

Pyro-Ecophysiology: Shifting the Paradigm of Live Wildland Fuel Research

www.nrfirescience.org/resource/17097

The most destructive wildland fires occur in mixtures of living and dead vegetation, yet very little attention has been given to the fundamental differences between factors that control their flammability. Historically, moisture content has been used to evaluate the relative flammability of live and dead fuels without considering...

Author(s): William Matt Jolly, Daniel M. Johnson

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

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

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

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

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

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

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

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

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

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

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 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

www.nrfirescience.org/resource/13006

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

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

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/12971

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

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

Year Published: 2014
Type: Document
Book or Chapter or Journal Article

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

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

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

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

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

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

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

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

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

Relationships between climate and macroscale area burned in the western United States

www.nrfirescience.org/resource/12027

Increased wildfire activity (e.g. number of starts, area burned, fire behaviour) across the western United States in recent decades has heightened interest in resolving climate-fire relationships. Macroscale climate-fire relationships were examined in forested and non-forested lands for eight Geographic Area Coordination Centers in...

Author(s): John T. Abatzoglou, Crystal A. Kolden

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

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

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

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

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

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

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

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

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

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

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

Bark beetles and fire: two forces of nature transforming western forests

www.nrfirescience.org/resource/11984

Bark beetles are chewing a wide swath through forests across North America. Over the past few years, infestations have become epidemic in lodgepole and spruce-fir forests of the Intermountain West. The resulting extensive acreages of dead trees are alarming the public and raising concern about risk of severe fire. Researchers...

Author(s): Gail Wells
Year Published: 2012
Type: Document
Research Brief or Fact Sheet

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

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

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

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

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

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

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

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

Fire-climate interactions in the American west since 1400 CE

www.nrfirescience.org/resource/11992

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

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

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

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

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

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

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

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

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

www.nrfirescience.org/resource/8228

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

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

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

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

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 Hovmöller 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

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

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

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

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

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

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

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

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

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, Brandon M. Collins, Philip N. Omi, Phillip L. Chapman

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

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

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

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

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

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

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

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

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

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/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

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

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

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

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

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

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

Conference Proceedings

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

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

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

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

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

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. Silvieus, Catherine A. Stewart

Year Published: 2000

Type: Document

Conference Proceedings

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

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

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

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

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

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

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

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

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. Albini

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

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

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

Smoke column height related to fire intensity

www.nrfirescience.org/resource/11946

Height of slash fire smoke columns, commonly thought to be a function of atmospheric conditions alone, through a series of 10-acre experimental fires is shown to be strongly related to fire intensity. By conducting intense fires, land managers can possibly burn forest debris and still maintain air quality when atmospheric conditions...

Author(s): Rodney A. Norum

Year Published: 1974

Type: Document

Technical Report or White Paper

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

The relationship of jet streams to forest fires

www.nrfirescience.org/resource/11470

Problems being encountered in implementing fire prevention programs were explored by studying the organization for fire prevention at the Fish Lake, Uinta, and Wasatch National Forests in Utah. The study focused on role congruency in fire prevention activities and on the social and organizational obstacles to effective programs. The...

Author(s): V. J. Schaefer

Year Published: 1957

Type: Document

Book or Chapter or Journal Article

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Fuel particle heat exchange

www.nrfirescience.org/resource/14336

This seminar was recorded by the RMRS Fire Sciences Laboratory.

Type: Media

Seminar

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

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

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

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