of northwestern North America

www.nrfirescience.org/resource/18922

Fire refugia, sometimes referred to as fire islands, shadows, skips, residuals, or fire remnants, are an important element of the burn mosaic, but we lack a quantitative framework that links observations of fire refugia from different environmental contexts. Here, we develop and test a conceptual model for how predictability of fire...

Author(s): Meg A. Krawchuk, Sandra L. Haire, Jonathan D. Coop, Marc-Andre Parisien, Ellen Whitman, Geneva W. Chong, Carol Miller

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

High-resolution infrared thermography for capturing wildland fire behaviour: RxCADRE 2012

www.nrfirescience.org/resource/13856

Wildland fire radiant energy emission is one of the only measurements of combustion that can be made at wide spatial extents and high temporal and spatial resolutions. Furthermore, spatially and temporally explicit measurements are critical for making inferences about fire effects and useful for examining patterns of fire spread. In...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Projected changes in cold hardiness zones and suitable overwinter ranges of perennial crops over the United States

www.nrfirescience.org/resource/15604

Average annual absolute minimum temperatures (TN_n) provide a means of delineating agriculturally relevant climate zones and are used to define cold hardiness zones (CHZ) by the United States Department of Agriculture. Projected changes in TN_n, mean winter minimum temperatures, and CHZs over the conterminous United States (CONUS...

Author(s): Lauren E. Parker, John T. Abatzoglou

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/13845

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

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Contribution of cut-off lows to precipitation across the United States

www.nrfirescience.org/resource/15602

A chronology of cutoff lows (COL) from 1979 to 2014 alongside daily precipitation observations across the conterminous United States was used to examine the contribution of COL to seasonal precipitation, extreme-precipitation events, and interannual precipitation variability. COL accounted for between 2% and 32% of annual...

Author(s): John T. Abatzoglou

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Synthesis of knowledge of extreme fire behavior: volume 2 for fire behavior specialists, researchers, and meteorologists

www.nrfirescience.org/resource/14330

The National Wildfire Coordinating Group's definition of extreme fire behavior indicates a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning/spotting, presence of fire whirls, and strong...

Author(s): Paul A. Werth, Brian E. Potter, Martin E. Alexander, Miguel G. Cruz, Craig B. Clements, Mark A. Finney, Jason M. Forthofer, Scott L. Goodrick, Chad M. Hoffman, William Matt Jolly, Sara S. McAllister, Roger D. Ottmar, Russell A. Parsons

Year Published: 2016

Type: Document

Synthesis, Technical Report or White Paper

Evaluation and optimization of fuel treatment effectiveness with an integrated experimental/modeling approach - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17048

The effectiveness of a hazardous fuel reduction treatment must take into account both the physical change on fuel loading and structure and the effect that this change may have on wildland fire behavior. We first took a remote sensing and field measurement approach to quantify the effects of an aggressive fuel treatment program on...

Author(s): Nick Skowronski, Albert Simeoni, Kenneth L. Clark, William E. Mell, Rory Hadden

Year Published: 2016

Type: Document

Technical Report or White Paper

STANDFIRE: an IFT-DSS module for spatially explicit, 3D fuel treatment analysis - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/15584

Managers are increasingly called upon to implement fuel treatments to alter potential fire behavior, in order to mitigate threats to firefighters and communities, or to maintain or restore healthy ecosystems. While some case studies have shown positive results, many questions remain about how effective certain kinds of fuel...

Author(s): Russell A. Parsons, Lucas Wells, F. Pimont, William Matt Jolly, Rodman Linn, William E. Mell

Year Published: 2016

Type: Document

Technical Report or White Paper

Weather, fuels, and topography impede wildland fire spread in western US landscapes

www.nrfirescience.org/resource/14716

As wildland fire activity continues to surge across the western US, it is increasingly important that we understand and quantify the environmental drivers of fire and how they vary across ecosystems. At daily to annual timescales, weather, fuels, and topography are known to influence characteristics such as area burned and fire...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/15576

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

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

Year Published: 2016

Type: Document

Technical Report or White Paper

Predicting large wildfires across western North America by modeling seasonal variation in soil water balance

www.nrfirescience.org/resource/14021

A lengthening of the fire season, coupled with higher temperatures, increases the probability of fires throughout much of western North America. Although regional variation in the frequency of fires is well established, attempts to predict the occurrence of fire at a spatial resolution <10 km² have generally

been unsuccessful. We...

Author(s): Richard H. Waring, Nicholas C. Coops

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Observations of energy transport and rate of spreads from low-intensity fires in longleaf pine habitat - Rxcadre 2012

www.nrfirescience.org/resource/16909

Wildland fire rate of spread (ROS) and intensity are determined by the mode and magnitude of energy transport from the flames to the unburned fuels. Measurements of radiant and convective heating and cooling from experimental fires are reported here. Sensors were located nominally 0.5 m above ground level. Flame heights varied...

Author(s): Bret W. Butler, Casey Teske, Daniel M. Jimenez, Joseph J. O'Brien, Paul Sopko, Cyle E. Wold, Mark Vosburgh, Benjamin Hornsby, E. Louise Loudermilk

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

The effect of wind on burning rate of wood cribs

www.nrfirescience.org/resource/14685

Wood cribs are often used as ignition sources for room fire tests. A wood crib may also apply to studies of burning rate in wildland fires, because wildland fuel beds are porous and three dimensional. A unique aspect of wildland fires is the ubiquitous presence of wind. However, very little is known about what effect the increased...

Author(s): Sara S. McAllister, Mark A. Finney

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Development of the rangeland vegetation simulator: a module for FVS

www.nrfirescience.org/resource/15570

The escalating awareness of non-forested landscapes and realization that more emphasis is needed for an all lands approach to management increasingly requires timely information to improve management effectiveness. The Forest Vegetation Simulator (FVS) has been used in a large number of studies to project future vegetation...

Author(s): Matthew C. Reeves

Year Published: 2016

Type: Document

Technical Report or White Paper

Does prescribed fire promote resistance to drought in low elevation forests of the Sierra Nevada, California, USA?

www.nrfirescience.org/resource/14244

Prescribed fire is a primary tool used to restore western forests following more than a century of fire exclusion, reducing fire hazard by removing dead and live fuels (small trees and shrubs). It is commonly assumed that the reduced forest density following prescribed fire also reduces competition for resources among the...

Author(s): Phillip J. van Mantgem, Anthony C. Caprio, Nathan L. Stevenson, Adrian J. Das

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Quantifying the influence of previously burned areas on suppression effectiveness and avoided exposure: a case study of the Las Conchas Fire

www.nrfirescience.org/resource/13919

We present a case study of the Las Conchas Fire (2011) to explore the role of previously burned areas (wildfires and prescribed fires) on suppression effectiveness and avoided exposure. Methodological innovations include characterisation of the joint dynamics of fire growth and suppression activities, development of a fire line...

Author(s): Matthew P. Thompson, Patrick H. Freeborn, Jon D. Rieck, David E. Calkin, Julie W. Gilbertson-Day, Mark A. Cochrane, Michael S. Hand

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Development of high-resolution (250 m) historical daily gridded air temperature data using reanalysis and distributed sensor networks for the US Northern Rocky Mountains

www.nrfirescience.org/resource/15620

Gridded temperature data sets are typically produced at spatial resolutions that cannot fully resolve fine-scale variation in surface air temperature in regions of complex topography. These data limitations have become increasingly important as scientists and managers attempt to understand and plan for potential climate change...

Author(s): Zachary A. Holden, Alan Swanson, Anna E. Klene, John T. Abatzoglou, Solomon Z. Dobrowski, Samuel A. Cushman, John Squires, Gretchen Moisen, Jared W. Oyler

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Charred forests accelerate snow albedo decay: parameterizing the post-fire radiative forcing on snow for three years following fire

www.nrfirescience.org/resource/14443

As large, high-severity forest fires increase and snowpacks become more vulnerable to climate change across the western USA, it is important to understand post-fire disturbance impacts on snow hydrology. Here, we examine, quantify, parameterize, model, and assess the post-fire radiative forcing effects on snow to improve hydrologic...

Author(s): Kelly E. Gleason, Anne W. Nolin

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

A review of the relationships between drought and forest fire in the United States

www.nrfirescience.org/resource/18719

The historical and presettlement relationships between drought and wildfire are well documented in North America, with forest fire occurrence and area clearly increasing in response to drought. There is also evidence that drought interacts with other controls (forest productivity, topography, fire weather, management activities) to...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Closure to development of soil moisture drought index to characterize droughts

www.nrfirescience.org/resource/15608

This is a discussion article qualifying four issues related to soil moisture drought index (SODI) moisture departure.

Author(s): Mohammad Sohrabi, Jae H. Ryu, John T. Abatzoglou, John Tracy

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Measuring radiant emissions from entire prescribed fires with ground, airborne, and satellite sensors - RxCADRE 2012

www.nrfirescience.org/resource/13855

Characterising radiation from wildland fires is an important focus of fire science because radiation relates directly to the combustion process and can be measured across a wide range of spatial extents and resolutions. As part of a more comprehensive set of measurements collected during the 2012 Prescribed Fire Combustion and...

Author(s): Matthew B. Dickinson, Andrew T. Hudak, Thomas J. Zajkowski, E. Louise Loudermilk, Wilfrid Schroeder, Luke Ellison, Robert L. Kremens, William Holley, Otto Martinez, Alexander Paxton, Benjamin C. Bright, Joseph J. O'Brien, Benjamin Hornsby, Charles Ichoku, Jason Faulring, Aaron Gerace, David L. Peterson, Joseph Mauceri

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Recent advances and remaining uncertainties in resolving past and future climate effects on global fire activity

www.nrfirescience.org/resource/15603

Fire is an integral component of the Earth system that will critically affect how terrestrial carbon budgets and living systems respond to climate change. Paleo and observational records document robust positive relationships between fire activity and aridity in many parts of the world on interannual to millennial timescales....

Author(s): A. Park Williams, John T. Abatzoglou

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Autoignition of wood under combined convective and radiative heating

www.nrfirescience.org/resource/15781

Many wildland fire models assume radiation heat transfer controls fuel particle ignition. However, evidence suggests that radiation is insufficient to ignite the predominantly small, thin fuel particles in wildlands and that convective heating by flame contact is a critical component. Here, convective ignition was studied using an...

Author(s): Sara S. McAllister, Mark A. Finney

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Controls on interannual variability in lightning-caused fire activity in the western US

www.nrfirescience.org/resource/15601

Lightning-caused wildfires account for a majority of burned area across the western United States (US),

yet lightning remains among the more unpredictable spatiotemporal aspects of the fire environment and a challenge for both modeling and managing fire activity. A data synthesis of cloud-to-ground lightning strikes, climate and...

Author(s): John T. Abatzoglou, Crystal A. Kolden, Jennifer Balch, Bethany A. Bradley

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Assessing the effectiveness of spatially heterogeneous fuels reduction restoration treatments - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17044

In response to increasing wildfire severity and extent across the dry forests of the western United States in the last several decades, federal policy initiatives have encouraged joint vegetation management and fuels treatments to restore ecosystem composition, structure and function and reduce the potential for extreme fire...

Author(s): Chad M. Hoffman, Michael A. Battaglia, Tony S. Cheng, Yvette Dickinson, Frederick W. Smith

Year Published: 2016

Type: Document

Technical Report or White Paper

A wildfire-relevant climatology of the convective environment of the United States

www.nrfirescience.org/resource/13270

Convective instability can influence the behaviour of large wildfires. Because wildfires modify the temperature and moisture of air in their plumes, instability calculations using ambient conditions may not accurately represent convective potential for some fire plumes. This study used the North American Regional Reanalysis to...

Author(s): Brian E. Potter, Matthew A. Anaya

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Future mega-fires and smoke impacts

www.nrfirescience.org/resource/15579

"Megafire" events, in which large high-intensity fires propagate over extended periods, can cause both immense damage to the local environment and catastrophic air quality impacts on cities and towns downwind. Increases in extreme events associated with climate change (e.g., droughts, heat waves) are projected to result in more...

Author(s): Narasimhan K. Larkin, John T. Abatzoglou, Donald McKenzie, Brian E. Potter, E. Ashley Steel, Brian J. Stocks

Year Published: 2015

Type: Document

Technical Report or White Paper

Projected changes in snowfall extremes and interannual variability of snowfall in the western U.S.

www.nrfirescience.org/resource/15647

Projected warming will have significant impacts on snowfall accumulation and melt, with implications for water availability and management in snow-dominated regions. Changes in snowfall extremes are confounded by projected increases in precipitation extremes. Downscaled climate projections from 20 global climate models were bias-...

Author(s): A.C. Lute, John T. Abatzoglou, Katherine C. Hegewisch
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Proceedings of the large wildland fires conference

www.nrfirescience.org/resource/18395

Large fires or “megafires” have been a major topic in wildland fire research and management for over a decade. There is great debate regarding the impacts of large fires. Many believe that they (1) are occurring too frequently, (2) are burning abnormally large areas, (3) cause uncharacteristically adverse ecological harm, and (4...

Year Published: 2015
Type: Document
Conference Proceedings

Seasonal reversal of the influence of El Niño–Southern Oscillation on very large wildfire occurrence in the interior northwestern United States

www.nrfirescience.org/resource/15643

Satellite-mapped fire perimeters and the multivariate El Niño–Southern Oscillation index were used to examine the impact of concurrent El Niño–Southern Oscillation (ENSO) phase on very large fire (VLF) occurrences over the intermountain northwestern United States (U.S.) from 1984 to 2012. While the warm phase of ENSO promotes...

Author(s): Renaud Barbero, John T. Abatzoglou, Timothy J. Brown
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Observations of distributed snow depth and snow duration within diverse forest structures in a maritime mountain watershed

www.nrfirescience.org/resource/14278

Spatially distributed snow depth and snow duration data were collected over two to four snow seasons during water years 2011–2014 in experimental forest plots within the Cedar River Municipal Watershed, 50 km east of Seattle, Washington, USA. These 40 × 40 m forest plots, situated on the western slope of the Cascade Range,...

Author(s): Susan E. Dickerson-Lange, James A. Lutz, Rolf Gersonde, Kael A. Martin, Jenna E. Forsyth, Jessica D. Lundquist
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Modeling fuel treatment impacts on fire suppression cost savings: a review

www.nrfirescience.org/resource/13950

High up-front costs and uncertain return on investment make it difficult for land managers to economically justify large-scale fuel treatments, which remove trees and other vegetation to improve conditions for fire control, reduce the likelihood of ignition, or reduce potential damage from wildland fire if it occurs. In the short-...

Author(s): Matthew P. Thompson, Nathaniel Anderson
Year Published: 2015
Type: Document
Book or Chapter or Journal Article, Synthesis

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

Evaluating crown fire rate of spread predictions from physics-based models

www.nrfirescience.org/resource/13614

Modeling the behavior of crown fires is challenging due to the complex set of coupled processes that drive the characteristics of a spreading wildfire and the large range of spatial and temporal scales over which these processes occur. Detailed physics-based modeling approaches such as FIRETEC and the Wildland Urban Interface Fire...

Author(s): Chad M. Hoffman, J. Ziegler, Rodman Linn, William E. Mell, Carolyn Hull Sieg, F. Pimont

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Developing a post-processor to link the Forest Vegetation Simulator (FVS) and the Fuel Characteristic Classification System (FCCS)

www.nrfirescience.org/resource/15561

In this project, we developed a Forest Vegetation Simulator (FVS, JFSP Project #) post-processor (FVS2FCCS) to convert FVS simulated treelist and surface fuel data into Fuel Characteristics Classification System (FCCS, JFSP Project #98-1-1-06) fuelbed format (.xml) that can be read and processed by the FCCS to create estimates of...

Author(s): Morris C. Johnson, Sarah J. Beukema, Stephanie A. Rebain, Paige C. Eagle, Kjell Swedin, Maria Petrova, Susan J. Prichard

Year Published: 2015

Type: Document

Technical Report or White Paper

Fuel loads and simulated fire behavior in 'old-stage' beetle-infested ponderosa pine of the Colorado Plateau

www.nrfirescience.org/resource/14527

Recent bark beetle outbreaks in western North America have led to concerns regarding changes in fuel profiles and associated changes in fire behavior. Data are lacking for a range of infestation severities and time since outbreak, especially for relatively arid cover types. We surveyed fuel loads and simulated fire behavior for...

Author(s): E. Matthew Hansen, Morris C. Johnson, Barbara J. Bentz, A. Steven Munson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Experimental analysis of fire spread across a two-dimensional ridge under wind conditions

www.nrfirescience.org/resource/13382

Results from a laboratory-scale investigation of a fire spreading on the windward face of a triangular-section hill of variable shape with wind perpendicular to the ridgeline are reported. They confirm previous observations that the fire enlarges its lateral spread after reaching the ridgeline, entering the leeward face with a much...

Author(s): J. R. Raposo, S. Cabiddu, Domingos Xavier Viegas, M. Salis, J. Sharples

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Forecasting integrated lightning and fuels ignition potentials in a system with real-time analysis of fire weather prediction accuracy

www.nrfirescience.org/resource/15557

Weather forecasts can help identify environmental conditions conducive to prescribed burning or to increased fire danger. These conditions are important components of fire management tools such as fire ignition potential maps, fire danger rating systems, fire behavior predictions, and smoke dispersion modeling. Fire managers use...

Author(s): Miriam L. Rorig, Stacy Drury

Year Published: 2015

Type: Document

Technical Report or White Paper

The potential impact of regional climate change on fire weather in the United States

www.nrfirescience.org/resource/13208

Climate change is expected to alter the frequency and severity of atmospheric conditions conducive for wildfires. In this study, we assess potential changes in fire weather conditions for the contiguous United States using the Haines Index (HI), a fire weather index that has been employed operationally to detect atmospheric...

Author(s): Ying Tang, Shiyuan Zhong, Lifeng Luo, Xindi Bian, Warren Heilman, Julie Winkler

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Climate-induced variations in global wildfire danger from 1979 to 2013

www.nrfirescience.org/resource/15322

Climate strongly influences global wildfire activity, and recent wildfire surges may signal fire weather-induced pyrogeographic shifts. Here we use three daily global climate data sets and three fire danger indices to develop a simple annual metric of fire weather season length, and map spatio-temporal trends from 1979 to 2013. We...

Author(s): William Matt Jolly, Mark A. Cochrane, Patrick H. Freeborn, Zachary A. Holden, Timothy J. Brown, G.J. Williamson, David M. J. S. Bowman

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Modeling spatial and temporal dynamics of wind flow and potential fire behavior following a mountain pine beetle outbreak in a lodgepole pine forest

www.nrfirescience.org/resource/13298

Patches of live, dead, and dying trees resulting from bark beetle-caused mortality alter spatial and temporal variability in the canopy and surface fuel complex through changes in the foliar moisture content of attacked trees and through the redistribution of canopy fuels. The resulting heterogeneous fuels complexes alter within...

Author(s): Chad M. Hoffman, Rodman Linn, Russell A. Parsons, Carolyn Hull Sieg, Judith Winterkamp
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Daily weather and other factors influencing burn severity in central Idaho and western Montana
www.nrfirescience.org/resource/15316

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

Author(s): Donovan Birch, Penelope Morgan, Crystal A. Kolden, John T. Abatzoglou, Gregory K. Dillon, Andrew T. Hudak, Alistair M. S. Smith
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Recent findings relating to firefighter safety zones

www.nrfirescience.org/resource/16918

Designation of safety zones is a primary duty of all wildland firefighters. Unfortunately, information regarding what constitutes an adequate safety zone is inadequately defined. Measurements of energy release from wildland fires have been used to develop an empirically based safety zone guideline. The basis for this work is...

Author(s): Bret W. Butler, Russell A. Parsons, William E. Mell
Year Published: 2015
Type: Document
Conference Proceedings

Warning signals for eruptive events in spreading fires

www.nrfirescience.org/resource/13265

Spreading fires are noisy (and potentially chaotic) systems in which transitions in dynamics are notoriously difficult to predict. As flames move through spatially heterogeneous environments, sudden shifts in temperature, wind, or topography can generate combustion instabilities, or trigger self-stabilizing feedback loops, that...

Author(s): Jerome M. Fox, George M. Whitesides
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

Development of soil moisture drought index (SODI) to characterize droughts

www.nrfirescience.org/resource/15645

A new drought index termed the "soil moisture drought index (SODI)" is developed to characterize droughts. The premise of the index is based on how much water is required to attain soil moisture at field capacity. SODI captures variations of precipitation, temperature, and soil moisture over time. Three widely used drought...

Author(s): Mohammad Sohrabi, Jae H. Ryu, John T. Abatzoglou, John Tracy

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Managing fire, understanding ourselves: human dimensions in safety and wildland fire

www.nrfirescience.org/resource/18394

Wildland fire management has risen to the forefront of land management and now receives greater social and political attention than ever before. As we progress through the 21st century, these areas of attention are continually presenting challenges never experienced before. We may consider ourselves well positioned to move into the...

Year Published: 2015

Type: Document

Conference Proceedings

Implications of climate change on wind erosion of agricultural lands in the Columbia plateau

www.nrfirescience.org/resource/15642

Climate change may impact soil health and productivity as a result of accelerated or decelerated rates of erosion. Previous studies suggest a greater risk of wind erosion on arid and semi-arid lands due to loss of biomass under a future warmer climate. There have been no studies conducted to assess the impact of climate change on...

Author(s): B.S. Sharratt, J. Tatarko, John T. Abatzoglou, F.A. Fox, D. Huggins

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Verification of Spot Fire Weather Forecasts

www.nrfirescience.org/resource/15563

Software was developed to evaluate National Weather Service (NWS) spot forecasts. Fire management officials request spot forecasts from the NWS to provide detailed guidance as to atmospheric conditions in the vicinity of planned prescribed burns as well as wildfires that do not have incident meteorologists on site. A multi-year set...

Author(s): John D. Horel, Timothy J. Brown

Year Published: 2015

Type: Document

Technical Report or White Paper

Exploring how alternative mapping approaches influence fire risk assessment and human community exposure to wildfire

www.nrfirescience.org/resource/13949

Attaining fire-adapted human communities has become a key focus of collaborative planning on landscapes across the western United States and elsewhere. The coupling of fire simulation with GIS has expanded the analytical base to support such planning efforts, particularly through the "fireside" concept that identifies areas where...

Author(s): Joe H. Scott, Matthew P. Thompson, Julie W. Gilbertson-Day
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/15631

The Monitoring Trends in Burn Severity project is a comprehensive fire atlas for the United States that includes perimeters and severity data for all fires greater than a particular size (,400 ha in the western US, and,200 ha in the eastern US). Although the database was derived for management purposes, the scientific community has...

Author(s): Crystal A. Kolden, Alistair M. S. Smith, John T. Abatzoglou
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/15558

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

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

Role of buoyant flame dynamics in wildfire spread

www.nrfirescience.org/resource/13377

Large wildfires of increasing frequency and severity threaten local populations and natural resources and contribute carbon emissions into the earth-climate system. Although wildfires have been researched and modeled for decades, no verifiable physical theory of spread is available to form the basis for the precise predictions...

Author(s): Mark A. Finney, Jack D. Cohen, Jason M. Forthofer, Sara S. McAllister, Michael J. Gollner, Daniel J. Gorham, Kozo Saito, Nelson K. Akafuah, Brittany A. Adam, Justin D. English
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Relationships between fire danger and the daily number and daily growth of active incidents burning in the Northern Rocky Mountains, USA

www.nrfirescience.org/resource/13170

Daily National Fire Danger Rating System (NFDRS) indices are typically associated with the number and final size of newly discovered fires, or averaged over time and associated with the likelihood and total burned area of large fires. Herein we used a decade (2003–12) of NFDRS indices and US Forest Service (USFS) fire reports to...

Author(s): Patrick H. Freeborn, Mark A. Cochrane, William Matt Jolly
Year Published: 2015
Type: Document

Book or Chapter or Journal Article

A comparison of three approaches for simulating fine-scale surface winds in support of wildland fire management. Part II. An exploratory study of the effect of simulated winds on fire growth simulations

www.nrfirescience.org/resource/16922

The effect of fine-resolution wind simulations on fire growth simulations is explored. The wind models are (1) a wind field consisting of constant speed and direction applied everywhere over the area of interest; (2) a tool based on the solution of the conservation of mass only (termed mass-conserving model) and (3) a tool based on...

Author(s): Jason M. Forthofer, Bret W. Butler, Charles W. McHugh, Mark A. Finney, Larry S. Bradshaw, Richard D. Stratton, Kyle S. Shannon, Natalie S. Wagenbrenner

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Modeling very large-fire occurrences over the continental United States from weather and climate forcing

www.nrfirescience.org/resource/15656

Very large-fires (VLFs) have widespread impacts on ecosystems, air quality, fire suppression resources, and in many regions account for a majority of total area burned. Empirical generalized linear models of the largest fires (>5000 ha) across the contiguous United States (US) were developed at 60 km spatial and weekly...

Author(s): Renaud Barbero, John T. Abatzoglou, E. Ashley Steel, Narasimhan K. Larkin

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Fire behavior in masticated fuels: a review

www.nrfirescience.org/resource/12387

Mastication is an increasingly common fuels treatment that redistributes 'ladder' fuels to the forest floor to reduce vertical fuel continuity, crown fire potential, and fireline intensity, but fuel models do not exist for predicting fire behavior in these fuel types. Recent fires burning in masticated fuels have behaved in...

Author(s): Jesse K. Kreye, Nolan W. Brewer, Penelope Morgan, J. Morgan Varner, Alistair M. S. Smith, Chad M. Hoffman, Roger D. Ottmar

Year Published: 2014

Type: Document

Book or Chapter or Journal Article, Synthesis

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

www.nrfirescience.org/resource/13006

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

Defining extreme wildland fires using geospatial and ancillary metrics

www.nrfirescience.org/resource/12953

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

Author(s): Karen O. Lannom, Wade T. Tinkham, Alistair M. S. Smith, John T. Abatzoglou, Beth A. Newingham, Troy E. Hall, Penelope Morgan, Eva K. Strand, Travis B. Paveglio, John Anderson, Aaron M. Sparks

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Understanding stochastic wildfire simulation results

www.nrfirescience.org/resource/12758

Stochastic simulations of wildfire occurrence and growth have become an integral part of both wildfire incident management and land management planning applications. The FSPPro simulation system, implemented in the online Wildland Fire Decision Support System (WFDSS), acknowledges that weather inputs to wildfire growth...

Author(s): Joe H. Scott

Year Published: 2014

Type: Document

Technical Report or White Paper

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

www.nrfirescience.org/resource/15569

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

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

Year Published: 2014

Type: Document

Technical Report or White Paper

Observed changes in false springs over the contiguous United States

www.nrfirescience.org/resource/15668

Climate warming fosters an earlier spring green-up that may bring potential benefits to agricultural systems. However, advances in green-up timing may leave early stage vegetation growth vulnerable to cold damage when hard freezes follow green-up resulting in a false spring. Spatiotemporal patterns of green-up dates, last spring...

Author(s): Alexander G. Peterson, John T. Abatzoglou

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Challenge of assessing fire and burn severity using field measures, remote sensing and modelling

www.nrfirescience.org/resource/18881

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

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

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Extent of the rain-snow transition zone in the western U.S. under historic and projected climate

www.nrfirescience.org/resource/15660

This study investigates the extent of the rain-snow transition zone across the complex terrain of the western United States for both late 20th century climate and projected changes in climate by the mid-21st century. Observed and projected temperature and precipitation data at 4 km resolution were used with an empirical...

Author(s): P. Zion Klos, Timothy E. Link, John T. Abatzoglou

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

A comparison of three approaches for simulating fine-scale surface winds in support of wildland fire management: Part I. Model formulation and comparison against measurements

www.nrfirescience.org/resource/16923

For this study three types of wind models have been defined for simulating surface wind flow in support of wildland fire management: (1) a uniform wind field (typically acquired from coarse-resolution (4 km) weather service forecast models); (2) a newly developed mass-conserving model and (3) a newly developed mass and...

Author(s): Jason M. Forthofer, Bret W. Butler, Natalie S. Wagenbrenner

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Observed and projected changes in absolute temperature extremes across the contiguous United States

www.nrfirescience.org/resource/15657

Changes in the extent of absolute, all-time, daily temperature records across the contiguous United States were examined using observations and climate model simulations. Observations from station data and reanalysis from 1980 to 2013 show increased extent of absolute highest temperature records and decreased extent of absolute...

Author(s): John T. Abatzoglou, Renaud Barbero

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Climate and very large wildland fires in the contiguous western USA

www.nrfirescience.org/resource/13009

Very large wildfires can cause significant economic and environmental damage, including destruction of homes, adverse air quality, firefighting costs and even loss of life. We examine how climate is associated with very large wildland fires (VLWFs > or =50,000 acres, or ~20,234 ha) in the western contiguous USA. We used composite...

Author(s): E. Natasha Stavros, John T. Abatzoglou, Narasimhan K. Larkin, Donald McKenzie, E. Ashley Steel
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Questionable evidence of natural warming of the northwestern United States

www.nrfirescience.org/resource/15655

Johnstone and Mantua (1) claim that changes in atmospheric circulation were the primary cause of the observed warming of sea surface temperature around the northeastern Pacific margins and surface air temperature (SAT) in Northern California, Oregon, and Washington from 1901 to 2012. The results of Johnstone and Mantua's report...

Author(s): John T. Abatzoglou, David E. Rupp, Philip W. Mote
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Spectroscopic analysis of seasonal changes in live fuel moisture content and leaf dry mass

www.nrfirescience.org/resource/13001

Live fuel moisture content (LFMC), the ratio of water mass to dry mass contained in live plant material, is an important fuel property for determining fire danger and for modeling fire behavior. Remote sensing estimation of LFMC often relies on an assumption of changing water and stable dry mass over time. Fundamental understanding...

Author(s): Yi Qi, Philip E. Dennison, William Matt Jolly, Rachel C. Kropp, Simon C. Brewer
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Predicting wildfire ignitions, escapes, and large fire activity using Predictive Service's 7-Day Fire Potential Outlook in the western USA

www.nrfirescience.org/resource/13615

Can fire potential forecasts assist with pre-positioning of fire suppression resources, which could result in a cost savings to the United States government? Here, we present a preliminary assessment of the 7-Day Fire Potential Outlook forecasts made by the Predictive Services program. We utilized historical fire occurrence data and...

Author(s): Karen L. Riley, Crystal S. Stonesifer, Haiganoush K. Preisler, David E. Calkin
Year Published: 2014
Type: Document
Conference Proceedings

Crown fire potential in lodgepole pine forests during the red stage of mountain pine beetle attack

www.nrfirescience.org/resource/12926

Mountain pine beetle (MPB) outbreaks within the previous 10-15 years have affected millions of hectares of lodgepole pine forests in western North America. Concerns about the influence of recent tree mortality on changes in fire behaviour amongst firefighters and fire managers have led researchers to attempt to quantify the effects...

Author(s): Wesley G. Page, Michael J. Jenkins, Martin E. Alexander
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Wildland firefighter safety zones: A review of past science and summary of future needs

www.nrfirescience.org/resource/16900

Current wildland firefighter safety zone guidelines are based on studies that assume flat terrain, radiant heating, finite flame width, constant flame temperature and high flame emissivity. Firefighter entrapments and injuries occur across a broad range of vegetation, terrain and atmospheric conditions generally when they are within...

Author(s): Bret W. Butler

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Representation and evaluation of wildfire propagation simulations

www.nrfirescience.org/resource/12390

This paper provides a formal mathematical representation of a wildfire simulation, reviews the most common scoring methods using this formalism, and proposes new methods that are explicitly designed to evaluate a forest fire simulation from ignition to extinction. These scoring or agreement methods are tested with synthetic cases in...

Author(s): Jean-Baptiste Filippi, Vivien Mallet, Bahaa Nader

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Seasonal climate variability and change in the Pacific Northwest of the United States

www.nrfirescience.org/resource/15671

Observed changes in climate of the U.S. Pacific Northwest since the early twentieth century were examined using four different datasets. Annual mean temperature increased by approximately 0.6°–0.8°C from 1901 to 2012, with corroborating indicators including a lengthened freeze-free season, increased temperature of the coldest...

Author(s): John T. Abatzoglou, David E. Rupp, Philip W. Mote

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Role of extreme snowfall events in interannual variability of snowfall accumulation in the western United States

www.nrfirescience.org/resource/15661

Water resources in the western United States are contingent on interannual variations in snow-pack. Interannual snowpack variability has been attributed to large-scale climate patterns including the El Niño ~ no-Southern Oscillation (ENSO), however, the contribution of snowfall frequency and extreme snowfall events to this...

Author(s): A.C. Lute, John T. Abatzoglou

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Fuel treatment effectiveness in reducing fire intensity and spread rate -- an experimental overview

www.nrfirescience.org/resource/16924

Fuel treatments represent a significant component of the wildfire mitigation strategy in the United

States. However, the lack of research aimed at quantifying the explicit effectiveness of fuel treatments in reducing wildfire intensity and spread rate limits our ability to make educated decisions about the type and placement of...

Author(s): Eric Mueller, Nick Skowronski, Albert Simeoni, Kenneth L. Clark, Robert L. Kremens, William E. Mell, Michael R. Gallagher, Jan C. Thomas, Alexander I. Filkov, M. El Houssami, John L. Hom, Bret W. Butler

Year Published: 2014

Type: Document

Conference Proceedings

Tracking interannual streamflow variability with drought indices in the U.S. Pacific Northwest

www.nrfirescience.org/resource/15659

Drought indices are often used for monitoring interannual variability in macroscale hydrology. However, the diversity of drought indices raises several issues: 1) which indices perform best and where; 2) does the incorporation of potential evapotranspiration (PET) in indices strengthen relationships, and how sensitive is the choice...

Author(s): John T. Abatzoglou, Renaud Barbero, Jacob W. Wolf, Zachary A. Holden

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Is proportion burned severely related to daily area burned?

www.nrfirescience.org/resource/13018

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

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

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Optimising fuel treatments over time and space

www.nrfirescience.org/resource/12039

Fuel treatments have been widely used as a tool to reduce catastrophic wildland fire risks in many forests around the world. However, it is a challenging task for forest managers to prioritise where, when, and how to implement fuel treatments across a large forest landscape. In this study, an optimisation model was developed for...

Author(s): Woodam Chung, J. Greg Jones, Kurt Krueger, Jody Bramel, Marco A. Contreras

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Fuel Characteristic Classification System version 3.0: technical documentation

www.nrfirescience.org/resource/12407

The Fuel Characteristic Classification System (FCCS) is a software module that records wildland fuel characteristics and calculates potential fire behavior and hazard potentials based on input environmental variables. The FCCS 3.0 is housed within the Integrated Fuels Treatment Decision Support System (Joint Fire Science Program...

Author(s): Susan J. Prichard, David V. Sandberg, Roger D. Ottmar, Ellen Eberhardt, Anne Andreu, Paige C. Eagle, Kjell Swedin

Year Published: 2013
Type: Document
Technical Report or White Paper

Developing a computerized approach for optimizing individual tree removal to efficiently reduce crown fire potential

www.nrfirescience.org/resource/11889

Thinning is a common silvicultural treatment being widely used to restore different types of overstocked forest stands in western U.S. because of its effect on changing fire behavior. Typically, thinning is applied at the stand level using prescriptions derived from sample plots that ignore variability in tree sizes and location...

Author(s): Marco A. Contreras, Woodam Chung

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Uncertainty associated with model predictions of surface and crown fire rates of spread

www.nrfirescience.org/resource/12418

The degree of accuracy in model predictions of rate of spread in wildland fires is dependent on the model's applicability to a given situation, the validity of the model's relationships, and the reliability of the model input data. On the basis of a compilation of 49 fire spread model evaluation datasets involving 1278 observations...

Author(s): Miguel G. Cruz, Martin E. Alexander

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Modelling conditional burn probability patterns for large wildland fires

www.nrfirescience.org/resource/12005

We present a technique for modelling conditional burn probability patterns in two dimensions for large wildland fires. The intended use for the model is strategic program planning when information about future fire weather and event durations is unavailable and estimates of the average probabilistic shape and extent of large fires...

Author(s): Pamela S. Ziesler, Douglas B. Rideout, Robin Reich

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Current status and future needs of the BehavePlus Fire Modeling System

www.nrfirescience.org/resource/12392

The BehavePlus Fire Modeling System is among the most widely used systems for wildland fire prediction. It is designed for use in a range of tasks including wildfire behaviour prediction, prescribed fire planning, fire investigation, fuel hazard assessment, fire model understanding, communication and research. BehavePlus is based on...

Author(s): Patricia L. Andrews

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

The missing mountain water: slower westerlies decrease orographic enhancement in the Pacific

Northwest USA

www.nrfirescience.org/resource/15674

Trends in streamflow timing and volume in the Pacific Northwest United States have been attributed to increased temperatures, because trends in precipitation at lower-elevation stations were negligible. We demonstrate that observed streamflow declines are probably associated with declines in mountain precipitation, revealing...

Author(s): Charles H. Luce, John T. Abatzoglou, Zachary A. Holden

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Combustibility of a mixture of live and dead fuel components

www.nrfirescience.org/resource/12427

The problem of predicting the rate of spread of a linear fire front in a fuel bed composed of one live and one dead fuel component in no-slope and no-wind conditions is addressed. Two linear models based on the mass fraction of each fuel component are proposed to predict the rate of spread of a fire front as a function of the mass...

Author(s): Domingos Xavier Viegas, J. Soares, Miguel Almeida

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Quantifying the potential impacts of fuel treatments on wildfire suppression costs

www.nrfirescience.org/resource/16138

Modeling the impacts and effects of hazardous fuel reduction treatments is a pressing issue within the wildfire management community. Prospective evaluation of fuel treatment effectiveness allows for comparison of alternative treatment strategies in terms of socioeconomic and ecological impacts and facilitates analysis of tradeoffs...

Author(s): Matthew P. Thompson, Nicole M. Vaillant, Jessica R. Haas, Krista M. Gebert, Keith Stockmann

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

A study of flame spread in engineered cardboard fuelbeds: part II: scaling law approach

www.nrfirescience.org/resource/12419

In this second part of a two part exploration of dynamic behavior observed in wildland fires, time scales differentiating convective and radiative heat transfer is further explored. Scaling laws for the two different types of heat transfer considered: Radiation-driven fire spread, and convection-driven fire spread, which can both...

Author(s): Brittany A. Adam, Nelson K. Akafuah, Mark A. Finney, Jason M. Forthofer, Kozo Saito

Year Published: 2013

Type: Document

Conference Proceedings

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

www.nrfirescience.org/resource/12442

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

Author(s): Roger D. Ottmar
Year Published: 2013
Type: Document
Book or Chapter or Journal Article, Synthesis

A polygon-based modeling approach to assess exposure of resources and assets to wildfire

www.nrfirescience.org/resource/12048

Spatially explicit burn probability modeling is increasingly applied to assess wildfire risk and inform mitigation strategy development. Burn probabilities are typically expressed on a per-pixel basis, calculated as the number of times a pixel burns divided by the number of simulation iterations. Spatial intersection of highly...

Author(s): Matthew P. Thompson, Joe H. Scott, Jeffrey D. Kaiden, Julie W. Gilbertson-Day

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Fire weather case study - Mann Gulch Fire, Montana

www.nrfirescience.org/resource/11976

The intent of this report is to analyze weather conditions to determine if a 'critical fire weather pattern' also contributed to the 'blowup.'

Author(s): Paul A. Werth

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Backfire technique for prescribed burning

www.nrfirescience.org/resource/12400

The term 'backfire' refers to a commonly used method for prescribed burning in which the igniter sets a line of fire that slowly backs into the wind. This technique should not be confused with the colloquial use of the term 'backfire' for 'suppression fire,' which refers to any fire set ahead of a wildfire in an attempt to stop it.

Author(s): Dale D. Wade

Year Published: 2013

Type: Document

Research Brief or Fact Sheet

Fire behaviour case study of two early winter grass fires in southern Alberta, 27 November 2011

www.nrfirescience.org/resource/11995

On November 27, 2011, two wildfires - the Lethbridge Fire and the Milk River Ridge Fire - starting within approximately an hour of each other, advanced in a north-easterly direction some 12 km and 32 km, respectively, from their point of origin in a relatively short period of time. Fortunately, no lives were lost. However, a few...

Author(s): Martin E. Alexander, Mark J. Heathcott, Randall L. Schwanke

Year Published: 2013

Type: Document

Technical Report or White Paper

Models for predicting fuel consumption in sagebrush-dominated ecosystems

www.nrfirescience.org/resource/11978

Fuel consumption predictions are necessary to accurately estimate or model fire effects, including

pollutant emissions during wildland fires. Fuel and environmental measurements on a series of operational prescribed fires were used to develop empirical models for predicting fuel consumption in big sagebrush (*Artemisia tridentata*...

Author(s): Clinton S. Wright

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Wildfire exposure and fuel management on western US national forests

www.nrfirescience.org/resource/12756

Substantial investments in fuel management activities on national forests in the western US are part of a national strategy to reduce human and ecological losses from catastrophic wildfire and create fire resilient landscapes. Prioritizing these investments within and among national forests remains a challenge, partly because a...

Author(s): Alan A. Ager, Michelle A. Day, Charles W. McHugh, Karen C. Short, Julie W. Gilbertson-Day, Mark A. Finney, David E. Calkin

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Flame descriptors

www.nrfirescience.org/resource/12396

The following three descriptors are used to characterize flaming combustion: 1) Flame height is the vertical distance from the base to the tip of the flames. 2) Flame length is the actual length of the flames from the tip to the midpoint of the flame footprint. Under no-wind conditions on flat ground, flame length equals flame...

Author(s): Dale D. Wade

Year Published: 2013

Type: Document

Research Brief or Fact Sheet

The relationship of large fire occurrence with drought and fire danger indices in the western USA, 1984-2008: the role of temporal scale

www.nrfirescience.org/resource/12025

The relationship between large fire occurrence and drought has important implications for fire prediction under current and future climates. This study's primary objective was to evaluate correlations between drought and fire-danger-rating indices representing short- and long-term drought, to determine which had the strongest...

Author(s): Karen L. Riley, John T. Abatzoglou, Isaac C. Grenfell, Anna E. Klene, Faith A. Heinsch

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Development of gridded surface meteorological data for ecological applications and modeling

www.nrfirescience.org/resource/15682

Landscape-scale ecological modelling has been hindered by suitable high-resolution surface meteorological datasets. To overcome these limitations, desirable spatial attributes of gridded climate data are combined with desirable temporal attributes of regional-scale reanalysis and daily gauge-based precipitation to derive a spatially...

Author(s): John T. Abatzoglou

Year Published: 2013

Type: Document
Book or Chapter or Journal Article

Angular variation of fire rate of spread

www.nrfirescience.org/resource/12428

Laboratory fire tests were performed in still air, for variable inclinations (10°, 15°) and fuel bed dimensions (1.28 x 2.50-3.0 x 4.6 m²), with homogeneous fuel beds of pine needles and pine wood excelsior. The fire ignition was made at a point, along a closed line with no fuel inside and along a straight edge of the fuel bed...

Author(s): Jorge C. S. Andre, Joao C. Goncalves, Gilberto C. Vaz, Domingos Xavier Viegas

Year Published: 2013

Type: Document
Book or Chapter or Journal Article

Capturing fire: RxCADRE takes fire measurements to whole new level

www.nrfirescience.org/resource/12425

Models of fire behavior and effects do not always make accurate predictions, and there is not enough systematically gathered data to validate them. To help advance fire behavior and fire effects model development, the Joint Fire Science Program is helping fund the RxCADRE, which is made up of scientists from the U.S. Forest Service...

Author(s): Gail Wells

Year Published: 2013

Type: Document
Research Brief or Fact Sheet

Forest fire management to avoid unintended consequences: a case study of Portugal using system dynamics

www.nrfirescience.org/resource/18905

Forest fires are a serious management challenge in many regions, complicating the appropriate allocation to suppression and prevention efforts. Using a System Dynamics (SD) model, this paper explores how interactions between physical and political systems in forest fire management impact the effectiveness of different allocations. A...

Author(s): Ross D. Collins, Richard de Neufville, João Claro, Tiago M. Oliveira, Abílio Pereira Pacheco

Year Published: 2013

Type: Document
Book or Chapter or Journal Article

Are the applications of wildland fire behaviour models getting ahead of their evaluation again?

www.nrfirescience.org/resource/12417

Evaluation is a crucial component for model credibility and acceptance by researchers and resource managers. The nature and characteristics of free-burning wildland fires pose challenges to acquiring the kind of quality data necessary for adequate fire behavior model evaluation. As a result, in some circles it has led to a research...

Author(s): Martin E. Alexander, Miguel G. Cruz

Year Published: 2013

Type: Document
Book or Chapter or Journal Article

Crown fire behavior characteristics and prediction in conifer forests: a state-of-knowledge synthesis - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/12447

Joint Fire Science Program (JFSP) project 09-S-03-1 was undertaken in response to JFSP Project Announcement No. FA-RFA09-0002 with respect to a synthesis on extreme fire behavior or more specifically a review and analysis of the literature dealing with certain features of crown fire behavior in conifer forests in the United States...

Author(s): Martin E. Alexander, Miguel G. Cruz, Nicole M. Vaillant, David L. Peterson

Year Published: 2013

Type: Document

Synthesis, Technical Report or White Paper

Surface fire intensity influences simulated crown fire behavior in lodgepole pine forests with recent mountain pine beetle-caused tree mortality

www.nrfirescience.org/resource/12138

Recent bark beetle outbreaks have had a significant impact on forests throughout western North America and have generated concerns about interactions and feedbacks between beetle attacks and fire. However, research has been hindered by a lack of experimental studies and the use of fire behavior models incapable of accounting for the...

Author(s): Chad M. Hoffman, Penelope Morgan, William E. Mell, Russell A. Parsons, Eva K. Strand, Stephen Cook

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Spatial bottom-up controls on fire likelihood vary across western North America

www.nrfirescience.org/resource/8311

The unique nature of landscapes has challenged our ability to make generalizations about the effects of bottom-up controls on fire regimes. For four geographically distinct fire-prone landscapes in western North America, we used a consistent simulation approach to quantify the influence of three key bottom-up factors, ignitions,...

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

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Fourmile Canyon Fire Findings

www.nrfirescience.org/resource/17701

The Fourmile Canyon Fire burned in the fall of 2010 in the Rocky Mountain Front Range adjacent to Boulder, Colorado. The fire occurred in steep, rugged terrain, primarily on privately owned mixed ponderosa pine and Douglas-fir forests. The fire started on September 6 when the humidity of the air was very dry (about <7%) and the...

Author(s): Russell T. Graham, Mark A. Finney, Charles W. McHugh, Jack D. Cohen, David E. Calkin, Richard D. Stratton, Ned Nikolov

Year Published: 2012

Type: Document

Technical Report or White Paper

The Waldo Canyon Fire: Fires on the Colorado Front Range and Home Destruction - A Report to the Pike and San Isabel National Forests

www.nrfirescience.org/resource/11266

The purpose of this white paper is to discuss fires on the Colorado Front Range and to share initial observations of fire behavior and home destruction during the Waldo Canyon Fire. It is my hope that

these lessons and observations will be beneficial to agencies and especially the public. I want to share this information early when...

Author(s): Richard D. Stratton

Year Published: 2012

Type: Document

Technical Report or White Paper

Climate extremes and their linkage to regional drought over Idaho, USA

www.nrfirescience.org/resource/15683

To investigate consequences of climate extreme and variability on agriculture and regional water resource, twenty-seven climatic indices of temperature and precipitation over Idaho, USA, were computed. Precipitation, mean temperature and maximum temperature, self-calibrated Palmer Drought Index and Standardized Precipitation Index...

Author(s): Mohammad Sohrabi, Jae H. Ryu, John T. Abatzoglou, John Tracy

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management

www.nrfirescience.org/resource/8320

Declining forest health attributed to associations between extensive bark beetle-caused tree mortality, accumulations of hazardous fuels, wildfire, and climate change have catalyzed changes in forest health and wildfire protection policies of land management agencies. These changes subsequently prompted research to investigate the...

Author(s): Michael J. Jenkins, Wesley G. Page, Elizabeth G. Hebertson, Martin E. Alexander

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

Modeling tree-level fuel connectivity to evaluate the effectiveness of thinning treatments for reducing crown fire potential

www.nrfirescience.org/resource/8295

Land managers have been using fire behavior and simulation models to assist in several fire management tasks. These widely-used models use average attributes to make stand-level predictions without considering spatial variability of fuels within a stand. Consequently, as the existing models have limitations in adequately modeling...

Author(s): Marco A. Contreras, Russell A. Parsons, Woodam Chung

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Relationships between moisture, chemistry, and ignition of Pinus contorta needles during the early stages of mountain pine beetle attack

www.nrfirescience.org/resource/8317

Very little is known about how foliar moisture and chemistry change after a mountain pine beetle attack and even less is known about how these intrinsic foliar characteristics alter foliage ignitability. Here, we examine the fuel characteristics and ignition potential of Pinus contorta (lodgepole pine) foliage during the early...

Author(s): William Matt Jolly, Russell A. Parsons, Ann M. Hadlow, Greg M. Cohn, Sara S. McAllister, John B. Popp, Robert M. Hubbard, Jose F. Negrón

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

Properties affecting the consumption of sound and rotten coarse woody debris in northern Idaho: a preliminary investigation using laboratory fires

www.nrfirescience.org/resource/8333

This study evaluates the consumption of coarse woody debris in various states of decay. Samples from a northern Idaho mixed-conifer forest were classified using three different classification methods, ignited with two different ignition methods and consumption was recorded. Intrinsic properties that change with decay were measured...

Author(s): Joshua C. Hyde, Alistair M. S. Smith, Roger D. Ottmar

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Entrainment regimes and flame characteristics of wildland fires

www.nrfirescience.org/resource/16925

This paper reports results from a study of the flame characteristics of 22 wind-aided pine litter fires in a laboratory wind tunnel and 32 field fires in southern rough and litter-grass fuels. Flame characteristic and fire behaviour data from these fires, simple theoretical flame models and regression techniques are used to...

Author(s): Ralph M. Nelson, Bret W. Butler, David R. Weise

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Numerical simulation of crown fire hazard immediately after bark beetle-caused mortality in lodgepole pine forests

www.nrfirescience.org/resource/8325

Quantifying the effects of mountain pine beetle (MPB)-caused tree mortality on potential crown fire hazard has been challenging partly because of limitations in current operational fire behavior models. Such models are not capable of accounting for fuel heterogeneity resulting from an outbreak. Further, the coupled interactions...

Author(s): Chad M. Hoffman, Penelope Morgan, William E. Mell, Russell A. Parsons, Eva K. Strand, Stephen Cook

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/8339

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

Spatial variability in wildfire probability across the western United States

www.nrfirescience.org/resource/8322

Despite growing knowledge of fire-environment linkages in the western USA, obtaining reliable estimates of relative wildfire likelihood remains a work in progress. The purpose of this study is to use updated fire observations during a 25-year period and a wide array of environmental variables in a statistical framework to produce...

Author(s): Marc-Andre Parisien, Susan Snetsinger, Jonathan A. Greenberg, Cara R. Nelson, Tania L. Schoennagel, Solomon Z. Dobrowski, Max A. Moritz

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Effect of suppression strategies on federal wildland fire expenditures

www.nrfirescience.org/resource/17807

Policymakers and decisionmakers alike have suggested that the use of less aggressive suppression strategies for wildland fires might help stem the tide of rising emergency wildland fire expenditures. However, the interplay of wildland fire management decisions and expenditures is not well understood. In this study, we assess the...

Author(s): Krista M. Gebert, Anne E. Black

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

An evaluation of multi-scalar drought indices in Nevada and eastern California

www.nrfirescience.org/resource/15687

Nevada and eastern California are home to some of the driest and warmest climates, most mountainous regions, and fastest growing metropolitan areas of the United States. Throughout Nevada and eastern California, snow-dominated watersheds provide most of the water supply for both human and environmental demands. Increasing demands on...

Author(s): Daniel J. McEvoy, Justin L. Huntington, John T. Abatzoglou, Laura M. Edwards

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Evaluating regression model estimates of canopy fuel stratum characteristics in four crown fire-prone fuel types in western North America

www.nrfirescience.org/resource/8312

Two evaluations were undertaken of the regression equations developed by M. Cruz, M. Alexander and R. Wakimoto (2003, International Journal of Wildland Fire 12, 39-50) for estimating canopy fuel stratum characteristics from stand structure variables for four broad coniferous forest fuel types found in western North America. The...

Author(s): Miguel G. Cruz, Martin E. Alexander

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests? Comment 1 & 2, Reply 1

www.nrfirescience.org/resource/13342

Comment 1 - Simard et al. (2011) have produced a comprehensive data set and analysis concerning

mountain pine beetle (MPB; *Dendroctonus ponderosae*)-caused mortality and associated crown fire feedbacks in lodgepole pine (*Pinus contorta*)-dominated forests. Misapplication of the NEXUS fire modeling system (Scott and...

Author(s): Christopher J. Moran, Mark A. Cochrane, William Matt Jolly, Russell A. Parsons, J. Morgan Varner, Bret W. Butler, Kevin C. Ryan, Corey L. Gucker, Martin Simard, William H. Romme, Monica G. Turner

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Towards the understanding of extreme wildland fire behavior

www.nrfirescience.org/resource/11092

The author presents a brief discussion of the changing face of extreme fire behavior and an introduction to Synthesis of knowledge of extreme fire behavior: volume I for fire managers.

Author(s): Martin E. Alexander

Year Published: 2012

Type: Document

Research Brief or Fact Sheet

A comparison of statistical downscaling methods suited for wildfire applications

www.nrfirescience.org/resource/11973

Place-based data is required in wildfire analyses, particularly in regions of diverse terrain that foster not only strong gradients in meteorological variables, but also complex fire behaviour. However, a majority of downscaling methods are inappropriate for wildfire application due to the lack of daily timescales and variables such...

Author(s): John T. Abatzoglou, Timothy J. Brown

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Influence of the PNA on declining mountain snowpack in the western United States

www.nrfirescience.org/resource/15695

The widespread decrease in mountain snowpack across the Western United States is a hallmark indicator of regional climate change. Observed decreases in snowpack across lower-elevation watersheds are broadly consistent with model predictions of anthropogenic climate change; however, the magnitude of the decreases across much of the...

Author(s): John T. Abatzoglou

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

How fuel treatments saved homes from the 2011 Wallow fire

www.nrfirescience.org/resource/17699

This is a fuel treatment effectiveness assessment report from Region 3 about the success of fuel treatments in protecting several communities from the recent Wallow fire in Arizona and New Mexico. The report narrative and graphics point to the success of good forest management and good community assistance to protect life, property...

Author(s): Pam Bostwick, James P. Menakis, Tim Sexton

Year Published: 2011

Type: Document

Technical Report or White Paper

Changes in climatic water balance drive downhill shifts in plant species optimum elevations

www.nrfirescience.org/resource/15690

Uphill shifts of species' distributions in response to historical warming are well documented, which leads to widespread expectations of continued uphill shifts under future warming. Conversely, downhill shifts are often considered anomalous and unrelated to climate change. By comparing the altitudinal distributions of 64 plant...

Author(s): Shawn M. Crimmins, Solomon Z. Dobrowski, Jonathan A. Greenberg, John T. Abatzoglou, Alison R. Mynsberge

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Analyzing wildfire exposure and source-sink relationships on a fire prone forest landscape

www.nrfirescience.org/resource/12736

We used simulation modeling to analyze wildfire exposure to social and ecological values on a 0.6 million ha national forest in central Oregon, USA. We simulated 50,000 wildfires that replicated recent fire events in the area and generated detailed maps of burn probability (BP) and fire intensity distributions. We also recorded the...

Author(s): Alan A. Ager, Nicole M. Vaillant, Mark A. Finney, Haiganoush K. Preisler

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

A method for ensemble wildland fire simulation

www.nrfirescience.org/resource/12732

An ensemble simulation system that accounts for uncertainty in long-range weather conditions and two-dimensional wildland fire spread is described. Fuel moisture is expressed based on the energy release component, a US fire danger rating index, and its variation throughout the fire season is modeled using time series analysis of...

Author(s): Mark A. Finney, Isaac C. Grenfell, Charles W. McHugh, Robert C. Seli, D. Trethewey, Richard D. Stratton, Stuart Brittain

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Linking 3D spatial models of fuels and fire: effects of spatial heterogeneity on fire behavior

www.nrfirescience.org/resource/14161

Crownfire endangers fire fighters and can have severe ecological consequences. Prediction of fire behavior in tree crowns is essential to informed decisions in fire management. Current methods used in fire management do not address variability in crown fuels. New mechanistic physics-based fire models address convective heat transfer...

Author(s): Russell A. Parsons, William E. Mell, Peter McCauley

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Synthesis of knowledge of extreme fire behavior: Volume 1 for managers

www.nrfirescience.org/resource/12566

The National Wildfire Coordinating Group definition of extreme fire behavior (EFB) indicates a level of

fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning/spotting, presence of fire whirls, and strong...

Author(s): Paul A. Werth, Brian E. Potter, Craig B. Clements, Mark A. Finney, Scott L. Goodrick, Martin E. Alexander, Miguel G. Cruz, Jason M. Forthofer, Sara S. McAllister

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests?

www.nrfirescience.org/resource/13340

Disturbance interactions have received growing interest in ecological research in the last decade. Fire and bark beetle outbreaks have recently increased in severity and extent across western North America, raising concerns about their possible interactions. Although it is often presumed that bark beetle outbreaks increase...

Author(s): Martin Simard, William H. Romme, Jacob M. Griffin, Monica G. Turner

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/11449

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

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

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

Empirical downscaling of daily minimum air temperature at very fine resolutions in complex terrain

www.nrfirescience.org/resource/15692

Available air temperature models do not adequately account for the influence of terrain on nocturnal air temperatures. An empirical model for night time air temperatures was developed using a network of one hundred and forty inexpensive temperature sensors deployed across the Bitterroot National Forest, Montana. A principle...

Author(s): Zachary A. Holden, John T. Abatzoglou, Scott L. Baggett, Charles H. Luce

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

A simulation of probabilistic wildfire risk components for the continental United States

www.nrfirescience.org/resource/12734

This simulation research was conducted in order to develop a large-fire risk assessment system for the contiguous land area of the United States. The modeling system was applied to each of 134 Fire Planning Units (FPUs) to estimate burn probabilities and fire size distributions. To obtain stable

estimates of these quantities, fire...

Author(s): Mark A. Finney, Charles W. McHugh, Isaac C. Grenfell, Karen L. Riley, Karen C. Short

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Simulating fuel treatment effects in dry forests of the western United States: testing the principles of a fire-safe forest

www.nrfirescience.org/resource/8275

We used the Fire and Fuels Extension to the Forest Vegetation Simulator (FFE-FVS) to simulate fuel treatment effects on 45,162 stands in low- to midelevation dry forests (e.g., ponderosa pine (*Pinus ponderosa* Dougl. ex. P....

Author(s): Morris C. Johnson, Maureen C. Kennedy, David L. Peterson

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Characterization of flame radiosity in shrubland fires

www.nrfirescience.org/resource/16927

The present study is aimed at quantifying the flame radiosity vertical profile and gas temperature in moderate to high intensity spreading fires in shrubland fuels. We report on the results from 11 experimental fires conducted over a range of fire rate of spread and frontal fire intensity varying respectively between 0.04–0.35 m s...

Author(s): Miguel G. Cruz, Bret W. Butler, Domingos Xavier Viegas, Pedro Palheiro

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Detailed point weather forecasts: how to get them when you need them

www.nrfirescience.org/resource/12441

Detailed point weather forecasts are a critical component of fire management planning. Accurate hour-by-hour forecasts for your exact location are valuable when you are preparing to ignite a prescribed burn and want to compare your prescription with actual conditions. They also provide important weather documentation for your files...

Author(s): Alan J. Long, Annie Oxarart

Year Published: 2011

Type: Document

Research Brief or Fact Sheet

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

www.nrfirescience.org/resource/15318

Fire is a keystone process in many ecosystems of western North America. Severe fires kill and consume large amounts of above- and belowground biomass and affect soils, resulting in long-lasting consequences for vegetation, aquatic ecosystem productivity and diversity, and other ecosystem properties. We analyzed the occurrence of,...

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Assessing crown fire potential in coniferous forests of western North America: a critique of current approaches and recent simulation studies

www.nrfirescience.org/resource/8187

To control and use wildland fires safely and effectively depends on credible assessments of fire potential, including the propensity for crowning in conifer forests. Simulation studies that use certain fire modelling systems (i.e. NEXUS, FlamMap, FARSITE, FFE-FVS (Fire and Fuels Extension to the Forest Vegetation Simulator), Fuel...

Author(s): Miguel G. Cruz, Martin E. Alexander

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

Evaluating the ecological benefits of wildfire by integrating fire and ecosystem simulation models

www.nrfirescience.org/resource/19269

Fire managers are now realizing that wildfires can be beneficial because they can reduce hazardous fuels and restore fire-dominated ecosystems. A software tool that assesses potential beneficial and detrimental ecological effects from wildfire would be helpful to fire management. This paper presents a simulation platform called...

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

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

Initialization of high resolution surface wind simulations using NWS gridded data

www.nrfirescience.org/resource/16936

WindNinja is a standalone computer model designed to provide the user with simulations of surface wind flow. It is deterministic and steady state. It is currently being modified to allow the user to initialize the flow calculation using National Digital Forecast Database. It essentially allows the user to downscale the coarse scale...

Author(s): Jason M. Forthofer, Bret W. Butler

Year Published: 2010

Type: Document

Conference Proceedings

The effect of terrain slope on firefighter safety zone effectiveness

www.nrfirescience.org/resource/16934

The current safety zone guidelines used in the US were developed based on the assumption that the fire and safety zone were located on flat terrain. The minimum safe distance for a firefighter to be from a flame was calculated as that corresponding to a radiant incident energy flux level of $7.0\text{kW}\cdot\text{m}^{-2}$.

Current firefighter safety...

Author(s): Bret W. Butler, Jason M. Forthofer, Kyle S. Shannon, Daniel M. Jimenez, David Frankman

Year Published: 2010

Type: Document

Conference Proceedings

Firefighter safety zone: the effect of terrain slope of separation distance

www.nrfirescience.org/resource/16930

Perhaps one of the most critical decisions made on wildland fires is the identification of suitable safety

zones for firefighters during daily fire management operations. To be effective (timely, repeatable, and accurate), these decisions rely on good training and good judgement. The current safety zone guidelines used in the US (...)

Author(s): Bret W. Butler, Jason M. Forthofer

Year Published: 2010

Type: Document

Conference Proceedings

A comparison of landscape fuel treatment strategies to mitigate wildland fire risk in the urban interface and preserve old forest structure

www.nrfirescience.org/resource/12725

We simulated fuel reduction treatments on a 16,000 ha study area in Oregon, US, to examine tradeoffs between placing fuel treatments near residential structures within an urban interface, versus treating stands in the adjacent wildlands to meet forest health and ecological restoration goals. The treatment strategies were evaluated...

Author(s): Alan A. Ager, Nicole M. Vaillant, Mark A. Finney

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

A portable system for characterizing wildland fire behavior

www.nrfirescience.org/resource/16928

A field deployable system for quantifying energy and mass transport in wildland fires is described. The system consists of two enclosures: The first is a sensor/data logger combination package that allows characterization of convective/radiant energy transport in fires. This package contains batteries, a programmable data logger,...

Author(s): Bret W. Butler, Daniel M. Jimenez, Jason M. Forthofer, Kyle S. Shannon, Paul Sopko

Year Published: 2010

Type: Document

Conference Proceedings

Large scale fire whirls: can their formation be predicted?

www.nrfirescience.org/resource/16937

Large scale fire whirls have not traditionally been recognized as a frequent phenomenon on wildland fires. However, there are anecdotal data suggesting that they can and do occur with some regularity. This paper presents a brief summary of this information and an analysis of the causal factors leading to their formation.

Author(s): Jason M. Forthofer, Bret W. Butler

Year Published: 2010

Type: Document

Conference Proceedings

Fine fuel heating by radiant flux

www.nrfirescience.org/resource/16903

Experiments were conducted wherein wood shavings and Ponderosa pine needles in quiescent air were subjected to a steady radiation heat flux from a planar ceramic burner. The internal temperature of these particles was measured using fine diameter (0.076 mm diameter) type K thermocouples. A narrow angle radiometer was used to...

Author(s): David Frankman, Brent W. Webb, Bret W. Butler, Donald J. Latham

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

In-situ characterization of wildland fire behavior

www.nrfirescience.org/resource/16932

A system consisting of two enclosures has been developed to characterize wildland fire behavior: The first enclosure is a sensor/data logger combination that measures and records convective/radiant energy released by the fire. The second is a digital video camera housed in a fire proof enclosure that records visual images of fire...

Author(s): Bret W. Butler, Daniel M. Jimenez, Jason M. Forthofer, Paul Sopko, Kyle S. Shannon, James J. Reardon

Year Published: 2010

Type: Document

Conference Proceedings

Wildfire risk and hazard: procedures for the first approximation

www.nrfirescience.org/resource/12726

This report was designed to meet three broad goals: (1) evaluate wildfire hazard on Federal lands; (2) develop information useful in prioritizing where fuels treatments and mitigation measures might be proposed to address significant fire hazard and risk; and (3) develop risk-based performance measures to document the effectiveness...

Author(s): David E. Calkin, Alan A. Ager, Julie W. Gilbertson-Day

Year Published: 2010

Type: Document

Technical Report or White Paper

Characterization of convective heating in full scale wildland fires

www.nrfirescience.org/resource/16929

Data collected in the International Crown Fire modeling Experiment during 1999 are evaluated to characterize the magnitude and duration of convective energy heating in full scale crown fires. To accomplish this objective data on total and radiant incident heat flux, air temperature, and horizontal and vertical gas velocities were...

Author(s): Bret W. Butler

Year Published: 2010

Type: Document

Conference Proceedings

How big was Dodge's escape fire?

www.nrfirescience.org/resource/8289

Several published accounts exist of how smokejumper foreman Wag Dodge survived the 1949 Mann Gulch Fire in northwestern Montana by setting an 'escape fire' in cured grass fuels, the most notable among them being Norman Maclean's 1992 book *Young Men and Fire*. Two other smokejumpers survived by reaching a rockslide. Sadly, 12...

Author(s): Martin E. Alexander

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/8189

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

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

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

Wildland surface fire spread modelling, 1990-2007. 1: Physical and quasi-physical models

www.nrfirescience.org/resource/13823

In recent years, advances in computational power have led to an increase in attempts to model the behaviour of wildland fires and to simulate their spread across the landscape. The present series of articles endeavours to comprehensively survey and present all types of surface fire spread models developed during the period 1990-...

Author(s): Andrew L. Sullivan

Year Published: 2009

Type: Document

Book or Chapter or Journal Article, Synthesis

How much influence does landscape-scale physiography have on air temperature in a mountain environment?

www.nrfirescience.org/resource/15698

Spatio-temporal patterns of temperature in mountain environments are complex due to both regional synoptic-scale and landscape-scale physiographic controls in these systems. Understanding the nature and magnitude of these physiographic effects has practical and theoretical implications for the development of temperature datasets...

Author(s): Solomon Z. Dobrowski, John T. Abatzoglou, Jonathan A. Greenberg, S.G. Schladow

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

Rx-CADRE (Prescribed Fire Combustion-Atmospheric Dynamics Research Experiments) collaborative research in the core fire sciences

www.nrfirescience.org/resource/16939

The Rx-CADRE project was the combination of local and national fire expertise in the field of core fire research. The project brought together approximately 30 fire scientists from six geographic regions and seven different agencies. The project objectives were to demonstrate the capacity for collaborative research by bringing...

Author(s): Daniel M. Jimenez, J. Kevin Hiers, Roger D. Ottmar, Matthew B. Dickinson, Robert L. Kremens, Joseph J. O'Brien, Andrew T. Hudak, C. Clements

Year Published: 2009

Type: Document

Conference Proceedings

Fuel treatment guidebook: illustrating treatment effects on fire hazard

www.nrfirescience.org/resource/8155

The Guide to Fuel Treatments (Johnson and others 2007) analyzes potential fuel treatments and the potential effects of those treatments for dry forest lands in the Western United States. The guide examines low- to mid-elevation dry forest stands with high stem densities and heavy ladder fuels, which are currently common due to fire...

Author(s): Crystal L. Raymond
Year Published: 2009
Type: Document
Book or Chapter or Journal Article

The 1988 fires of Yellowstone and beyond as a wildland fire behavior case study

www.nrfirescience.org/resource/11217

A 'Learning Organization' is an organization that creates, acquires, interprets, transfers, and retains knowledge and purposefully modifies its behavior to reflect new knowledge and insights (Garvin 2000). Dr. Marty Alexander's report The 1988 Fires of Yellowstone and Beyond as a Wildland Fire Behavior Case Study now provides the...

Author(s): Martin E. Alexander
Year Published: 2009
Type: Document
Technical Report or White Paper

Wildland surface fire spread modelling, 1990-2007. 2: Empirical and quasi-empirical models

www.nrfirescience.org/resource/13824

In recent years, advances in computational power have led to an increase in attempts to model the behaviour of wildland fires and to simulate their spread across landscape. The present series of articles endeavours to comprehensively survey and précis all types of surface fire spread models developed during the period 1990-2007....

Author(s): Andrew L. Sullivan
Year Published: 2009
Type: Document
Book or Chapter or Journal Article, Synthesis

Learning the rhythm of the seasons in the face of global change: phenological research in the 21st century

www.nrfirescience.org/resource/15709

Phenology is the study of recurring life-cycle events, classic examples being the flowering of plants and animal migration. Phenological responses are increasingly relevant for addressing applied environmental issues. Yet, challenges remain with respect to spanning scales of observation, integrating observations across taxa, and...

Author(s): Jeffrey T. Morrisette, Andrew D. Richardson, Alan K. Knapp, Jeremy I. Fisher, Eric A. Graham, John T. Abatzoglou, Bruce E. Wilson, David D. Breshears, Geoffrey M. Henebry, Jonathan M. Hanes, Liang Liang
Year Published: 2009
Type: Document
Book or Chapter or Journal Article

Influence of the Madden Julian Oscillation on summertime cloud-to-ground lightning activity over the continental US

www.nrfirescience.org/resource/15696

Summertime cloud-to-ground lightning strikes are responsible for the majority of wildfire ignitions across vast sections of the seasonally dry western United States. In this study, a strong connection between active phases of the Madden-Julian oscillation (MJO) and regional summertime lightning activity was found across the...

Author(s): John T. Abatzoglou, Timothy J. Brown
Year Published: 2009
Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/17700

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

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

Year Published: 2009

Type: Document

Technical Report or White Paper

An analysis of Dodge's escape fire on the 1949 Mann Gulch Fire in terms of a survival zone for wildland firefighters

www.nrfirescience.org/resource/11020

The Wildland Fire Operations Research Group of FPIInnovations-Feric Division in collaboration with the University of Alberta initiated a project in late 2007 at the request of its stakeholders to examine and define the limits of wildland firefighter safety and survival zones. Part of this project involves examining past wildfire...

Author(s): Martin E. Alexander, Mark Y. Ackerman, Gregory J. Baxter

Year Published: 2009

Type: Document

Conference Proceedings

Efforts to update firefighter safety zone guidelines

www.nrfirescience.org/resource/16935

One of the most critical decisions made on wildland fires is the identification of suitable safety zones for firefighters during daily fire management operations. To be effective (timely, repeatable, and accurate), these decisions rely on good training and judgment, but also on clear, concise guidelines. This article is a summary of...

Author(s): Bret W. Butler

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

January 31st 2009 off-season grassland wildfire

www.nrfirescience.org/resource/11145

Wildland fires can be high impact events no matter what the season or fuel type. While the first image that comes to mind of wildland fire suppression is timbered mountainous terrain on a late summer afternoon, this wildland fire occurred in relatively flat grasslands during the overnight and early morning hours, during the...

Author(s): Robert W. Hoenisch

Year Published: 2009

Type: Document

Technical Report or White Paper

The '88 Fires: Yellowstone and Beyond IAWF Conference Proceedings

www.nrfirescience.org/resource/18464

Description not available

Author(s): Ronald E. Masters, Krista E. M. Galley, Don G. Despain

Year Published: 2009

Type: Document

Conference Proceedings

Wildland surface fire spread modelling, 1990-2007. 3: Simulation and mathematical analogue models

www.nrfirescience.org/resource/13825

In recent years, advances in computational power have led to an increase in attempts to model the behaviour of wildland fires and to simulate their spread across landscape. The present series of articles endeavours to comprehensively survey and précis all types of surface fire spread models developed during the period 1990-2007....

Author(s): Andrew L. Sullivan

Year Published: 2009

Type: Document

Book or Chapter or Journal Article, Synthesis

Seasonal predictions for wildland fire severity

www.nrfirescience.org/resource/11064

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

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

Year Published: 2009

Type: Document

Conference Proceedings, Technical Report or White Paper

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

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

Temporal and spatial structure in a daily wildfire-start data set from the western United States (1986-96)

www.nrfirescience.org/resource/8201

The temporal and spatial structure of 332 404 daily fire-start records from the western United States for the period 1986 through 1996 is illustrated using several complimentary visualisation techniques. We supplement maps and time series plots with Hovmiller diagrams that reduce the spatial dimensionality of the daily data in order...

Author(s): Patrick J. Bartlein, Steven W. Hostetler, Sarah L. Shafer, J. O. Holman, Allen M. Solomon

Year Published: 2008

Type: Document
Book or Chapter or Journal Article

A physics-based approach to modelling grassland fires

www.nrfirescience.org/resource/14842

Physics-based coupled fire-atmosphere models are based on approximations to the governing equations of fluid dynamics, combustion, and the thermal degradation of solid fuel. They require significantly more computational resources than the most commonly used fire spread models, which are semi-empirical or empirical. However, there...

Author(s): William E. Mell, Mary Ann Jenkins, Jim Gould, Phil Cheney

Year Published: 2007

Type: Document
Book or Chapter or Journal Article

A fuel treatment reduces fire severity and increases suppression efficiency in a mixed conifer forest

www.nrfirescience.org/resource/17717

Fuel treatments are being implemented on public and private lands across the western United States. Although scientists and managers have an understanding of how fuel treatments can modify potential fire behaviour under modelled conditions, there is limited information on how treatments perform under real wildfire conditions in...

Author(s): Jason J. Moghaddas, Larry Craggs

Year Published: 2007

Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/11164

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

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

Year Published: 2007

Type: Document
Technical Report or White Paper

Effects of alternative treatments on canopy fuel characteristics in five conifer stands

www.nrfirescience.org/resource/11129

A detailed study of canopy fuel characteristics in five different forest types provided a unique dataset for simulating the effects of various stand manipulation treatments on canopy fuels. Low thinning, low thinning with commercial dbh limit, and crown thinning had similar effects on canopy bulk density (CBD) and canopy fuel load (...)

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

Year Published: 2007

Type: Document
Conference Proceedings, Technical Report or White Paper

Guide to fuel treatments in dry forests of the Western United States: assessing forest structure

and fire hazard

www.nrfirescience.org/resource/11166

Guide to Fuel Treatments analyzes a range of fuel treatments for representative dry forest stands in the Western United States with overstories dominated by ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and pinyon pine (*Pinus edulis*). Six silvicultural options (no thinning; thinning from below to 50 trees...

Author(s): Morris C. Johnson, David L. Peterson, Crystal L. Raymond

Year Published: 2007

Type: Document

Technical Report or White Paper

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

On the use of a firebrand generator to investigate the ignition of structures in wildland-urban interface (WUI) fires

www.nrfirescience.org/resource/12439

An experimental apparatus has been constructed to generate a controlled and repeatable size and mass distribution of glowing firebrands. The present study reports on a series of experiments conducted in order to characterize the performance of this firebrand generator. Firebrand generator characterization and subsequent structural...

Author(s): Anthony Manzello, John R. Shields, Jiann C. Yang, Yoshihiko Hayashi, Daisaku Nii

Year Published: 2007

Type: Document

Conference Proceedings

Testing the modeled effectiveness of an operational fuel reduction treatment in a small western Montana interface landscape using two spatial scales

www.nrfirescience.org/resource/8410

Much of the coniferous zones in the Western United States where fires were historically frequent have seen large increases in stand densities and associated forest fuels due to 20th century anthropogenic influences. This condition is partially responsible for contemporary large, uncharacteristically severe wildfires. Therefore,...

Author(s): Michael G. Harrington, Erin Noonan-Wright, Mitchell Doherty

Year Published: 2007

Type: Document

Conference Proceedings

Predicted fire behavior in selected mountain pine beetle-infested lodgepole pine

www.nrfirescience.org/resource/12113

Using custom fuel models developed for use with Rothermel's surface fire spread model, we predicted

and compared fire behavior in lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) stands with endemic, current epidemic, and postepidemic mountain pine beetle (*Dendroctonus ponderosae* Hopkins) populations using standardized...

Author(s): Wesley G. Page, Michael J. Jenkins

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

An assessment of fuel treatments on three large 2007 Pacific Northwest fires

www.nrfirescience.org/resource/17705

The Monument Fire burned across a landscape with extensive but relatively low intensity fuel treatments that reduced severe fire effects. The area that burned in the Egley Complex included both extensive underburns and intensive, strategically located fuel and other vegetation treatments that improved suppression effectiveness. The...

Author(s): Steve Harbert, Andrew T. Hudak, Laura Mayer, T. D. Rich, Sarah Robertson

Year Published: 2007

Type: Document

Technical Report or White Paper

Simulation of long-term landscape-level fuel treatment effects on large wildfires

www.nrfirescience.org/resource/8166

A simulation system was developed to explore how fuel treatments placed in topologically random and optimal spatial patterns affect the growth and behaviour of large fires when implemented at different rates over the course of five decades. The system consisted of a forest and fuel dynamics simulation module (Forest Vegetation...

Author(s): Mark A. Finney, Robert C. Seli, Charles W. McHugh, Alan A. Ager, Bernhard Bahro, James K. Agee

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Statistical model for forecasting monthly large wildfire events in the western United States

www.nrfirescience.org/resource/8123

The ability to forecast the number and location of large wildfire events (with specified confidence bounds) is important to fire managers attempting to allocate and distribute suppression efforts during severe fire seasons. This paper describes the development of a statistical model for assessing the forecasting skills of fire-...

Author(s): Haiganoush K. Preisler, Anthony L. Westerling

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

The fire-climate connection

www.nrfirescience.org/resource/11985

JFSP-funded research is exploring and quantifying relationships among the large-scale drivers of climate and the occurrence and extent of wildfire in the various regions of the western United States.

Author(s): Gail Wells

Year Published: 2007

Type: Document

Research Brief or Fact Sheet

Wildfires, weather, and productivity

www.nrfirescience.org/resource/11016

The object of this paper is to show the intercorrelations existing between statistics of wildfires (occurrences: N; areas burned: A), climatic parameters (precipitation: P; temperature: T) and net primary productivity: NPP. To this purpose, statistics of wildfires have been studied in several regions of the world, focusing on...

Author(s): Michel L. Bernard, Nouredine Nimour

Year Published: 2007

Type: Document

Conference Proceedings

The asymmetry of trends in spring and autumn temperature and circulation regimes over western North America

www.nrfirescience.org/resource/15710

Observational evidence shows that spring temperatures over western North America have undergone significant warming over the past half century, while autumn temperatures have shown relatively little change. Low-frequency modes of atmospheric variability for spring and autumn are demonstrated to account for a great deal of the...

Author(s): John T. Abatzoglou, Kelly T. Redmond

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Fuels Management - How to Measure Success: Conference Proceedings

www.nrfirescience.org/resource/18399

Fuels management programs are designed to reduce risks to communities and to improve and maintain ecosystem health. The International Association of Wildland Fire initiated the 1st Fire Behavior and Fuels Conference to address development, implementation, and evaluation of these programs. The focus was on how to measure success....

Author(s): Patricia L. Andrews, Bret W. Butler

Year Published: 2006

Type: Document

Conference Proceedings

Employing numerical weather models to enhance fire weather and fire behavior predictions

www.nrfirescience.org/resource/11428

This paper presents an assessment of fire weather and fire behavior predictions produced by a numerical weather prediction model similar to those used by operational weather forecasters when preparing their forecasts. The PSU/NCAR MM5 model is used to simulate the weather conditions associated with three fire episodes in June 2005....

Author(s): Joseph J. Charney, Lesley A. Fusina

Year Published: 2006

Type: Document

Conference Proceedings

Windwizard: a new tool for fire management decision support

www.nrfirescience.org/resource/16902

A new software tool has been developed to simulate surface wind speed and direction at the 100m to 300 m scale. This tool is useful when trying to estimate fire behavior in mountainous terrain. It is based on widely used computational fluid dynamics technology and has been tested against measured wind

flows. In recent years it has...

Author(s): Bret W. Butler, Mark A. Finney, Larry S. Bradshaw, Jason M. Forthofer, Charles W. McHugh, Rick Stratton, Daniel M. Jimenez

Year Published: 2006

Type: Document

Conference Proceedings

Fuel Treatment Evaluator 3.0

www.nrfirescience.org/resource/11078

The Fuel Treatment Evaluator (FTE) 3.0 is a web-based tool that simulates uneven-aged and even-aged silvicultural treatments on timberland in 12 western states. This tool simulates treatments to reduce forest fire hazard to specific target levels and identifies the volume of biomass removed, harvesting costs, and estimated biomass...

Author(s): U.S. Department of Agriculture, Forest Service

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

Planetary wave breaking and nonlinear reflection: seasonal cycle and interannual variability

www.nrfirescience.org/resource/15713

Forty-six years of daily averaged NCEP–NCAR reanalysis data are used to identify the occurrence of planetary wave breaking (PWB) in the subtropical upper troposphere. As large-amplitude waves propagate into the subtropics where the zonal flow is weak, they may break. PWB is diagnosed by observing the large-scale meridional...

Author(s): John T. Abatzoglou, Gudrun Magnusdottir

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Biomass consumption during prescribed fires in big sagebrush ecosystems

www.nrfirescience.org/resource/11419

Big sagebrush (*Artemisia tridentata*) ecosystems typically experience stand replacing fires during which some or all of the ignited biomass is consumed. Biomass consumption is directly related to the energy released during a fire, and is an important factor that determines smoke production and the effects of fire on other resources....

Author(s): Clinton S. Wright, Susan J. Prichard

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

Comparison of crown fire modeling systems used in three fire management applications

www.nrfirescience.org/resource/11200

The relative behavior of surface-crown fire spread rate modeling systems used in three fire management applications-CFIS (Crown Fire Initiation and Spread), FlamMap and NEXUS- is compared using fire environment characteristics derived from a dataset of destructively measured canopy fuel and associated stand characteristics. Although...

Author(s): Joe H. Scott

Year Published: 2006

Type: Document

Technical Report or White Paper

Organizational characteristics that contribute to success in engaging the public to accomplish fuels management at the wilderness/non-wilderness interface

www.nrfirescience.org/resource/10984

In the fall of 2003, the Rocky Mountain Ranger District of the Lewis and Clark National Forest initiated a multi-year, large-scale prescribed burn in the Scapegoat Wilderness. The objectives of this burn were to make the non-wilderness side of the wilderness boundary more defensible from wildfire and to establish conditions that...

Author(s): Katie Knotek, Alan E. Watson

Year Published: 2006

Type: Document

Conference Proceedings

Evaluation of MM5 model resolution when applied to prediction of National Fire Danger Rating indexes

www.nrfirescience.org/resource/7943

Weather predictions from the MM5 mesoscale model were used to compute gridded predictions of National Fire Danger Rating System (NFDRS) indexes. The model output was applied to a case study of the 2000 fire season in Northern Idaho and Western Montana to simulate an extreme event. To determine the preferred resolution for automating...

Author(s): Jeanne L. Hoadley, Miriam L. Rorig, Larry S. Bradshaw, Sue A. Ferguson, Kenneth Westrick, Scott L. Goodrick, Paul A. Werth

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Regional relationships between climate and wildfire-burned area in the Interior West, USA

www.nrfirescience.org/resource/11507

Recent studies have linked the Atlantic Multidecadal Oscillation (AMO) and the Pacific Decadal Oscillation (PDO) with drought occurrence in the interior United States. This study evaluates the influence of AMO and PDO phases on interannual relationships between climate and wildfire-burned area during the 20th century. Palmer's...

Author(s): Brandon M. Collins, Philip N. Omi, Phillip L. Chapman

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Is global warming causing more, larger wildfires?

www.nrfirescience.org/resource/19326

On 3 April 2006, the U.S. weekly news magazine Time ran a report on global warming with the cover

title "Be worried, be very worried." Similar coverage of global warming has emerged in other general-interest magazines in recent months, triggered by scientific studies that are finding evidence for adverse impacts of global...

Author(s): Steven W. Running

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Predicting cumulative watershed effects of fuel management with improved WEPP technology

www.nrfirescience.org/resource/8436

The increase in severe wildfires in recent years is due in part to an abundance of fuels in forests. In an effort to protect values at risk, and decrease the severity of wildfires, forest managers have embarked on a major program of fuel reduction. Past research has shown that such fuel reduction may have minimal impact at a...

Author(s): William J. Elliot, Joan Q. Wu

Year Published: 2005

Type: Document

Conference Proceedings

Demonstration and integration of systems for fire remote sensing, ground-based fire measurement, and fire modeling - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11158

Proof-of-concept research is being conducted to: compare airborne and in situ, ground-based fire measurement systems; begin evaluation of two fire-behavior simulation models with these data; test approaches to incorporating improved wind-field and weather data in these models; test the utility of the airborne remote sensing for...

Author(s): Colin C. Hardy, Philip J. Riggan

Year Published: 2005

Type: Document

Technical Report or White Paper

Evaluation of the Experimental Climate Prediction Center's fire danger forecasts with remote automated weather station observations

www.nrfirescience.org/resource/8127

The Scripps Experimental Climate Prediction Center has been routinely making regional forecasts of atmospheric elements and fire danger indices since 27 September 1997. This study evaluates these forecasts using selected remote automated weather station observations over the western USA. Bias and anomaly correlations are computed...

Author(s): Hauss J. Reinbold, John O. Roads, Timothy J. Brown

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Characterization of firefighter safety zone effectiveness - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11153

Firefighters are required to play close attention to fire behavior and have safety zones readily available in case of unexpected fire behavior. However, safety zone location and size are often a matter of anecdotal evidence, personal experience, and untested models. This is particularly troublesome for younger firefighters that...

Author(s): Bret W. Butler

Year Published: 2005
Type: Document
Technical Report or White Paper

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

Optimizing landscape treatments for reducing wildfire risk and improving ecological sustainability of ponderosa pine forests with mixed severity fire regimes - Part 2 - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11169

A mixed severity fire regime historically created complex landscape structures in ponderosa pine forests of the Colorado Front Range. Mitigating present wildfire risks and restoring these forests to ecologically sustainable conditions requires new guidelines for landscape treatment. However, vast acreages need treatment while only...

Author(s): Merrill R. Kaufmann, Jimmie D. Chew, J. Greg Jones

Year Published: 2005

Type: Document

Technical Report or White Paper

Modeling surface winds in complex terrain for wildland fire incident support - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11167

One major source of uncertainty in fire behavior and fire behavior modeling is the spatial variation in wind fields. Mountainsides, valleys, ridges, and the fire itself, influence both the speed and direction of wind flows. Small scale surface wind variations cannot be predicted by synoptic forecasting methods or on-site...

Author(s): Mark A. Finney, Larry S. Bradshaw, Bret W. Butler

Year Published: 2005

Type: Document

Technical Report or White Paper

FuelCalc: A tool for calculating wildland fuel quantities and qualities and supporting fuel management decision - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11165

A need exists for a simple computer program to determine surface and canopy fuel quantities (load, bulk density, depth) and qualities (fire behavior fuel model, fire-carrying fuel type) from a variety of fuel inventory data sources. In addition, fuel managers need help analyzing the potential effects of silvicultural treatments on...

Author(s): Elizabeth D. Reinhardt, Joe H. Scott, Duncan C. Lutes

Year Published: 2005

Type: Document
Technical Report or White Paper

Evaluation of the Experimental Climate Prediction Center's fire danger forecasts with remote automated weather station observations

www.nrfirescience.org/resource/8208

The Scripps Experimental Climate Prediction Center has been routinely making regional forecasts of atmospheric elements and fire danger indices since 27 September 1997. This study evaluates these forecasts using selected remote automated weather station observations over the western USA. Bias and anomaly correlations are computed...

Author(s): Hauss J. Reinbold, John O. Roads, Timothy J. Brown

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Forest fuel treatments in western North America: merging silviculture and fire management

www.nrfirescience.org/resource/7948

In order to accomplish complex and multiple management objectives related to forest structure, fuels, and fire disturbance, these two disciplines must be effectively integrated in science and practice. The authors have linked scientific and management tools to develop an analytical approach that allows resource managers to quantify...

Author(s): Morris C. Johnson, David L. Peterson

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/11157

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

Author(s): Mark A. Finney

Year Published: 2005

Type: Document

Technical Report or White Paper

Evaluating ASTER imagery and gradient modeling for mapping wildland fire fuels

www.nrfirescience.org/resource/11280

Land managers need cost-effective methods for mapping and characterizing fire fuels quickly and accurately. The advent of sensors with increased spatial resolution may improve the accuracy and reduce the cost of fuels mapping. The objective of this research is to evaluate the accuracy and utility of imagery from the Advanced...

Author(s): Michael J. Falkowski

Year Published: 2004

Type: Document

Research Brief or Fact Sheet

The impact of twenty-first century climate change on wildland fire danger in the western United

States: an applications perspective

www.nrfirescience.org/resource/8343

High-temporal resolution meteorological output from the Parallel Climate Model (PCM) is used to assess changes in wildland fire danger across the western United States due to climatic changes projected in the 21st century. A business-as-usual scenario incorporating changing greenhouse gas and aerosol concentrations until the year...

Author(s): Timothy J. Brown, Beth L. Hall, Anthony L. Westerling

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

'Brewer fire mystery' discussion

www.nrfirescience.org/resource/8288

Occasionally, Fire Management Today publishes comments from readers on topics of concern, offering authors a chance to respond. Stephen A. Eckert contends that the 'Brewer fire mystery' is not so mysterious. He says that the conditions were ripe for extreme fire behavior, and that under those conditions, the fire quickly went from a...

Author(s): Stephen A. Eckert, Martin E. Alexander

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

MODIS Applications in 2003 Fire Management - Slide presentation

www.nrfirescience.org/resource/11516

Powerpoint presentation MODIS Applications in 2003 Fire Management

Author(s): C. A. Ryan, Bryce L. Nordgren, James P. Menakis, Mark A. Finney, Wei Min Hao

Year Published: 2004

Type: Document

Conference Proceedings

A comment on models and modelling in fire/fuel management

www.nrfirescience.org/resource/12394

'Modeling is fine as long as you know what you are doing.' General remark made to the author by a retired University of Alberta forestry professor a few years ago. The April 1988 issue of the Journal of Forestry published an article by John J. Garland that I have often handed out at various training courses and workshops to impress...

Author(s): Martin E. Alexander

Year Published: 2004

Type: Document

Technical Report or White Paper

Landscape fire simulation and fuel treatment optimization

www.nrfirescience.org/resource/111

Fuel treatment effects on the growth and behavior of large wildland fires depend on the spatial arrangements of individual treatment units. Evidence of this is found in burn patterns of wildland fires. During planning stages, fire simulation is most often used to anticipate effects of fuel treatment units. Theoretical modeling shows...

Author(s): Mark A. Finney

Year Published: 2004

Type: Document

Technical Report or White Paper

Probability based models for estimation of wildfire risk

www.nrfirescience.org/resource/12709

We present a probability-based model for estimating fire risk. Risk is defined using three probabilities: the probability of fire occurrence; the conditional probability of a large fire given ignition; and the unconditional probability of a large fire. The model is based on grouped data at the 1 km²-day cell level. We fit a...

Author(s): Haiganoush K. Preisler, David R. Brillinger, Robert E. Burgan, John W. Benoit

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

Science basis for changing forest structure to modify wildfire behavior and severity

www.nrfirescience.org/resource/15018

Fire, other disturbances, physical setting, weather, and climate shape the structure and function of forests throughout the Western United States. More than 80 years of fire research have shown that physical setting, fuels, and weather combine to determine wildfire intensity (the rate at which it consumes fuel) and severity (the...

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

Year Published: 2004

Type: Document

Synthesis, Technical Report or White Paper

Statistical forecasts of the 2003 western wildfire season using canonical correlation analysis

www.nrfirescience.org/resource/8193

Experimental forecasts for the 2003 fire season indicate low area burned in most western deserts and basins, high area burned in the southern Rocky Mountains and at higher elevations in Arizona and New Mexico, and mid to high area burned in the Sierra Nevada. This pattern - largely a continuation of that seen in 2002 - is the result...

Author(s): Anthony L. Westerling, Alexander Gershunov, Daniel R. Cayan

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Fire whirls, fire tornados, and fire storms: physical and numerical modeling

www.nrfirescience.org/resource/11022

Fire whirls are a typically rare but potentially catastrophic form of fire. They are observed during urban and forest fires, where fire "tornadoes" are characterized by large-scale whirling flames which rise in 2 to 360 m diameter vortices from 10 to 1200 m high. These fire whirls accelerate combustion, produce significant suction...

Author(s): Robert N. Meroney

Year Published: 2003

Type: Document

Conference Proceedings

An initial analysis of relationships between 2- and 10-minute averaged winds at 10, 6, and 1.8 meters: implications for fire behavior and danger applications

www.nrfirescience.org/resource/8424

Recently there has been discussion in the National Wildland Fire Coordination Group (NWCG) fire danger and fire weather working teams about the impact of observations from different anemometer

heights and more importantly, averaging times, on inputs to fire management systems such as National Fire Danger Rating System (Deeming and...

Author(s): Larry S. Bradshaw, Eugene Petrescu, Isaac C. Grenfell

Year Published: 2003

Type: Document

Conference Proceedings

Climate and wildfire in the western United States

www.nrfirescience.org/resource/8184

A 21-yr gridded monthly fire-starts and acres-burned dataset from U.S. Forest Service, Bureau of Land Management, National Park Service, and Bureau of Indian Affairs fire reports recreates the seasonality and interannual variability of wildfire in the western United States. Despite pervasive human influence in western fire regimes,...

Author(s): Anthony L. Westerling, Timothy J. Brown, Alexander Gershunov, Daniel R. Cayan, M. D. Dettinger

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Comparison of 2-D wind fields and simulated wildland fire growth

www.nrfirescience.org/resource/11019

The paper discusses wildfire growth simulated by the FARSITE model using high-resolution wind fields over complex terrain extracted from operational runs of the MM5 weather forecast model supported by the USDA FS Rocky Mountain Center (RMC: <http://www.fs.fed.us/rmc/>). The original 12-km resolution wind field (simulated by MM5) has...

Author(s): Karl F. Zeller, Ned Nikolov, John S. Snook, Mark A. Finney, Jason M. Forthofer

Year Published: 2003

Type: Document

Conference Proceedings

The spatial context of fire: a new approach for predicting fire occurrence

www.nrfirescience.org/resource/10993

Across North America, decades of fire suppression and recent patterns of human settlement have combined to increase the risks that wildland fires pose to human life, property, and natural resource values. Various methods can be used to reduce fuel hazards and mitigate these risks, but funding and other constraints require that these...

Author(s): Carol Miller

Year Published: 2003

Type: Document

Conference Proceedings, Technical Report or White Paper

Assessing the value of increased model resolution in forecasting fire danger

www.nrfirescience.org/resource/10969

The fire season of 2000 was used as a case study to assess the value of increasing mesoscale model resolution for fire weather and fire danger forecasting. With a domain centered on Western Montana and Northern Idaho, MM5 simulations were run at 36, 12, and 4-km resolutions for a 30 day period at the height of the fire season....

Author(s): Jeanne L. Hoadley, Miriam L. Rorig, Kenneth Westrick, Larry S. Bradshaw, Sue A. Ferguson, Scott L. Goodrick, Paul A. Werth

Year Published: 2003

Type: Document

Assessing canopy fuel stratum characteristics in crown fire prone fuel types of western North America

www.nrfirescience.org/resource/7917

Application of crown fire behavior models in fire management decision-making have been limited by the difficulty of quantitatively describing fuel complexes, specifically characteristics of the canopy fuel stratum. To estimate canopy fuel stratum characteristics of four broad fuel types found in the western United States and...

Author(s): Martin E. Alexander, Ronald H. Wakimoto

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Performance of the Haines Index during August 2000 for Montana

www.nrfirescience.org/resource/10997

The Haines Index, introduced by Haines (1988) as the Lower Atmosphere Severity Index, is designed to gauge how readily the lower mid-troposphere (500 to 4500 m AGL) will spur an otherwise fairly predictable fire to become erratic and unmanageable. Based on stability and moisture, the Haines Index (hereafter, HI) takes on integer...

Author(s): Brian E. Potter, Scott L. Goodrick

Year Published: 2003

Type: Document

Conference Proceedings

Reaction times and burning rates for wind tunnel headfires

www.nrfirescience.org/resource/8211

Catchpole et al. (1998) reported rates of spread for 357 heading and no-wind fires burned in the wind tunnel facility of the USDA Forest Service's Fire Sciences Laboratory in Missoula, Montana for the purpose of developing models of wildland fire behavior. The fires were burned in horizontal fuel beds with differing characteristics...

Author(s): Ralph M. Nelson

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Wildland fire behavior case studies and analysis: part 2

www.nrfirescience.org/resource/15996

This resource is a special issue of Fire Management Today that includes articles on fire behavior and descriptions of specific large fires that have important lessons in fire fighter safety.

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Predicting surface winds in complex terrain for use in fire spread models

www.nrfirescience.org/resource/8438

Fire behavior predictions and forecasts are vital to tactical planning on wildland firefighting incidents. One major source of uncertainty in fire behavior predictions is spatial variation in the wind fields used in the fire models. In most cases wind data are limited to only a few specific locations, none of which may be actually...

Author(s): Jason M. Forthofer, Bret W. Butler, Kyle S. Shannon, Mark A. Finney, Larry S. Bradshaw, Richard D. Stratton
Year Published: 2003
Type: Document
Conference Proceedings

Long lead statistical forecasts of area burned in western U.S. wildfires by ecosystem province

www.nrfirescience.org/resource/8377

A statistical forecast methodology exploits large-scale patterns in monthly U.S. Climatological Division Palmer Drought Severity Index (PDSI) values over a wide region and several seasons to predict area burned in western U.S. wildfires by ecosystem province a season in advance. The forecast model, which is based on canonical...

Author(s): Anthony L. Westerling, Alexander Gershunov, Daniel R. Cayan, Tim P. Barnett
Year Published: 2002
Type: Document
Book or Chapter or Journal Article

The 2000 fire season: lightning-caused fires

www.nrfirescience.org/resource/8141

A large number of lightning-caused fires burned across the western United States during the summer of 2000. In a previous study, the authors determined that a simple index of low-level moisture (85-kPa dewpoint depression) and instability (85-50-kPa temperature difference) from the Spokane, Washington, upper-air soundings was very...

Author(s): Miriam L. Rorig, Sue A. Ferguson
Year Published: 2002
Type: Document
Book or Chapter or Journal Article

Using FVS and its fire and fuels extension in the context of uncertain climate

www.nrfirescience.org/resource/11011

While the prospect of a static climate is no longer tenable, the direction of change for particular localities is not yet clear. Modelling vulnerability of silvicultural options to various scenarios of climate change requires a modelling system that can represent major processes affected by climatic variability. The Forest...

Author(s): Albert R. Stage
Year Published: 2002
Type: Document
Conference Proceedings

Statistical forecast of the 2001 western wildfire season using principal components regression

www.nrfirescience.org/resource/8396

Description not entered

Author(s): Anthony L. Westerling, Daniel R. Cayan, Alexander Gershunov, M. D. Dettinger, Timothy J. Brown
Year Published: 2001
Type: Document
Book or Chapter or Journal Article

Sequential use of simulation and optimization in analysis and planning

www.nrfirescience.org/resource/11045

Management activities are analyzed at landscape scales employing both simulation and optimization. SIMPPLLE, a stochastic simulation modeling system, is initially applied to assess the risks associated with a specific natural process occurring on the current landscape without management treatments, but with fire suppression. These...

Author(s): Hans R. Zuuring, Jimmie D. Chew, J. Greg Jones

Year Published: 2000

Type: Document

Conference Proceedings

Simulating fire patterns in heterogeneous landscapes

www.nrfirescience.org/resource/18408

A broad-scale probabilistic model of forest fires, EMBYR, has been developed to simulate the effects of large fires burning through heterogeneous landscapes. Fire ignition and spread are simulated on a gridded landscape by (1) examining each burning site at each time step, (2) independently evaluating the probability of spread to...

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

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

An overview of the fire and fuels extension to the forest vegetation simulator

www.nrfirescience.org/resource/11037

The Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS) has been developed to assess the risk, behavior, and impact of fire in forest ecosystems. This extension to the widely-used stand-dynamics model FVS simulates the dynamics of snags and surface fuels as they are affected by stand management (of trees or fuels...

Author(s): Sarah J. Beukema, Elizabeth D. Reinhardt, Werner A. Kurz, Nicholas L. Crookston

Year Published: 2000

Type: Document

Conference Proceedings

The Mann Gulch Fire and the Canadian Forest Fire Danger Rating System

www.nrfirescience.org/resource/8408

The year 1999 marks the 50th anniversary of the Mann Gulch Fire that occurred in western Montana on August 5, 1949 (Matthews 1999). There has been considerable interest amongst the Canadian wildland fire community in the 1949 Mann Gulch Fire ever since the publishing of MacLean's (1992) book 'Young Men and Fire' and Rothermel's (...)

Author(s): Martin E. Alexander

Year Published: 2000

Type: Document

Conference Proceedings

Stevensville West Central Study

www.nrfirescience.org/resource/10981

This paper reports on an application of two modeling systems in the assessment and planning effort for a 58,038-acre area on the Bitterroot National Forest: SIMulating Vegetative Patterns and Processes at Landscape ScaLEs (SIMPPLLE), and Multi-resource Analysis and Geographic Information System (MAGIS). SIMPPLLE was a useful model...

Author(s): J. Greg Jones, Jimmie D. Chew, Nan K. Christianson, D. J. Silvius, Catherine A. Stewart

Year Published: 2000

Type: Document
Conference Proceedings

Critical fire weather patterns of the United States

www.nrfirescience.org/resource/12780

Descriptions of critical fire weather patterns from across the United States. Watch out conditions discussed.

Year Published: 1999

Type: Document

Research Brief or Fact Sheet

Applying simulation and optimization to plan fuel treatments at landscape scales

www.nrfirescience.org/resource/11067

Fuel treatment activities are analyzed at the landscape scale by using both simulation and optimization. Simulating vegetative patterns and processes at landscape scales (SIMPPLLE), a stochastic simulation modeling system, is initially applied to assess wildfire risks on the current landscape without management treatments but with...

Author(s): J. Greg Jones, Jimmie D. Chew, Hans R. Zuuring

Year Published: 1999

Type: Document

Conference Proceedings, Technical Report or White Paper

Development of input data layers for the FARSITE fire growth model for the Selway-Bitterroot Wilderness Complex, USA

www.nrfirescience.org/resource/11240

Fuel and vegetation spatial data layers required by the spatially explicit fire growth model FARSITE were developed for all lands in and around the Selway-Bitterroot Wilderness Area in Idaho and Montana. Satellite imagery and terrain modeling were used to create the three base vegetation spatial data layers of potential vegetation,...

Author(s): Robert E. Keane, Janice L. Garner, Kirsten M. Schmidt, Donald G. Long, James P. Menakis, Mark A. Finney

Year Published: 1998

Type: Document

Technical Report or White Paper

Wildfire case study: Butte City Fire, southeastern Idaho, July 1, 1994

www.nrfirescience.org/resource/11146

The Butte City Fire occurred on July 1, 1994, west of Idaho Falls, ID. Ignited from a burning flat tire, the blaze was driven by high winds that caused it to cover over 20,500 acres in just over 6.5 hours. Sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the principal shrub species of this high desert rangeland. With the...

Author(s): Bret W. Butler, Timothy D. Reynolds

Year Published: 1997

Type: Document

Technical Report or White Paper

Making sense of fire weather

www.nrfirescience.org/resource/8122

This paper analyzes data from 339 large wildland fires that occurred in the Continental United States from 1971 through 1984. Each fire burned 1,000 acres (400 ha) or more. Each fire was associated with

the nearest upper-air weather station and classified according to its season (spring, summer, autumn, or winter). Results of this...

Author(s): Brian E. Potter

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

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

Intermountain West lightning-caused fires: climatic predictors of area burned

www.nrfirescience.org/resource/11460

An increase in continuous fine fuels promoted by the expansion of aggressive annual exotic grasses in the Intermountain West has altered the region's fire regimes, with both ecologic and economic ramifications. I examine the predictive nature of seasonal climatic variables, seasonal precipitation and temperature data up to 2 years...

Author(s): Paul A. Knapp

Year Published: 1995

Type: Document

Book or Chapter or Journal Article

A statistical-topographic model for mapping climatological precipitation over mountainous terrain

www.nrfirescience.org/resource/8361

The demand for climatological precipitation fields on a regular grid is growing dramatically as ecological and hydrological models become increasingly linked to geographic information systems that spatially represent and manipulate model output. This paper presents an analytical model that distributes point measurements of monthly...

Author(s): Christopher Daly, Ronald P. Neilson, Donald L. Phillips

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

Fire growth maps for the 1988 Greater Yellowstone Area fires

www.nrfirescience.org/resource/11212

Daily fire growth maps display the growth of the 1988 fires in the Greater Yellowstone Area. Information and data sources included daily infrared photography flights, satellite imagery, ground and aerial reconnaissance, command center intelligence, and the personal recollections of fire behavior observers. Fire position was...

Author(s): Richard C. Rothermel, Roberta A. Hartford, Carolyn H. Chase

Year Published: 1994

Type: Document

Technical Report or White Paper

Probability of fire-stopping precipitation events

www.nrfirescience.org/resource/11933

Fire managers in the Northwestern United States are often confronted by the problem of determining when precipitation might stop an ongoing fire. The possibility that a useful probability for fire-stopping precipitation could be developed from historical weather records was investigated. Persons familiar with weather and fire...

Author(s): Donald J. Latham, Richard C. Rothermel

Year Published: 1993

Type: Document

Research Brief or Fact Sheet

The evaluation of Idaho wildfire growth using the Haines Index

www.nrfirescience.org/resource/8307

An atmospheric index specifically designed to be related to the growth of wildland fires is evaluated for two recent Idaho fires. The index includes terms related to high midlevel lapse rates and low-level dry air. In the cases examined, the index performs well at pinpointing the time of the most explosive fire growth. Long-term...

Author(s): Paul A. Werth, Richard Ochoa

Year Published: 1993

Type: Document

Book or Chapter or Journal Article

Fuel moisture, forest type, and lightning-caused fire in Yellowstone National Park

www.nrfirescience.org/resource/13568

The occurrence and behavior of lightning-caused fires in Yellowstone National Park were summarized for 17 years (1972-1988) during a prescribed natural fire program. Both ignition (occurrence) and spread (Stand replacing fire activity) of fires were strongly influenced by fuel moisture and forest cover type. Fuel moisture estimates...

Author(s): Roy A. Renkin, Don G. Despain

Year Published: 1992

Type: Document

Book or Chapter or Journal Article

Fuel moisture as measured and predicted during the 1988 fires in Yellowstone National Park

www.nrfirescience.org/resource/11109

Fine fuel moisture content, relative humidity, air temperature, and fire behavior were observed hourly for 48 hours on the North Fork Fire in Yellowstone National Park from August 25 to August 27, 1988. Fine fuel reached minimum moisture content of 3 to 5 percent late in the afternoon, remained below 8 percent until after midnight,...

Author(s): Roberta A. Hartford, Richard C. Rothermel

Year Published: 1991

Type: Document

Research Brief or Fact Sheet

Lookouts, communication, escape routes, safety zones

www.nrfirescience.org/resource/15460

In a presentation to the USDA Forest Service's national Fire and Aviation Staff, Gleason provides a clear overview of his proposed Lookouts, Communication, Escape Routes, Safety Zones (LCES) method of training firefighters for greater safety. After defining LCES, he discusses how it should be implemented on the ground. He emphasizes...

Author(s): Paul Gleason

Year Published: 1991
Type: Document
Management or Planning Document

The 1985 Butte fire in central Idaho: a Canadian perspective on the associated burning conditions

www.nrfirescience.org/resource/11055

During the afternoon of August 29, 1985, the Butte Fire made a high-intensity crown fire run, covering a distance of 2.22 km in one hour and 40 minutes, and forcing 73 fire fighters to deploy their protective fire shelters. This paper presents a retrospective analysis of the fire behavior in terms of the two major subsystems of the...

Author(s): Martin E. Alexander

Year Published: 1991

Type: Document

Conference Proceedings, Technical Report or White Paper

Predicting behavior and size of crown fires in the northern Rocky Mountains

www.nrfirescience.org/resource/11195

Assessment of crown fire conditions calls for two important judgments: (1) identifying conditions for the onset of severe fires, and (2) predicting the spread rate, intensity, and size of expected crown fires. This paper addresses the second problem and provides methods for making a first approximation of the behavior of a running...

Author(s): Richard C. Rothermel

Year Published: 1991

Type: Document

Technical Report or White Paper

Predicting behavior of the 1988 Yellowstone fires: projections versus reality

www.nrfirescience.org/resource/8252

An account is presented of the initial long range, 30-day, projections of fire growth of the wildfires in the Greater Yellowstone Area in 1988. The request for information, the method of prediction, and the actual fire growth are discussed and documented with maps. The difficulties and uncertainties of long-range fire prediction...

Author(s): Richard C. Rothermel

Year Published: 1991

Type: Document

Book or Chapter or Journal Article

The Haines Index and Idaho fire growth

www.nrfirescience.org/resource/8306

[Excerpted from text] The growth of wildfires is related to three broad factors: fuel type, topography and weather. The National Fire Danger Rating System and the Fire Behavior Prediction System combine these factors to predict the probability and severity of wildland fires. However, these systems have mixed results in predicting...

Author(s): Paul A. Werth, Richard Ochoa

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

Stream shading, summer streamflow and maximum water temperature following intense wildfire

in headwater streams

www.nrfirescience.org/resource/18470

Adjacent headwater streams were monitored for postfire shade, summer streamflow and maximum water temperature following the 40,000 ha Silver Complex fire in southern Oregon. Average postfire shade (30 percent) for the three streams was considerably less than prefire shade (est.>90 percent). Dramatic increases in direct solar...

Author(s): Michael Amaranthus, Howard Jubas, David Arthur

Year Published: 1989

Type: Document

Conference Proceedings

The relationship between mean monthly fire potential indices and monthly fire severity

www.nrfirescience.org/resource/10970

Thirty-day forecasts of fire potential are needed, and can be computed using a variety of monthly fire weather indices. But which indices are most related to monthly fire severity? Correlation analysis was used to determine the relationships between mean monthly fire potential indices and monthly measures of fire severity at 16...

Author(s): M. H. McCutchan, William A. Main

Year Published: 1989

Type: Document

Conference Proceedings

Help with making crown fire hazard assessments

www.nrfirescience.org/resource/11046

This paper offers some suggestions and field guides with respect to the operational application of C.E. Van Wagner's (1997, Can. J. For. Res. 7:23-34) theory to calculate the threshold conditions for the start and spread of crown fires in conifer forests. Three categories of crowning are recognized (passive, active, and independent...

Author(s): Martin E. Alexander

Year Published: 1988

Type: Document

Conference Proceedings, Technical Report or White Paper

Surface fuel loadings and predicted fire behavior for vegetation types in the northern Rocky Mountains

www.nrfirescience.org/resource/11930

Means, standard deviations, and quartiles of fuel loadings were determined for litter, for downed woody material of 0 to one-fourth inch, one-fourth to 1 inch, 0 to 1 inch, and 1 to 3 inches, for herbaceous vegetation, and for shrubs by cover types and fire groups. The studies were conducted at four locations in northwestern Wyoming...

Author(s): James K. Brown, Collin D. Bevins

Year Published: 1986

Type: Document

Research Brief or Fact Sheet

Appraising fuels and flammability in western aspen: a prescribed fire guide

www.nrfirescience.org/resource/11132

Describes a method for appraising fuels and fire behavior potential in aspen forests to guide the use of prescribed fire and the preparation of fire prescriptions. Includes an illustrated classification of aspen fuels; appraisals of fireline intensity, rate of spread, adjective ratings for fire behavior and probability of burn...

Author(s): James K. Brown, Dennis Simmerman
Year Published: 1986
Type: Document
Technical Report or White Paper

Fire Review of the 1985 Log Tom Fire Complex (Butte Fire)

www.nrfirescience.org/resource/15987

This report reviews the Long Tom Fire Complex. The review team identified 11 issues and provided alternatives for them to reduce suppression costs, improve suppression efficiency, and minimize resource impacts on future large fires in the Salmon River area.

Author(s): Jerry Monesmith, Dick Flannelly, Bert Strom, Jim Lawrence
Year Published: 1985
Type: Document
Management or Planning Document

Predicting duff and woody fuel consumed by prescribed fire in the Northern Rocky Mountains

www.nrfirescience.org/resource/11265

Relationships for predicting duff reduction, mineral soil exposure, and consumption of downed woody fuel were determined to assist in planning prescribed fires. Independent variables included lower and entire duff moisture contents, loadings of downed woody fuels, duff depth, National Fire-Danger Rating System 1,000-hour moisture...

Author(s): James K. Brown, Michael A. Marsden, Kevin C. Ryan, Elizabeth D. Reinhardt
Year Published: 1985
Type: Document
Technical Report or White Paper

Behavior of the life-threatening Butte Fire: August 27-29, 1985

www.nrfirescience.org/resource/8314

On August 29, 1985, 73 firefighters were forced into safety zones, where they took refuge in their fire shelters for 1 to 2 hours while a very severe crown fire burned over them. The incident took place on the Butte Fire on the Salmon National Forest in Idaho. Five firefighters were hospitalized overnight for heat exhaustion, smoke...

Author(s): Richard C. Rothermel, Robert W. Mutch
Year Published: 1985
Type: Document
Book or Chapter or Journal Article

Modeling behavior of prescribed fires in Yosemite National Park

www.nrfirescience.org/resource/8313

The National Fire Danger Rating System and the Fire Behavior Prediction System were tested on prescribed fires burning underneath canopies in six fuel types in Yosemite National Park, California. The mean error for rate of spread was +0.03 foot per minute for the NFDRS and -0.15foot for the FBPS. For flame length factors for...

Author(s): Jan W. van Wagendonk, Stephen J. Botti
Year Published: 1984
Type: Document
Book or Chapter or Journal Article

Changes in fire weather distributions: effects on predicted fire behavior

www.nrfirescience.org/resource/11221

Data that represent average worst fire weather for a particular area are used to index daily fire danger; however, they do not account for different locations or diurnal weather changes that significantly affect fire behavior potential. To study the effects that selected changes in weather databases have on computed fire behavior...

Author(s): Lucy A. Salazar, Larry S. Bradshaw

Year Published: 1984

Type: Document

Technical Report or White Paper

Wildland fires: predicting the behavior of wildland fires-among nature's most potent forces-can save lives, money, and natural resources

www.nrfirescience.org/resource/8315

During a period of three days in mid-February 1983, bushfires swept over 400,000 ha in southern Australia, killing 74 people, destroying more than 2,000 homes, and burning out 7 towns. This tragic repetition of the fires of January 1939, in which 71 people perished, was foretold by Noble (1977), whose monograph on the 1939 fires...

Author(s): Frank A. Albin

Year Published: 1984

Type: Document

Book or Chapter or Journal Article

Monoammonium phosphate: effect on flammability of excelsior and pine needles

www.nrfirescience.org/resource/11959

The study quantified differences between fire-retarding abilities of monoammonium phosphate samples from five different sources. Ponderosa pine needles and aspen excelsior fuel beds were spray-treated with different levels of chemical solutions, dried, and burned under controlled laboratory conditions.

Flame spread and energy...

Author(s): Aylmer D. Blakely

Year Published: 1983

Type: Document

Technical Report or White Paper

Fuel and fire behavior prediction in big sagebrush

www.nrfirescience.org/resource/11957

Relationships between height of big sagebrush and crown area, fuel loading, bulk density, size distribution of foliage and stemwood, and fraction dead stemwood are presented. Based upon these relationships, modeled rate-of-fire spread and fireline intensity are shown for sagebrush ranging in height from 20 to 120 cm and in coverage...

Author(s): James K. Brown

Year Published: 1982

Type: Document

Technical Report or White Paper

Influence of harvesting and residues on fuels and fire management

www.nrfirescience.org/resource/13134

Fuel and fire behavior potential in clearcut lodgepole pine and in Douglas-fir/larch under clearcutting, group selection, and shelterwood silvicultural systems were compared after logging to near-complete and conventional utilization standards. Fuels and fire behavior potentials were unaffected by silvicultural...

Author(s): James K. Brown

Year Published: 1980

Type: Document
Technical Report or White Paper

Lightning direction-finding systems for forest fire detection throughout the western United States and Alaska

www.nrfirescience.org/resource/7958

Extensive networks of magnetic direction-finding (DF) stations have been installed throughout the western United States and Alaska to facilitate early detection of lightning-caused fires. Each station contains a new wideband direction-finder that responds primarily to cloud-to-ground lightning and discriminates against cloud...

Author(s): E. Philip Krider, R. C. Noggle, A. E. Pifer, Dale L. Vance

Year Published: 1980

Type: Document

Book or Chapter or Journal Article

Progress toward locating lightning fires

www.nrfirescience.org/resource/12120

Systems to enable land managers to locate, evaluate, and counter the fire threat of lightning storms are in the early stages of development. In the western U.S. and Alaska, the Bureau of Land Management has established networks of instruments that locate lightning strikes by means of recorded azimuths.

Further research could add...

Author(s): Donald J. Latham

Year Published: 1979

Type: Document

Research Brief or Fact Sheet

Predicting slash depth for fire modeling

www.nrfirescience.org/resource/11954

Development of equations for predicting fuel bed depth (called "bulk depth" herein) appropriate for modeling fire behavior in slash is described. Bulk depth (y) was correlated with the expected number of 1/4-to 1-inch-diameter particle intercepts per foot of vertical plane transect (x) by regressions of the form $y = ax$. Values of "...

Author(s): Frank A. Albini, James K. Brown

Year Published: 1978

Type: Document

Technical Report or White Paper

Fire danger rating network density

www.nrfirescience.org/resource/11969

Conventional statistical techniques are used to answer the question, "What is the necessary station density for a fire danger network?" The Burning Index of the National Fire-Danger Rating System is used as an indicator of fire danger. Results are presented as station spacing in tabular form for each of six regions in the western...

Author(s): Rudy M. King, R. William Furman

Year Published: 1976

Type: Document

Technical Report or White Paper

Broadcast burning in larch-fir clearcuts: the Miller Creek-Newman Ridge study

www.nrfirescience.org/resource/11950

Seventy-three clearcuts in western larch/Douglas-fir forests of western Montana were broadcast burned over a wide range of environmental conditions for the purpose of quantifying fire characteristics and burn accomplishment. The moisture content of the upper duff, and the National Fire-Danger Rating System Buildup Index (1964) were...

Author(s): William R. Beaufait, Charles E. Hardy, William C. Fischer

Year Published: 1975

Type: Document

Technical Report or White Paper

Meteorological factors in the Sundance Fire run

www.nrfirescience.org/resource/11905

Strong, sustained, southwesterly winds were a major factor in the Sundance Fire run in northern Idaho during which the fire front raced 16 miles northeastward within a 9-hr. period on September 1, 1967. These winds were found to be dependent upon an unusually strong summertime pressure gradient ahead of an approaching trough,...

Author(s): Arnold I. Finklin

Year Published: 1973

Type: Document

Technical Report or White Paper

Field test of a rate-of-fire-spread model in slash fuels

www.nrfirescience.org/resource/11945

Predicted rates of fire spread using a mathematical model were consistently greater but in reasonably close agreement with rates observed on test fires in ponderosa pine and Douglas-fir slash. Fuel loading, bulk density, particle density, particle surface-to-volume ratio, heat content, total plant salt content, silica-free salt,...

Author(s): James K. Brown

Year Published: 1972

Type: Document

Technical Report or White Paper

The seasonal trends in moisture content, ether extractives, and energy of ponderosa pine and Douglas-fir needles

www.nrfirescience.org/resource/11943

The moisture, ether extractive, and energy content of ponderosa pine (*Pinus ponderosa* Laws.) and Douglas-fir (*Pseudotsuga menziesii* L.) foliage were measured during two fire seasons. The moisture content of 1- and 2-year-old needles was found to rise throughout the summer. The ether extractive content was highest in the fir foliage...

Author(s): Charles W. Philpot, Robert W. Mutch

Year Published: 1971

Type: Document

Technical Report or White Paper

Tree-bole ignition in superimposed lightning scars

www.nrfirescience.org/resource/11921

This Note presents observations on a little-known mode of tree-bole ignition by lightning in which a fire-setting discharge partially superimposes its furrow upon an older lightning scar and causes ignition in the older injury.

Author(s): Alan R. Taylor

Year Published: 1969

Type: Document

Sundance Fire: an analysis of fire phenomena

www.nrfirescience.org/resource/11229

The Sundance Fire on September 1, 1967, made a spectacular run of 16 miles in 9 hours and destroyed more than 50,000 acres. This run became the subject of a detailed research analysis of the environmental, topographic, and vegetation variables aimed at reconstructing and describing fire phenomena. This report details the fire's...

Author(s): Hal E. Anderson

Year Published: 1968

Type: Document

Technical Report or White Paper

Mechanisms of fire spread research progress report no. 2

www.nrfirescience.org/resource/11937

In 1961 the National Science Foundation awarded grants to Washington State University and the Northern Forest Fire Laboratory of the Intermountain Forest and Range Experiment Station to further a joint study of the mechanisms of fire spread in wildland fuels. The combined efforts of the two research groups encompass theoretical...

Author(s): Hal E. Anderson

Year Published: 1966

Type: Document

Technical Report or White Paper

Characteristics of backfires and headfires in a pine needle fuel bed

www.nrfirescience.org/resource/11920

Burning characteristics of backfires, headfires, and no-wind fires in fuel beds of ponderosa pine needles were compared at the Northern Forest Fire Laboratory. Data gathered under controlled laboratory conditions indicate that fires backed into the wind (backfires) consistently burn slower, longer, and deeper than fires burned with...

Author(s): William R. Beaufait

Year Published: 1965

Type: Document

Research Brief or Fact Sheet

Conversion tables for use with the National Fire-Danger Rating System in the Intermountain Area

www.nrfirescience.org/resource/11919

Two tables prepared for use with the National Fire-Danger Rating System replace 10 tables previously used with the Model-8 Fire-Danger Rating System. They provide for the conversion of Spread Index values at various altitudes, aspects, and times of day. A rate of spread table facilitates converting Spread Index values to chains per...

Author(s): Dwight S. Stockstad, Richard J. Barney

Year Published: 1964

Type: Document

Research Brief or Fact Sheet

Calculating the National Fire-Danger Rating spread index by computer

www.nrfirescience.org/resource/11918

Changeover from use of the Intermountain Model-8 Burning Index Meter to use of the Spread Index of

the National Fire-Danger Rating System required a comparative analysis of both systems. This note describes a program written in SPS to calculate various indexes of both systems on an IBM 1620 computer.

Author(s): Richard J. Barney

Year Published: 1964

Type: Document

Research Brief or Fact Sheet

Fire behavior in Northern Rocky Mountain Forests

www.nrfirescience.org/resource/11133

The main purpose of this publication is to summarize the most important aspects of fire behavior as we now know them. The author recognizes that there are still many unknowns in the behavior of forest and range fires. These unknowns will be the targets of future research. In the meantime it is important that the best available...

Author(s): Jack S. Barrows

Year Published: 1951

Type: Document

Technical Report or White Paper

Death in Blackwater Canyon

www.nrfirescience.org/resource/11494

On August 21, 1937, the tragic Blackwater Fire caused the death of 15 firefighters, burning approximately 1,700 acres of National Forest System lands on the Shoshone National Forest, near Cody, Wyoming. An electrical storm occurred in the general vicinity of Blackwater Creek on Wednesday, August 18th causing a fire, which was not...

Author(s): Erle Kauffman

Year Published: 1937

Type: Document

Book or Chapter or Journal Article

Meteorological conditions affecting the Freeman Lake (Idaho) Fire

www.nrfirescience.org/resource/8305

[Excerpt from text] Measurements of meteorological conditions prevailing during the rapid spread of forest fires are greatly needed so that when their recurrence seems probable, fire weather forecasters may issue warnings of the danger.

Author(s): George M. Jemison

Year Published: 1932

Type: Document

Book or Chapter or Journal Article

Meteorological factors in the Quartz Creek forest fire

www.nrfirescience.org/resource/8304

[Excerpted from text] It is not often that a large forest fire occurs conveniently near a weather station specially equipped for measuring forest-fire weather. The 13,000-acre Quartz Creek fire on the Kaniksu National Forest during the summer of 1936 was close enough to the Priest River Experimental...

Author(s): Harry T. Gisborne

Year Published: 1927

Type: Document

Book or Chapter or Journal Article

The New Generation Fire Shelter

www.nrfirescience.org/resource/16010

The New Generation Fire Shelter - National Wildfire Coordinating Group 2003 - NFES 2712 The new generation fire shelter offers improved protection from radiant and convective heat. All federal, state, and local wildland firefighters carry the fire shelter while working federal fires. As always, the fire shelter should be used only...

Type: Media

Video

The structure of fire size distributions: a broad view of interacting gradients in wilderness management, spatial climate, and topography in three western regions

www.nrfirescience.org/resource/12813

Determining the effects of land management on fire regime characteristics is complicated by the interaction of several factors that vary in space and time. First, fire size and frequency are linked to climate conditions, including drought, as well as wind and temperature that define weather conditions during burning. Second,...

Type: Media

Webinar

WindWizard

www.nrfirescience.org/resource/18000

WindWizard is a Gridded Wind Model - Gridded wind is a method that can provide information about the effect of topography on local wind flow at the 100-300 ft scale. Wind information at this detail is not available from the weather service. The wind simulations are not forecasts but rather simulations of what the wind flow would be...

Type: Website

Website

How effective were fuel treatments in the 2011 Wallow fire?

www.nrfirescience.org/resource/14301

This webinar presents results of an opportunistic study to quantify the performance of thinning and surface fuel treatment in migrating wildfire behavior and severity, as represented by bole char, crown scorch proportion, tree burn severity index, on the largest wildfire in southwest USA history: 2011 Wallow fire. The results...

Type: Media

Webinar

Fire Modeling in the Wildland Fire Decision Support System - WFDSS

www.nrfirescience.org/resource/59

Mediasite video presentation given by Sam Amato, (National Fire Decision Support Center) at the 2011 Southwest Interagency Fuels Workshop, Flagstaff, AZ on March 10, 2011. The Wildland Fire Decision Support System (WFDSS) model uses different fire models to provide landscape scale fire modeling. This presentation defines the model...

Type: Media

Video

Look Up, Look Down, Look Around

www.nrfirescience.org/resource/15995

Look Up, Look Down, Look Around is a fire environment factors and fire behavior training video, released in 1993. It was assigned NFES #2244, and PMS #427. It contains several chapters on fuel

characteristics that are important to fire behavior.

Type: Media

Video

FlamMap

www.nrfirescience.org/resource/17995

FlamMap software creates raster maps of potential fire behavior characteristics (ROS, flame length, crown fire activity, etc.) and environmental conditions (dead fuel moistures, mid-flame wind speeds, and solar irradiance) over an entire FARSITE landscape. These raster maps can be viewed in FlamMap or exported for use in a GIS,...

Type: Website

Website

Influence of buoyant dynamics on wildfire spread

www.nrfirescience.org/resource/13251

Technology has improved our utilization of existing fire models but has contributed little to advancing knowledge of fire spread. The knowledge of physical processes, and their organization in producing fire spread, is essential to reliably modeling wildland fire behaviors beyond current capabilities (crown fire, thresholds etc.)....

Type: Media

Webinar

Wildland Fire Assessment Tool

www.nrfirescience.org/resource/14297

WFAT provides an interface between ArcMap, FlamMap 5, and the First Order Fire Effects Model (FOFEM), combining their strengths into a spatial fire behavior and fire effects analysis tool in GIS. In the webinar, you will learn how to use WFAT to locate potential fuel treatment units, develop a prescription for those units, and...

Type: Media

Webinar

Part 2. Wildland fire, smoke & roadway visibility series: Weather information and tools available to stay ahead of superfog events

www.nrfirescience.org/resource/15295

In Part 2 of the Wildland Fire Smoke and Roadway Visibility Webinar Series, Gary Curcio, former Fire Environment Branch Head NC Forest Service, presented information on the following topics: • Obtaining and tracking key environmental variables • Reviewing operationally developed indexes (Turner Stability Index (TS)),...

Type: Media

Webinar

Modeling Dynamic Fuels with an Index System: MoD-FIS in the Great Basin and Southwest U.S.

www.nrfirescience.org/resource/15947

This webinar is co-hosted by LANDFIRE and members of the Joint Fire Science Program: Great Basin Fire Science Exchange, Southwest Fire Science Consortium, and the Northern Rockies Fire Science Network. Content will address challenges that managers of large landscapes deal with in these regions. The LANDFIRE Program strives to...

Type: Media

Webinar

Measurement of Fire Spread Phenomena at the Laboratory Scale

www.nrfirescience.org/resource/17984

The use of low intensity fires is a key tool in the arsenal of the wildfire professional. Nevertheless, there are fundamental challenges to understanding how these fire spread and consequently these fires present significant challenges to the application and use of existing fire spread models. This presentation will discuss the...

Type: Media

Webinar

Assessing the drivers of 'spring dip' in foliar moisture content and their potential impact on forest fire behavior

www.nrfirescience.org/resource/13248

This webinar discussed the following - 1) Foliar moisture content changes are driven by changes in density, 2) Density changes are primarily due to an increase in starch, 3) Starch content may be the missing link in the increased flammability during the Spring Dip, 4) Density or LFM can be measured throughout the...

Type: Media

Webinar

Burning rate of porous fuel beds with and without wind

www.nrfirescience.org/resource/13770

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

Type: Media

Seminar

Spot fires

www.nrfirescience.org/resource/12940

Brian Potter, a research meteorologist with the USDA Forest Service, presented a summary of the state of science behind spot fires. Spotting is one characteristic of "extreme fire behavior," capable of short range acceleration of fires as well as producing long-distance spot fires that complicate management efforts. The...

Type: Media

Webinar

A topographically resolved wildfire danger and drought monitoring system for the conterminous United States

www.nrfirescience.org/resource/15242

Patterns of energy and available moisture vary over small distances in mountainous regions and available climate data are too coarse to resolve these terrain-mediated effects. This seminar focused on efforts to improve the physical template we use to analyze vegetation patterns and post-fire ecological effects, including what has...

Type: Media

Seminar

Rapidly-updating numerical weather prediction for fire weather situational awareness and forecasting: The High-Resolution Rapid Refresh model

www.nrfirescience.org/resource/15804

The 3-km High-Resolution Rapid Refresh (HRRR) numerical weather prediction model, developed at

the NOAA Earth System Research Laboratory and operational since September 2014, is a tool for situational weather awareness and short-range forecasting for a variety of end-user applications, ranging from severe weather prediction to...

Type: Media

Seminar

Two Days on the Rice Ridge Fire

www.nrfirescience.org/resource/18764

The Rice Ridge fire ultimately burned over 150,000 acres in western Montana in the summer of 2017. Two days stand out in particular, September 2nd and 3rd. Both days were hot, dry, and windy with Red Flag warnings issued by the local NWS office. However, on the 2nd the fire consumed roughly 12,000 acres, whereas on the 3rd it developed...

Type: Media

Seminar

Progress Towards Precision Measurements of Radiant and Convective Flows in Wildland Fires: History and Current State of the Art

www.nrfirescience.org/resource/17981

The energy flow from a wildland fire is the most important measurable physical quantity. If we understand the time history of the energy flows, we can derive all other fire behavior and fire effects parameters. Dr. Bob Kremens will describe the difficulties in measuring the radiant heat release and explain a newly designed...

Type: Media

Webinar

Mega fire project PNW

www.nrfirescience.org/resource/13243

Haiganoush Preisler talks about her work modeling very large fires over very large areas. She is a research scientist and statistician with the USFS PSW Research Station and lead author on the attached paper. You can find out more about her work at: <http://www.wfas.net/index.php/large-fire-potential-and-fire-potential-indexes-...>

Type: Media

Webinar

Introduction to Combustion 1

www.nrfirescience.org/resource/18391

Learn the basics of combustion through the fire triangle and the three methods of heat transfer. This video is part of the World of Wildland Fire video series.

Type: Media

Video

Weather forecast verification for fire behavior predictions

www.nrfirescience.org/resource/12876

Interpret results from a verification study of the NDFD grids from the local Missoula Weather Forecast Office and the implications for fire behavior forecasts that use NDFD data. Afternoon temperature, minimum humidity, and winds are investigated specifically, and the effects on a fire behavior forecast are evaluated with BehavePlus...

Type: Media

Webinar

Transitioning from a small fire: fire behavior driving episodic fire growth after 1988 in Yellowstone National Park

www.nrfirescience.org/resource/15154

This presentation was part of the 13th Biennial Scientific Conference on the Greater Yellowstone Ecosystem held at Jackson Lake Lodge in Grand Teton National Park, October 4-6, 2016. The conference theme was Building on the Past, Leading into the Future: Sustaining the Greater Yellowstone Ecosystem in the Coming Century.

Type: Media

Webinar

Introduction to the 2017 Prescribed Fire Complexity Rating System Guide and Worksheets

www.nrfirescience.org/resource/17780

This 45 minute webinar covers significant changes made to the 2017 Prescribed Fire Complexity Rating System Guide (PMS 424).

Type: Media

Webinar

Evidence for population differentiation among Jeffrey and Ponderosa pines in survival, growth and phenology

www.nrfirescience.org/resource/18740

Ecological restoration projects that include reforestation require that land managers select appropriate source of seeds for long-term persistence. In California, the standard approach for making this choice is based on seed zone and elevational band, both geographically-based measures. However, given the pace of contemporary...

Author(s): Alejandra Martínez-Berdeja, Jill A. Hamilton, Aurore Bontemps, Johanna Schmitt, Jessica W. Wright

Type: Document

Book or Chapter or Journal Article

Demonstration of Canadian fire behavior calculator REDApp

www.nrfirescience.org/resource/13238

REDapp is a universal fire behavior calculator developed with financial support from the Canadian Interagency Forest Fire Centre (CIFFC), and in-kind support from fire management agencies across Canada. This application is currently in a beta stage of development, with public release expected in early 2015. Unlike WFDSS, Behave,...

Type: Media

Webinar

The CarrFire Vortex: A case of pyro-tornadogenesis?

www.nrfirescience.org/resource/19244

This talk is a component of the Missoula Fire Sciences Laboratory 1918-1919 Seminar Series. In this talk, radar and satellite observations are used to document the evolution of a rare, destructive, fire-generated vortex during the Carr fire on 26 July 2018 near Redding, California. The National Weather Service estimated that...

Type: Media

Seminar

Predicting Burn Severity Patterns in Yosemite National Park and the Douglas Complex Fires in Oregon

www.nrfirescience.org/resource/15798

Mountainous topography creates fine-scale environmental mosaics that vary in precipitation, temperature, insolation, and slope position. This mosaic in turn influences fuel accumulation, moisture, and forest structure that in turn influence patterns of burn severity. We studied the effects of varying environmental conditions on burn...

Type: Media

Seminar

An update on the High-Resolution Rapid Refresh model

www.nrfirescience.org/resource/18381

The High-Resolution Rapid Refresh (HRRR) is NOAA's real-time operational hourly updating forecast systems run at 3-km grid spacing. The HRRR uses the Advanced Research version of the Weather Research and Forecasting (WRF-ARW) as the model component of the forecast system. During the second installment of the Wind Forecast...

Type: Media

Seminar

Introduction to FlamMap5

www.nrfirescience.org/resource/12850

FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.) over an entire FARSITE landscape for constant weather and fuel moisture conditions. Since 2006 FlamMap3 has been widely used by the U.S. Forest Service, National Park...

Type: Media

Webinar

Why We Can't Just Let Fire Burn

www.nrfirescience.org/resource/18967

With the understanding the fire on the landscape is important to forest health, why aren't more fires allowed to burn? Colin Hardy, program manager at the U.S. Forest Service Rocky Mountain Research Station, explains the balance of improving forest health and protecting critical infrastructure from uncharacteristic fires. (video 3...

Type: Media

Video

A summary of fire season 2016 in Oregon and Washington

www.nrfirescience.org/resource/15112

John Saltenberger, Meteorologist with the US Fish and Wildlife Service, presented A Summary of Fire Season 2016 in OR and WA. This webinar was hosted by the NW Fire Science Consortium.

Type: Media

Webinar

The US National Fire Danger Rating System: Past, Present and Future

www.nrfirescience.org/resource/17778

This one hour webinar explores the US National Fire Danger Rating System, history and updates, that is in use today.

Type: Media

Webinar

A research model of flame spread

www.nrfirescience.org/resource/14342

Current operational models of fire spread rely on several constraining assumptions that would ideally be relaxed. A promising method to do this is to develop a more physically based model rather than the mostly empirical basis for the current models. This seminar gives a preliminary look at one such model in...

Type: Media

Seminar

Using IRAWs observations and alternative NWS point forecasts in Near Term Fire

www.nrfirescience.org/resource/17084

Cary Newman is the Fire Planner for the San Juan National Forest in southern Colorado. Cary is a Long Term Fire Analyst who used some different methodologies for modeling fire behavior on the Soberanes Fire in California this season. Working with geospatial fire behavior models for more than a decade he has learned that in spite of...

Type: Media

Video

Development of a Fully Integrated Meteorological/Fire Behavior/Smoke Modeling

www.nrfirescience.org/resource/15793

An modeling/science team of the US Forest Service Washington Office, Rocky Mountain Research Station, and Pacific Northwest Research Station is conducting a proof-of-concept study integrating meteorological, fire behavior, fuels, and air quality models to improve the accuracy of smoke model dispersion forecasts. The atmospheric...

Type: Media

Seminar

Modeling and Mapping the Potential for High Severity Fire in the Western U.S.

www.nrfirescience.org/resource/18377

The ecological effects of wildland fire – also termed the fire severity – are often highly heterogeneous in space and time. This heterogeneity is a result of spatial variability in factors such as fuel, topography, and climate (e.g. a map of mean annual temperature). However, temporally variable factors such as daily weather and...

Type: Media

Webinar

Provision of science-based information and technology in support of the Canadian wildland fire strategy

www.nrfirescience.org/resource/14137

erry Anderson of the Canadian Forest Service, begins this presentation on the current fire research in Canada. The Canadian Forest Service provides national monitoring, model and software development, mapping, and decision support systems, but is not in the business of fire suppression, since natural resources are owned by the...

Type: Media

Video

Fuels and fire behavior data collected on wildland fires by the fire behavior assessment team

www.nrfirescience.org/resource/12833

Fire behavior and effects models are frequently used to inform fire and land management decisions despite a lack of testing against field measurements. The Adaptive Management Services Enterprise

Team (AMSET, USFS) coordinates a module focused on the collection of pre- and post-fire fuels and fire behavior data during wildland fires...

Type: Media

Webinar

Latest research on estimating safety zones

www.nrfirescience.org/resource/13343

Bret Butler, of the Fire Lab in Missoula, addresses the problem stated in the IRPG, of how to calculate the increase in Safety Zone sizes when considering slope and wind. Currently, there is a beta version Safety Zone Calculator android app available for testing and feedback. Contact Bret Butler if interested at: bwbutler@fs.fed...

Type: Media

Video

National and global fire danger rating systems: development, applications, and improvements

www.nrfirescience.org/resource/14335

Wildland fire potential is best described as a combination of available fuels, suitable weather conditions and sources of ignitions and weather is the most spatially and temporally variable of these three components. Weather variables such as temperature, relative humidity, precipitation and wind speed...

Type: Media

Webinar

Presentation 1: Analyst considerations in Alaska (concepts applicable to the lower 48)

www.nrfirescience.org/resource/17080

This presentation is the first of two within a webinar entitled "Sharing Fire Behavior Practices & Lessons Learned: Fire Season 2015". As the fire behavior community aspires to promote best practices amongst a range of fire behavior experience, this webinar strives to share information regarding lessons learned from fire...

Type: Media

Webinar

Evaluating the Swiss SNOWPACK modeling system across the Northern Rocky Mountains

www.nrfirescience.org/resource/15791

Since late 2015, a one dimensional model of snow pack structure, know as SNOWPACK, has been evaluated by the National Weather Service at Missoula, in collaboration with Montana State University. The model is driven by point-based output from a high-resolution numerical model (WRF-ARW).Hourly forecasts of incoming radiation,...

Type: Media

Seminar

Wildland Urban Interface Fires: An Overview for Responders

www.nrfirescience.org/resource/16068

This 58 minute video is produced for fire responders to improve knowledge and safety when fighting fires in the wildland-urban interface

Type: Media

Video

WFDSS modeling and weather

www.nrfirescience.org/resource/14131

This webinar was facilitated by Tom St. Clair, Fairbanks, Alaska, and focused on WFDSS modeling and weather. The agenda items covered included: how to pick RAWs to get the best data for wind and fuels, using predicted weather, ERC classes tab in WFDSS, ERC streams tab in WFDSS, winds tab in WFDSS, dealing with weather forecast...

Type: Media

Webinar

Effects of complex terrain on extreme fire behavior

www.nrfirescience.org/resource/12822

This webinar, presented on January 27, 2015 by Craig Clements and Neil Lareau from the Fire Weather Research Laboratory at San Jose State University, provides a discussion of wind systems in mountainous terrain, modeling fire behavior on slopes, and wind modeling tools.

Type: Media

Webinar

ArcFuels

www.nrfirescience.org/resource/18006

ArcFuels is a library of ArcGIS macros developed to streamline fire behavior modeling and spatial analyses for fuel treatment planning. The macros link: 1) key wildfire behavior models; 2) fuels and vegetation data (e.g. Landfire, FVS databases); 3) MS Office, and 4) ArcGIS. ArcFuels is used to rapidly design and test fuel...

Type: Website

Website

Post-outbreak fire risk and behavior: mountain pine beetle influences on fuel characteristics and fire behavior

www.nrfirescience.org/resource/13033

This study attempts to understand how the Mountain Pine Beetle affects various fuels and how those various fuel changes actually affect fire behavior. This webinar was hosted by the Southern Rockies Fire Science Network, and was presented by Matt Jolly.

Type: Media

Webinar

Learning From The Experts: Margit Bucher - Another Pair of Eyes

www.nrfirescience.org/resource/16040

In this 9 minute video, Margit Bucher explains how she uses her crew as another pair of eyes and the importance of double checking assumptions that you are working on within the burn plan. The goal of the Learning from the Experts video series is to speed up individual and organizational learning. Project personnel have...

Type: Media

Video

Lessons from the Woodview fire burnover

www.nrfirescience.org/resource/14118

This video examines a near miss that occurred when inadequate planning and communication put an initial attack crew in the middle of a crowning fire without a viable escape route.

Type: Media

Video

Fire columns and plume dynamics

www.nrfirescience.org/resource/12819

Brian Potter, a research meteorologist with the USDA Forest Service, presented a webinar on February 26, 2015 regarding the state of science with respect to the airflow associated with fire convection plumes. This includes the concepts of plume dominated fires, adverse wind profiles, the role of atmospheric stability in fire...

Type: Media

Webinar

First Order Fire Effects Model (FOFEM)

www.nrfirescience.org/resource/18002

First Order Fire Effects Model (FOFEM) is a computer program that was developed to meet needs of resource managers, planners, and analysts in predicting and planning for fire effects. Quantitative predictions of fire effects are needed for planning prescribed fires that best accomplish resource needs, for impact assessment, and for...

Type: Website

Website

STANDFIRE: a prototype 3-D fuels and fire modeling platform for fuel treatment analysis

www.nrfirescience.org/resource/14872

Across the country, hundreds of millions of dollars have been spent, and tens of millions of acres of fuels have been treated with the intention of altering fire behavior, either to mitigate threats to firefighters and communities, or to maintain or restore healthy ecosystems. While some case studies have shown...

Type: Media

Webinar

Past meets the present: using old burns in fire management

www.nrfirescience.org/resource/14303

Over the past two decades the size of wildfires has dramatically increased across the Southwest. These large burned areas have become so common that newer wildfires are burning into and around them. Fire managers increasingly use these previous burns as treatments that either stop or slow fire spread. The interaction of past and...

Type: Media

Video

Lodgepole pine ecology & fire behavior

www.nrfirescience.org/resource/14098

This webinar was not recorded. Media link below is to a pdf of the webinar slide show. This presentation covers the following points: 1) Surprises/Lessons from the 1988 fires in Yellowstone National Park; 2) Resistance to an aggressive invasive species in post-fire lodgepole pine forests; 3) Interactions of mountain pine...

Type: Media

Webinar

The ability of wildfire to act as a fuel treatment

www.nrfirescience.org/resource/12802

This webinar highlighted results from a study investigating the ability of wildfire to act as a fuel treatment. The study evaluated whether or not wildfires limited the occurrence, size, and severity of subsequent wildfires in four large wilderness complexes in Idaho, Montana, and New Mexico. The study

focused on protected areas to...

Type: Media

Webinar

USFS Wildland Fire Assessment System (WFAS) - National Fire Danger Rating System

www.nrfirescience.org/resource/17996

The National Fire danger Rating System is a set of computer programs and algorithms that allow land management agencies to estimate today's or tomorrow's fire danger for a given rating area. NFDRS characterizes fire danger by evaluating the approximate upper limit of fire behavior in a fire danger rating area during a 24-hour period...

Type: Website

Website

Computer models for wildland and wildland-urban interface fires

www.nrfirescience.org/resource/13808

Hosted by the Northwest Fire Science Consortium. Ruddy Mell from the USFS Pacific Wildland Fire Sciences Lab in Seattle, WA provides an overview of the current state, limitations, and future developments in wildland and wildland-urban interface fire behavior models.

Type: Media

Webinar

Proceedings of the fourth fire behavior and fuels conference

www.nrfirescience.org/resource/18396

The Fourth Fire Behavior and Fuels Conference was held in Raleigh, North Carolina, USA, February 18-22, 2013. The theme for this conference was At The Crossroads: Looking Toward the Future in a Changing Environment. Joint sponsorship of the conference was by the International Association of Wildland Fire (IAWF) and the International...

Author(s): Dale D. Wade, Rebekah L. Fox

Type: Document

Conference Proceedings

A deadly beauty: the danger of fire whirls

www.nrfirescience.org/resource/14300

A 22-minute video about the dangers of fire whirls.

Type: Media

Video

Part 3. Wildland fire, smoke & roadway visibility series: Planned Burn (PB) Piedmont Web Tool - Estimating Superfog potential from Smoldering Combustion

www.nrfirescience.org/resource/15297

In Part 3 of the Wildland Fire Smoke and Roadway Visibility Webinar Series, Matthew Fearon, research meteorologist for the Desert Research Institute, presented on the PB-Piedmont Web Tool, Super-Fog Potential, and Estimated Smoldering Potential - all with a focus on moving science to a usable tool for managers and others.

Type: Media

Webinar

Twisp River Fire Learning Review Briefing

www.nrfirescience.org/resource/17830

This 14 minute video gives an overview of the Twisp River Fire in 2016. To view the Twisp River Fire Fatalities report, visit: <http://bit.ly/twispriverfatalities> to download a pdf version.

Type: Media

Video

Introduction to Fire Behavior Fuel Models

www.nrfirescience.org/resource/17985

This video describes how and why fire behavior fuel models were developed, and introduces how they are used today.

Type: Media

Webinar

A new look at the seasonal dynamics of live fuel physio-chemistry and their potential influence on wildland fire behavior

www.nrfirescience.org/resource/13250

Wildland fires spread through combinations of living and dead vegetation and the largest fires generally occur in fuels that are dominated by living plants. While much is known about the factors that regulate fire spread through dead fuels, the controlling factors of live fuel flammability have proven elusive. Here we present an...

Type: Media

Webinar

Comparison of sling psychrometer to digital weather meters

www.nrfirescience.org/resource/13774

Belt weather kits for recording of weather information have been in use since 1959. The use of a sling psychrometer from these kits is standard practice for the recording of dry and wet bulb temperatures to calculate relative humidity. Electronic based meters for recording weather information could replace belt...

Type: Media

Webinar

Synthesis of knowledge of extreme fire behavior for fire managers

www.nrfirescience.org/resource/14287

Extreme fire behavior indicates a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning/spotting, presence of fire whirls, and strong convection column. This webinar will summarize the recent JFSP...

Type: Media

Webinar

A day in the life of a fire behavior analyst

www.nrfirescience.org/resource/12944

Ever wish you could be out on the ground watching how fire behaves over the terrain, in different fuels with effects from weather, then use that experience to try and replicate what you saw and predict what will happen tomorrow? Well the Fire Behavior Analyst job is for you. Learn what it's like to be able to watch Mother Nature at...

Type: Media

Webinar

Your Home Can Survive a Wildfire

www.nrfirescience.org/resource/18100

Dr. Jack Cohen, Fire Science Researcher with the USDA Forest Service, explains current research about how homes ignite during wildfires, and the actions that homeowners can take to help their home survive the impacts of flames and embers. Featuring footage from the IBHS Research Center showing ember experiments on full-scale...

Type: Media

Video

Part 1. Wildland fire, smoke & roadway visibility series: Superfog: how it forms, where it forms, where it goes, what to do

www.nrfirescience.org/resource/15293

In Part 1 of the Wildland Fire Smoke and Roadway Visibility Webinar Series, Gary Achtemeier, former research meteorologist for the USFS Southern Research Station, presented information on the following topics: • What is Superfog and how it forms on your burn site • How common is Superfog on burn sites • Superfog weather:...

Type: Media

Webinar

An Assessment of Temperature and RH from a Variety of Weather Meters

www.nrfirescience.org/resource/15934

Do you use belt weather kits or electronic handheld weather meters for measuring temperature and relative humidity in the field? Which device do you trust? Belt weather kits for obtaining weather information on prescribed fires and wildfires have been in use since the 1960's and the use of sling psychrometers from these kits has...

Type: Media

Webinar

Fire behavior in the wildland/urban interface

www.nrfirescience.org/resource/14009

The National Wildland/Urban Interface Fire Protection Program (www.firewise.org) Firefighter Safety Series FWC-602-03-DVD. Part 1: Fire Behavior in the Wildland/Urban Interface. The Fire Fighter Safety Series is a multipart instructional package developed for small community fire departments to address the...

Type: Media

Video

Small-scale Fire Behavior Measurements in the Field: Bridging the Gap Between the Laboratory and Management-scale Prescribed Fires

www.nrfirescience.org/resource/17983

To provide a better understanding of combustion processes and fire behavior during planned wildland fires across spatial scales, we conducted 12 intensively-instrumented experiments on replicated 100 m² plots, contrasting cool, dormant season vs. warm, growing season conditions, and natural vs. augmented fuel loads. Instrumentation...

Type: Media

Webinar

The fire lab

www.nrfirescience.org/resource/14664

Massive wildfires cost billions of dollars and burn millions of acres in the U.S. every year, but we know

surprisingly little about the basic science of how they spread. At the Fire Lab in Missoula, Montana, researchers reverse-engineer spreading fires using wind tunnels, fire-whirl generators, and giant combustion chambers. They're...

Type: Media

Video

Elements of the National Weather Service fire weather forecast

www.nrfirescience.org/resource/13247

Casey Sullivan provides an overview of the National Weather Service fire weather forecast program and discusses elements of the fire weather forecast available to any fire practitioner. The hourly weather graph and definitions of surface winds were emphasized.

Type: Media

Webinar

Introduction to Combustion 2

www.nrfirescience.org/resource/18392

Learn how the four phases of combustion contribute to the burning of wildland fire fuels. This video discusses preignition, ignition, combustion, and extinction and how these phases relate to fire behavior and fire spread. This video is part of the World of Wildland Fire video series.

Type: Media

Video

Fundamental research on how wildfires spread

www.nrfirescience.org/resource/15228

About half of the Forest Service budget is spent on fire suppression, yet we still can't explain exactly how wildland fires spread. In order to make more informed decisions and improve fire fighter safety, a new research program at the Missoula Fire Lab is going back to the basics. This webinar with Sara McAllister discusses the...

Type: Media

Webinar

Fire and Lightning from Space: Using the new GOES-16 Satellite for Fire and Total Lightning Detection

www.nrfirescience.org/resource/15802

GOES-16 is NOAA's latest earth-observing geostationary satellite, launched Nov 19, 2016. The GOES-16 platform hosts many improved earth-and sun-looking instruments, of which the Advanced Baseline Imager (ABI) and the Geostationary Lightning Mapper (GLM) are the primary earth-pointing instruments. Both instruments take current...

Type: Media

Seminar

A dynamic, severe fire weather potential mobile mapping program

www.nrfirescience.org/resource/14536

Goal of this tool is to provide spatial, dynamic fire danger and fire behavior assessment tools so that firefighters can abide by the Standard Fire Orders 1 and 3: "Keep informed of fire weather conditions and forecasts" and "Base all action on current and expected fire behavior".

Type: Media

Video

Introduction to remote sensing for wildfire applications: terrain data applications

www.nrfirescience.org/resource/13242

The fifth webinar in this series covered data access, tools, and recent terrain data releases.

Type: Media

Webinar

Effects of burning piles

www.nrfirescience.org/resource/19245

Millions of acres of fuels reduction treatments are being implemented each year in the fire adapted forests of the US. Typical these fuel reduction treatments target small diameter trees for removal producing large amounts of unmerchantable woody material and elevating surface fuel loadings. Often this material has no market value...

Type: Media

Webinar

Climate, Megafires, and Conservation Financing

www.nrfirescience.org/resource/16356

Join us in a discussion on how climatic changes can influence wildland fire activity across the globe and how these critical fire weather variables have changed over the last 40 years. These changes in key weather variables have combined to both lengthen the fire season and increase the fire weather severity within the fire season....

Type: Media

Webinar

Improving Parameterization of Combustion Processes in Coupled Fire-Atmosphere Models through Remote Sensing

www.nrfirescience.org/resource/18384

Coupled fire-atmosphere models intended to be used for landscape-scale fires (domains of hundreds of meters to 10s of kilometers), typically divide the simulation domain up into a mesh of grid cells and these grid cells typically range in size from 1-30 meters on a side. As the processes governing combustion of an individual fuel...

Type: Media

Seminar

Lessons from the behavior of the 2002 Hayman fire

www.nrfirescience.org/resource/14187

Mark Finney, Research Forester, US Forest Service, Rocky Mountain Research Station, presents an overview fire behavior during the Hayman Fire at the Hayman Fire Science Symposium: Lessons Learned After Ten Years of Recovery, Rehabilitation, & Restoration on June 21, 2012.

Type: Media

Video

Introduction to WFDSS - air quality tools

www.nrfirescience.org/resource/12865

Introduction to WFDSS - Air Quality Tools Smoke management is an important aspect of managing wildland fire. While mitigating smoke impacts from prescribed burns is important, smoke from large wildfire complexes (such as the AZ/NM fires in 2011) can expose millions of people to significant smoke, with hundreds of thousands living in...

Type: Media

Webinar

BehavePlus Updates and Changes

www.nrfirescience.org/resource/17779

In this 38 minute webinar, Faith Ann briefly describes major changes from version 5 to version 6; shows sample Runs demonstrating these changes; provides suggestions for calculating surface fire behavior using BehavePlus v6; describes how changes in BehavePlus affect NWCG courses that use this program (e.g., S-490; RX-301/341); and...

Type: Media

Webinar

Vortices and wildland fire

www.nrfirescience.org/resource/13222

Scott Goodrick, a research meteorologist with the USDA Forest Service, and Jason Forthofer, a mechanical engineer with the USDA Forest Service, present a summary of vortices and wildland fire. Vortices are almost always present in the wildland fire environment and can sometimes interact with the fire in unpredictable ways, causing...

Type: Media

Webinar

The evolving role of the IMET and their interaction with other intelligence folks

www.nrfirescience.org/resource/17086

This presentation is the second video available for a webinar entitled "Fire Season 2016 Hot Topics." As the fire community aspires to promote firefighter safety and best practices, this webinar strived to share information regarding lessons learned from the 2016 wildfire season. Every fire season there are parts of the country that...

Type: Media

Video

Temporal Dynamics of Wildfire Risk Assessments: Assessing tradeoffs and asking the hard questions

www.nrfirescience.org/resource/15794

Recent advances in integrating wildfire planning and strategic wildfire response can create more tangible fire outcomes that are better aligned the national cohesive strategy goals of living sustainably with wildfire. By integrating both in-situ and transboundary wildfire risk assessments with potential operations delineations, we...

Type: Media

Seminar

Vegetation, fuel, and potential fire dynamics years after Montana's Fire and Fire Surrogate Study

www.nrfirescience.org/resource/17602

This seminar is part of the Missoula Fire Sciences Laboratory 2018 Seminar Series.

Type: Media

Seminar

WeatherSHIELD: a System for Forecasting Fire Weather and Indices

www.nrfirescience.org/resource/18379

WeatherSHIELD (Weather SHort & Intermediate Ensemble and Long-term Dynamic weather patterns) is a system for preparing and displaying probabilistic weather forecasts over the short, intermediate,

and long term. WeatherSHIELD is comprised of (1) Aviation Forest Fire & Emergency Services' 5 day forecast, (2) the North...

Type: Media

Webinar

Burn boss stories

www.nrfirescience.org/resource/14148

Veteran burn bosses share their stories and firsthand insights.

Type: Media

Video

Predicting local smoke dispersion during low-intensity wildland fires in forested environments

www.nrfirescience.org/resource/12835

Smoke generated from low-intensity prescribed fires used for fuels management can have an adverse impact on local air quality, raising human health and safety concerns especially in wildland-urban-interface areas. Local smoke behavior is a complex process and is highly dependent on local ambient atmospheric conditions (e.g....

Type: Media

Webinar

Understanding the spread of wildfire

www.nrfirescience.org/resource/13878

Rocky Mountain Research Station Research Mechanical Engineer Sara McAllister talks about and demonstrates her research on the understanding of fire ignition and the dynamics behind the spread of wildfire.

Type: Media

Video

Near Real-time Wildfire Simulation Using Spark Big Data Platform

www.nrfirescience.org/resource/17777

There has been a lack of tools and platforms for real-time prediction of wildfire movement and risk. Commonly used models do not address the dynamic nature of an area's current meteorological conditions such as the wind, humidity, and precipitation when determining the direction and speed of fire propagation. Near-real time...

Type: Media

Seminar

Fuel particle heat exchange

www.nrfirescience.org/resource/14336

This seminar was recorded by the RMRS Fire Sciences Laboratory.

Type: Media

Seminar

Presentation 2: Finny versus Scott and Reinhardt crown fire methods in FSPro. (applicable to other fire spread models)

www.nrfirescience.org/resource/17081

This presentation contains the four powerpoint presentations comprising a webinar entitled "Sharing Fire Behavior Practices & Lessons Learned: Fire Season 2015". As the fire behavior community aspires to promote best practices amongst a range of fire behavior experience, this webinar strives to share

information regarding...

Type: Media

Webinar

Complex Patterns of the Lolo Peak Fire from Carlton Ridge to Bass Creek

www.nrfirescience.org/resource/15792

The recent Lolo Peak Fire and associated burnouts and backburns resulted in both expected and unexpected burn patterns related to differences in forest structure, topography, and weather. It also illustrates the "perfect storm" of stifling constraints the Forest Service faces in attempting to implement ecologically-based management...

Type: Media

Seminar

The Story Behind the Yellowstone Fires of 1988: retro Report

www.nrfirescience.org/resource/16084

This 11 minute video covers the lessons learned from the summer of 1988 when fires burned nearly one third of Yellowstone National Park. The 1988 fire continue to shape the way we fight wildfires raging across the West today.

Type: Media

Video

Introduction to the Canadian Forest Fire Weather Index System

www.nrfirescience.org/resource/14134

This video provides an introduction to the Canadian Forest Fire Weather Index System.

Type: Media

Video

The how, what, and where of safety zones: recent findings

www.nrfirescience.org/resource/12823

Bret Butler presented a webinar on December 2, 2014. Current safety zone guidelines for wildland firefighters are based on the assumption of flat ground, no wind, and radiative heating only. Recent measurements in grass, shrub and crown fires indicate that convective heating can be significant especially when wind or slope are...

Type: Media

Webinar

BehavePlus Fire Modeling System

www.nrfirescience.org/resource/16640

The BehavePlus fire modeling system is managed by the U.S.Forest Service, Rocky Mountain Research Station, Fire, Fuel, and Smoke Science Program (FFS) in Missoula, Montana. In 2014, information on BehavePlus was transferred from www.FireModels.org to <https://www.frames.gov/partner-sites/behaveplus/home/>. If you are looking for...

Type: Website

Website

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

www.nrfirescience.org/resource/14334

All wildland firefighters are required to identify a location to which they can retreat in the event that fire conditions threaten their safety. These areas termed safety zones. However it was not until the work by

Butler and Cohen in 1995 that any quantitative information existed for actually gauging the...

Type: Media

Webinar

Beyond the stability index: fire management and forecasting tools for air quality, weather and climate impacts of prescribed fires

www.nrfirescience.org/resource/13063

This webinar introduced and described forecasting tools for air quality, weather and climate impacts of prescribed fires.

Type: Media

Webinar

Wildland Urban Interface Fires: An Overview for Homeowners

www.nrfirescience.org/resource/16067

This 58 minute video covers what the wildland-urban interface is and what the public and firefighters need to know about fighting fire in it.

Type: Media

Video

The National Center for Ecological Analysis and Synthesis (NCEAS)

www.nrfirescience.org/resource/18362

Established in 1995, NCEAS was the first synthesis science center in the world. We pioneered the movement toward this collaborative approach to science and have helped build a community of scientists around it. NCEAS conducts transformational science focused on informing solutions that will allow people and nature to thrive. We are...

Type: Website

Website

Close call - What you can learn from the Ahorn fire shelter deployment

www.nrfirescience.org/resource/14120

A look at the "close call" firefighter shelter deployment that occurred on the Ahorn Fire—focusing on key lessons and effective practices to be learned from this incident. This video from the Wildland Fire Lessons Learned Center.

Type: Media

Video

Critical fire weather patterns - Western United States

www.nrfirescience.org/resource/12820

In this webinar, presented on February 11, 2015, Paul Werth, a fire weather meteorologist with Weather Research and Consulting Services, LLC, provides a discussion of weather elements that promote extreme fire behavior, regional critical fire weather patterns, and forecast products that are useful in determining areas at risk for...

Type: Media

Webinar

Fire and Fuels Extension to the Forest Vegetation Simulator

www.nrfirescience.org/resource/18005

The Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS) simulates fuel dynamics and potential fire behaviour over time, in the context of stand development and management. The Fire

Effects Model Extension is a new extension to FVS and the PPE that allows users to simulate the effects of fire on a number of...

Type: Website

Website

Fires of 2000 overview: a fire manager perspective

www.nrfirescience.org/resource/13311

In this video, Jacquie Parks, Fire and Fuels Management Specialist with the Bitterroot National Forest, describes fire management challenges during the Bitterroot fires of 2000. This was filmed at the Bitterroot National Forest headquarters in Hamilton, MT, which was one of the stops during the Fires of 2000 field trip that was part...

Type: Media

Video

Inside the lab studying the growing threat of fire tornadoes

www.nrfirescience.org/resource/18140

This video was aired on CBS news to explain work being done on fire tornados at the Missoula Fire Sciences Lab in Montana.

Type: Media

Video

The science behind California's surging wildfires

www.nrfirescience.org/resource/18406

As three major fires blaze in California, we consider some of their causes, both human and meteorological. Science correspondent Miles O'Brien has been filming a NOVA documentary on megafires and witnessed the Camp Fire not long after it began. He joins William Brangham to describe that stunning experience, along with the broader...

Type: Media

Video

American burning: the Yarnell Hill fire tragedy and the nation's wildfire crisis

www.nrfirescience.org/resource/14305

On June 30, 2013, 19 firefighters from the Granite Mountain Hotshots were killed battling a wildfire near Yarnell, Arizona. Huge questions remain about the last moments of their lives. Why did they move out of a safe area in their final minutes of life? Why did the fire move so quickly? Could their deaths have been prevented? The...

Type: Media

Video

Fire.org

www.nrfirescience.org/resource/114

Fire.org is the home page of Systems for Environmental Management, a Montana nonprofit research and educational corporation. For over 29 years we've specialized in issues concerning wildland fire planning, behavior, fuel, weather, and effects. Here we post many of the publications and software packages we've developed in cooperation...

Type: Website

Website