

The Fire and Tree Mortality Database, for empirical modeling of individual tree mortality after fire

www.nrfirescience.org/resource/21454

Wildland fires have a multitude of ecological effects in forests, woodlands, and savannas across the globe. A major focus of past research has been on tree mortality from fire, as trees provide a vast range of biological services. We assembled a database of individual-tree records from prescribed fires and wildfires in the United...

Author(s): C. Alina Cansler, Sharon M. Hood, Phillip J. van Mantgem, J. Morgan Varner

Year Published: 2020

Type: Document

Synthesis

Adaptive prescribed burning in Australia for the early 21st Century – context, status, challenges

www.nrfirescience.org/resource/21072

Despite evident advances in knowledge and understanding concerning the application of prescribed burning for delivering benefits in wildfire control and a variety of sociocultural, economic and environmental outcomes, the practical application of prescribed burning in Australia is increasingly administratively and logistically...

Author(s): Jeremy Russell-Smith, Lachlan McCaw, Adam J. Leavesley

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Probability-based wildfire risk measure for decision-making

www.nrfirescience.org/resource/21158

Wildfire is a natural element of many ecosystems as well as a natural disaster to be prevented. Climate and land usage changes have increased the number and size of wildfires in the last few decades. In this situation, governments must be able to manage wildfire, and a risk measure can be crucial to evaluate any preventive action...

Author(s): Adán Rodríguez-Martínez, Begoña Vitoriano

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Wildfire detection using transfer learning on augmented datasets

www.nrfirescience.org/resource/20976

Wildfire detection is a time-critical application as the difficulty to pinpoint ignition locations in a short time-frame often leads to the escalation of the severity of fire events. This problem has motivated considerable interest from expert systems research to develop accurate early-warning applications and the breakthroughs in...

Author(s): Maria João Sousa, Alexandra Moutinho, Miguel Almeida

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

The next generation soil heating model - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/19006

Accurately modeling the duration and extent of soil heating from prescribed fires and wildfires is vital to predicting many second-order fire effects, including development of soil hydrophobicity and other biological, chemical, and physical effects. Advancements have been made in the process-based soil heating models that consider...

Author(s): Peter R. Robichaud, William J. Massman, Anthony S. Bova, Antonio Girona-García, Mathew

Lesiecki
Year Published: 2019
Type: Document
Technical Report or White Paper

Modeling ground firefighting resource activities to manage risk given uncertain weather

www.nrfirescience.org/resource/20415

Wildland firefighting requires managers to make decisions in complex decision environments that hold many uncertainties; these decisions need to be adapted dynamically over time as fire behavior evolves. Models used in firefighting decisions should also have the capability to adapt to changing conditions. In this paper, detailed...

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

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A landscape-scale optimisation model to break the hazardous fuel continuum while maintaining habitat quality

www.nrfirescience.org/resource/20022

Wildfires have demonstrated their destructive powers in several parts of the world in recent years. In an effort to mitigate the hazard of large catastrophic wildfires, a common practice is to reduce fuel loads in the landscape. This can be achieved through prescribed burning or mechanically. Prioritising areas to treat is a...

Author(s): Javier Leon, Victor M. J. J. Reijnders, John W. Hearne, Melih Ozlen, Karin J. Reinke

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Effects of atmospheric oxygen on horizontal peat smoldering fires: experimental and numerical study

www.nrfirescience.org/resource/19396

The smoldering combustion of natural organic layers such as peatlands leads to the largest and most persistent wildland fires on the Earth. The atmospheric oxygen concentration (mass fraction of oxygen) significantly influences the smoldering characteristics of peatlands. This work investigates the effects of on horizontal peat...

Author(s): Jiuling Yang, Naian Liu, Haixiang Chen, Wei Gao, Ran Tu

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Detection of coarse woody debris using airborne light detection and ranging (LiDAR)

www.nrfirescience.org/resource/19024

Coarse woody debris (CWD) is an essential component of forest ecosystems that provides habitat for diverse species, functions in water and nutrient cycling, and can be a potential surface fuel in wildfires. CWD detection and mapping would enhance forestry and wildlife research and management but passive remote sensing technologies...

Author(s): Michael J. Joyce, John D. Erb, Barry A. Sampson, Ron A. Moen

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Land-cover dependent relationships between fire and soil moisture

www.nrfirescience.org/resource/20414

For this study, we characterized the dependence of fire counts (FCs) on soil moisture (SM) at global and sub-global scales using 15 years of remote sensing data. We argue that this mathematical relationship serves as an effective way to predict fire because it is a proxy for the semi-quantitative fire-productivity relationship that...

Author(s): Alexander J. Schaefer, Brian I. Magi

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Is Anthropogenic Pyrodiversity Invisible in Paleofire Records?

www.nrfirescience.org/resource/19885

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

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

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

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

Near-future forest vulnerability to drought and fire varies across the western United States

www.nrfirescience.org/resource/19196

Recent prolonged droughts and catastrophic wildfires in the western United States have raised concerns about the potential for forest mortality to impact forest structure, forest ecosystem services, and the economic vitality of communities in the coming decades. We used the Community Land Model (CLM) to determine forest...

Author(s): Polly C. Buotte, Samuel Levis, Beverly E. Law, Tara W. Hudiburg, David E. Rupp, Jeffrey J. Kent

Year Published: 2019

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

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

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

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

Evaluation of past-fire mosaics on subsequent wildfire behavior, severity and management strategies - JFSP Final Report

www.nrfirescience.org/resource/18250

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

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

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

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

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

Biomass and fire dynamics in a temperate forest-grassland mosaic: Integrating multi-species herbivory, climate, and fire with the FireBGCv2/GrazeBGC system

www.nrfirescience.org/resource/13195

Landscape fire succession models (LFSMs) predict spatially-explicit interactions between vegetation succession and disturbance, but these models have yet to fully integrate ungulate herbivory as a driver of their processes. We modified a complex LFSM, FireBGCv2, to include a multi-species herbivory module, GrazeBGC. The system is...

Author(s): Robert A. Riggs, Robert E. Keane, Norm Cimon, Rachel Cook, Lisa M. Holsinger, John Cook, Timothy DelCurto, Scott L. Baggett, Donald Justice, David Powell, Martin Vavra, Bridgett J. Naylor

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

When relationships estimated in the past cannot be used to predict the future: using mechanistic models to predict landscape ecological dynamics in a changing world

www.nrfirescience.org/resource/16834

Researchers and natural resource managers need predictions of how multiple global changes (e.g., climate change, rising levels of air pollutants, exotic invasions) will affect landscape composition and ecosystem function. Ecological predictive models used for this purpose are constructed using either a mechanistic (process-based) or...

Author(s): Eric J. Gustafson

Year Published: 2013

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

An individual-based process model to simulate landscape-scale forest ecosystem dynamics

www.nrfirescience.org/resource/18461

Forest ecosystem dynamics emerges from nonlinear interactions between adaptive biotic agents (i.e., individual trees) and their relationship with a spatially and temporally heterogeneous abiotic environment. Understanding and predicting the dynamics resulting from these complex interactions is crucial for the sustainable stewardship...

Author(s): Rupert Seidl, Werner Rammer, Robert M. Scheller, Thomas A. Spies

Year Published: 2012

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

Influence of fire regimes on lodgepole pine stand age and density across the Yellowstone National Park (USA) landscape

www.nrfirescience.org/resource/18410

A probabilistic spatial model was created based on empirical data to examine the influence of different fire regimes on stand structure of lodgepole pine (*Pinus contorta* var. *latifolia*) forests across a >500,000-ha landscape in Yellowstone National Park, Wyoming, USA. We asked how variation in the frequency of large fire events...

Author(s): Tania L. Schoennagel, Monica G. Turner, Daniel M. Kashian, Andrew Fall

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

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

FIREMON: Fire Effects Monitoring and Inventory System

www.nrfirescience.org/resource/18927

FIREMON is a fire effects monitoring and inventory protocol developed for interagency use through a grant from the Joint Fire Science Program. It is designed to help the fire manager determine how plots should be placed on the landscape and what sampling methods should be used at each plot location based on the project funding and...

Author(s): Duncan C. Lutes, Robert E. Keane, John F. Caratti, Larry J. Gangi, Carl H. Key, Nathan C. Benson, Steve Sutherland

Year Published: 2003

Type: Document

Conference Proceedings

Catastrophic wildfire and number of populations as factors influencing risk of extinction for Gila trout (*Onchorhynchus gilae*)

www.nrfirescience.org/resource/18501

We used the computer program RAMAS to explore the sensitivity of an extinction-risk model for the

Gila trout (*Oncorhynchus gibe*) to management of wildfires and number of populations of the species. The Gila trout is an endangered salmonid presently restricted to very few headwaters of the Gila and San Francisco river tributaries in...

Author(s): D. K. Brown, A. A. Echelle, D. L. Propst, J. E. Brooks, W. L. Fisher

Year Published: 2001

Type: Document

Book or Chapter or Journal Article