

Towards a comprehensive look at global drivers of novel extreme wildfire events

www.nrfirescience.org/resource/23131

Extreme wildfire events in recent years are shaking our established knowledge of how fire regimes respond to climate variables and how societies need to react to fire impacts. Albeit fires are stochastic and extreme in nature, the speed, intensity, and extension of new extreme fires that have occurred during the last years are...

Author(s): Andrea Duane, Marc Castellnou, Lluís Brotons

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Book or Chapter or Journal Article

How climate change and fire exclusion drive wildfire regimes at actionable scales

www.nrfirescience.org/resource/22742

Extreme wildfires are increasing in frequency globally, prompting new efforts to mitigate risk. The ecological appropriateness of risk mitigation strategies, however, depends on what factors are driving these increases. While regional syntheses attribute increases in fire activity to both climate change and fuel accumulation through...

Author(s): Erin J. Hanan, Jianning Ren, Christina Tague, Crystal A. Kolden, John T. Abatzoglou, Ryan R. Bart, Maureen C. Kennedy, Mingliang Liu, Jennifer C. Adam

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Book or Chapter or Journal Article

Spatial analysis of wildfire incidence in the USA: the role of climatic spillovers

www.nrfirescience.org/resource/23126

Wildfires constitute a serious threat for both the environment and human well-being. The US fire policy aims to tackle this problem, devoting a sizeable amount of resources and resorting extensively to fire suppression strategies. The theoretical literature has established a link between climate conditions and wildfire incidence....

Author(s): Massimiliano Agovino, Massimiliano Cerciello, Aniello Ferraro, Antonio Garofalo

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Book or Chapter or Journal Article

Native American fire management at an ancient wildland-urban interface in the Southwest United States

www.nrfirescience.org/resource/22621

The intersection of expanding human development and wildland landscapes—the “wildland–urban interface” or WUI—is one of the most vexing contexts for fire management because it involves complex interacting systems of people and nature. Here, we document the dynamism and stability of an ancient WUI that was apparently...

Author(s): Christopher I. Roos, Thomas W. Swetnam, T. J. Ferguson, Matthew J. Liebmann, Rachel A. Loehman, John R. Welch, Ellis Q. Margolis, Christopher H. Guiterman, William C. Hockaday, Michael J. Aiuvalasit, Jenna Battillo, Josh Farella, Christopher A. Kiahtipes

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Book or Chapter or Journal Article

Resilient landscapes to prevent catastrophic forest fires

www.nrfirescience.org/resource/23114

Extreme wildfires are a major environmental and socioeconomic threat across many regions worldwide.

The limits of fire suppression-centred strategies have become evident even in technologically well-equipped countries, due to high-cost and a legacy of landscape transformations, yet with ultimately low-efficient solutions vis-à-vis...

Author(s): Sven Wunder, David E. Calkin, Val Charlton, Sarah Feder, Inazio Martinez de Arano, Peter F. Moore, Francisco Rodriguez y Silva, Luca Tacconi, Cristina Vega-García

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Book or Chapter or Journal Article

The changing risk and burden of wildfire in the United States

www.nrfirescience.org/resource/22574

Recent dramatic and deadly increases in global wildfire activity have increased attention on the causes of wildfires, their consequences, and how risk from wildfire might be mitigated. Here we bring together data on the changing risk and societal burden of wildfire in the United States. We estimate that nearly 50 million homes are...

Author(s): Marshall Burke, Anne Driscoll, Sam Heft-Neal, Jiani Xue, Jennifer Burney, Michael Wara

Year Published: 2021

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Book or Chapter or Journal Article

Cross-cultural comparison of behavioural itinerary actions and times in wildfire evacuations

www.nrfirescience.org/resource/22955

Evacuation of residents during wildfire is a highly time-sensitive process. Available time may be limited. Previous research on other types of incident demonstrate that individuals delay their evacuation by first undertaking actions in response to the threat. However, currently there is little evidence of what actions individuals...

Author(s): Sandra Vaiciulyte, Lynn M. Hulse, Anand Veeraswamy, Edwin R. Galea

Year Published: 2021

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Book or Chapter or Journal Article

Increasing synchronous fire danger in forests of the western United States

www.nrfirescience.org/resource/22566

Widespread fire activity taxes suppression resources and can compound wildfire hazards. We examine the geographic synchronicity of fire danger across western United States forests as a proxy for the strain on fire suppression resource availability. Interannual variability in the number of days with synchronous fire danger —...

Author(s): John T. Abatzoglou, Caroline S. Juang, A. Park Williams, Crystal A. Kolden, Anthony L. Westerling

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

Risk perceptions and mitigation behaviors of residents following a near-miss wildfire

www.nrfirescience.org/resource/22923

Wildfires pose significant risks to populations living in the Wildland-Urban Interface (WUI). We examine the influence of WUI residents' risk perceptions as well as other cognitive constructs (guided by Protection Motivation Theory) likely to influence their decisions to take wildfire mitigation actions before and shortly after a...

Author(s): Lauren Nicole Dupey Larsen, Peter D. Howe, Mark W. Brunson, Larissa L. Yocom, Darren McAvoy, E. Helen Berry, Jordan W. Smith

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Book or Chapter or Journal Article

A Qualitative Study on the US Forest Service's Risk Management Assistance Efforts to Improve Wildfire Decision-Making

www.nrfirescience.org/resource/22885

To support improved wildfire incident decision-making, in 2017 the US Forest Service (Forest Service) implemented risk-informed tools and processes, together known as Risk Management Assistance (RMA). The Forest Service is developing tools such as RMA to improve wildfire decision-making and implements these tools in complex...

Author(s): Courtney Schultz, Lauren Miller, S. Michelle Greiner, Chad Kooistra

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Book or Chapter or Journal Article

Pre-season fire management planning: the use of Potential Operational Delineations to prepare for wildland fire events

www.nrfirescience.org/resource/22853

US fire scientists are developing Potential Wildfire Operational Delineations, also known as 'PODs', as a pre-fire season planning tool to promote safe and effective wildland fire response, strengthen risk management approaches in fire management and better align fire management objectives. PODs are a collaborative planning...

Author(s): S. Michelle Greiner, Courtney Schultz, Chad Kooistra

Year Published: 2021

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Book or Chapter or Journal Article

Orchestrating performance of healthcare networks subjected to the compound events of natural disasters and pandemic

www.nrfirescience.org/resource/22745

The current COVID-19 pandemic has demonstrated the vulnerability of healthcare systems worldwide. When combined with natural disasters, pandemics can further strain an already exhausted healthcare system. To date, frameworks for quantifying the collective effect of the two events on hospitals are nonexistent. Moreover, analytical...

Author(s): Emad M. Hassan, Hussam Mahmoud

Year Published: 2021

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Book or Chapter or Journal Article

Some challenges for forest fire risk predictions in the 21st century

www.nrfirescience.org/resource/23130

Global wildfire activity has experienced a dramatic surge since 2017. From Chile to Indonesia, unprecedented fire behavior has occurred in many areas worldwide including, but not limited to, Portugal, Siberia, Australia, the Amazon and Orinoco basins, and the Western US. This surge in global wildfire activity has led to a dramatic...

Author(s): Víctor Resco de Dios, Rachael H. Nolan

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Book or Chapter or Journal Article

Forest Roads and Operational Wildfire Response Planning

www.nrfirescience.org/resource/22700

Supporting wildfire management activities is frequently identified as a benefit of forest roads. As such, there is a growing body of research into forest road planning, construction, and maintenance to improve fire surveillance, prevention, access, and control operations. Of interest here is how road networks directly support fire...

Author(s): Matthew P. Thompson, Benjamin Gannon, Michael D. Caggiano

Year Published: 2021

Type: Document

Book or Chapter or Journal Article

Would you like to know more? The effect of personalized wildfire risk information and social comparisons on information-seeking behavior in the wildland-urban interface

www.nrfirescience.org/resource/23121

Private landowners are important actors in landscape-level wildfire risk management. Accordingly, wildfire programs and policy encourage wildland–urban interface homeowners to engage with local organizations to properly mitigate wildfire risk on their parcels. We investigate whether parcel-level wildfire risk assessment data,...

Author(s): James R. Meldrum, Hannah Brenkert-Smith, Patricia A. Champ, Jamie Gomez, Hilary Byerly, Lilia C. Falk, Christopher M. Barth

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Type: Document

Book or Chapter or Journal Article

Understanding support for regulatory approaches to wildfire management and performance of property mitigations on private lands

www.nrfirescience.org/resource/22609

Formal regulation of private property and exploration of 'risk transmission' across ownerships are two popular means for addressing wildfire management at landscape scales. However, existing studies also indicate that a number of barriers exist for implementing formal regulations surrounding wildfire risk, and that few efforts gauge...

Author(s): Travis B. Paveglio, Amanda M. Stasiewicz, Catrin Edgeley

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Book or Chapter or Journal Article

Using Artificial Intelligence for Safe and Effective Wildfire Evacuations

www.nrfirescience.org/resource/22966

Wildfire is a growing global concern for rural and urban areas [1]. Statistics show that the intensity and negative consequences of wildfire have increased in recent decades creating serious challenges for fire and emergency services, as well as communities in the wildland-urban interface [2,3,4]. As an example, 85 people lost their...

Author(s): Xilei Zhao, Ruggiero Lovreglio, Erica D. Kuligowski, Daniel Nilsson

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Book or Chapter or Journal Article

Developing a geospatial data-driven solution for rapid natural wildfire risk assessment

www.nrfirescience.org/resource/22567

Computational natural wildfire simulation is a computing-intensive process. The process is also

challenging because of the need to integrate data with wide spatial and temporal variability. Our study sought to simulate rapidly spreading natural wildfire with fidelity and quality through computational realization. We developed a...

Author(s): Bishrant Adhikari, Chen Xu, Paddington Hodza, Thomas A. Minckley

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Book or Chapter or Journal Article

A qualitative study on the US Forest Service's risk management assistance efforts to improve wildfire decision-making

www.nrfirescience.org/resource/22940

To support improved wildfire incident decision-making, in 2017 the US Forest Service (Forest Service) implemented risk-informed tools and processes, together known as Risk Management Assistance (RMA). The Forest Service is developing tools such as RMA to improve wildfire decision-making and implements these tools in complex...

Author(s): Courtney Schultz, Lauren Miller, S. Michelle Greiner, Chad Kooistra

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Book or Chapter or Journal Article

High-severity wildfire potential – associating meteorology, climate, resource demand and wildfire activity with preparedness levels

www.nrfirescience.org/resource/22538

National and regional preparedness level (PL) designations support decisions about wildfire risk management. Such decisions occur across the fire season and influence pre-positioning of resources in areas of greatest fire potential, recall of personnel from off-duty status, requests for back-up resources from other areas, responses...

Author(s): Alison Cullen, Travis Axe, Harry Podschwit

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Book or Chapter or Journal Article

A simple metric of landscape fire exposure

www.nrfirescience.org/resource/22900

Context: Proximity of landcover elements to each other will enable or constrain fire spread.

Assessments of potential fire propagation across landscapes typically involve empirical or simulation models that estimate probabilities based on complex interactions among biotic and abiotic controls.

Objectives: We developed a metric of...

Author(s): Jennifer L. Beverly, Neal McLoughlin, Elizabeth Chapman

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Book or Chapter or Journal Article

Multiple-Scale Relationships between Vegetation, the Wildland–Urban Interface, and Structure Loss to Wildfire in California

www.nrfirescience.org/resource/22884

Recent increases in destructive wildfires are driving a need for empirical research documenting factors that contribute to structure loss. Existing studies show that fire risk is complex and varies geographically, and the role of vegetation has been especially difficult to quantify. Here, we evaluated the relative importance of...

Author(s): Alexandra D. Syphard, Heather Rustigian-Romsos, Jon E. Keeley

Year Published: 2021
Type: Document
Book or Chapter or Journal Article

Operationalising homeowner wildfire risk mitigation in fire-prone areas

www.nrfirescience.org/resource/22851

A significant amount of research has examined what motivates people living in fire-prone areas to mitigate their wildfire risk (i.e. engage in activities that reduce vulnerability and the effects of a wildfire on an individual's property). However, drawing overarching conclusions from this research is difficult because of the...

Author(s): Hugh D. Walpole, Sarah M. McCaffrey, Claire Rapp, Robyn S. Wilson
Year Published: 2021
Type: Document
Book or Chapter or Journal Article

Characterization of occupational smoke exposure among wildland firefighters in the midwestern United States

www.nrfirescience.org/resource/22783

Wildland firefighters are repeatedly exposed to elevated levels of wildland fire smoke (WFS) while protecting lives and properties from wildland fires. Studies reporting personal exposure concentrations of air pollutants in WFS during fire suppression or prescribed burn activities have been geographically limited to the western and...

Author(s): Chieh-Ming Wu, Chi Song, Ryan Chartier, Jacob Kremer, Luke P. Naeher, Olorunfemi Adetona
Year Published: 2021
Type: Document
Book or Chapter or Journal Article

Potential COVID-19 outbreak in fire camp: Modeling scenarios and interventions

www.nrfirescience.org/resource/21608

The global COVID-19 pandemic will pose unique challenges to the management of wildland fire in 2020. Fire camps may provide an ideal setting for the transmission of SARS-CoV-2, the virus that causes COVID-19. However, intervention strategies can help minimize disease spread and reduce the risk to the firefighting community. We...

Author(s): Matthew P. Thompson, Jude Bayham, Erin J. Belval
Year Published: 2020
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Book or Chapter or Journal Article

The mitigated neighborhood: exploring homeowner associations' role in resident wildfire-mitigation actions

www.nrfirescience.org/resource/22326

Considerable research has explored homeowner wildfire-mitigation efforts identifying many salient factors that help predict acceptance and behaviors. A growing body of literature is unlocking the dynamics of formal associations' roles in promoting fire adapted communities. This mixed-method study adds to the research by using a...

Author(s): Eric Steffey, Megha Budruk, Christine A. Vogt
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Support for regulatory and voluntary approaches to wildfire adaptation among unincorporated wildland-urban interface communities

www.nrfirescience.org/resource/20811

Regulation of building standards and residential development practices in the wildland-urban interface (WUI) is increasingly advocated as a possible avenue for wildfire risk reduction. However, many documented instances of successful wildfire adaptation occur in incorporated communities with local governments or formalized...

Author(s): Catrin Edgeley, Travis B. Paveglio, Daniel R. Williams

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Book or Chapter or Journal Article

Smoke and Roadway Safety Guide

www.nrfirescience.org/resource/22041

The Smoke and Roadway Safety Guide provides wildland fire personnel the tools and methods to effectively plan and forecast for roadway smoke impacts and to monitor, respond to, and mitigate smoke on roadways to reduce the risk to the public and fire personnel. This publication: •Outlines a sequential process which readers may...

Author(s): Gary M. Curcio, David Mueller, Peter Lahm, Mark Fitch, Joshua C. Hyde

Year Published: 2020

Type: Document

Technical Report or White Paper

Exploring the impact of resident proximity to wildfires in the northern Rocky Mountains: perceptions of climate change risks, drought, and policy

www.nrfirescience.org/resource/21096

Wildfire disaster risks are being heightened globally due to climate change. Here, we present a United States-based wildfire case study of the northern Rocky Mountains to investigate links between wildfire experience, knowledge, and perceived risk due to climate change and potential policy support for two internationally relevant...

Author(s): Christopher A. Craig, Myria W. Allen, Song Feng, Matthew L. Spialek

Year Published: 2020

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Book or Chapter or Journal Article

Evaluating wildland fire liability standards – does regulation incentivise good management?

www.nrfirescience.org/resource/21585

Fire spread on forested landscapes depends on vegetation conditions across the landscape that affect the fire arrival probability and forest stand value. Landowners can control some forest characteristics that facilitate fire spread, and when a single landowner controls the entire landscape, a rational landowner accounts for spatial...

Author(s): Christopher J. Lauer, Claire A. Montgomery, Thomas G. Dieterich

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Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/22316

Increases in burned area across the western US since the mid-1980's have been widely documented

and linked partially to climate factors, yet evaluations of trends in fire severity are lacking. Here, we evaluate fire severity trends and their interannual relationships to climate for western US forests from 1985?2017....

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

Year Published: 2020

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Book or Chapter or Journal Article

Weather, Risk, and Resource Orders on Large Wildland Fires in the Western US

www.nrfirescience.org/resource/20807

Research Highlights: Our results suggest that weather is a primary driver of resource orders over the course of extended attack efforts on large fires. Incident Management Teams (IMTs) synthesize information about weather, fuels, and order resources based on expected fire growth rather than simply reacting to observed fire growth....

Author(s): Jude Bayham, Erin J. Belval, Matthew P. Thompson, Christopher J. Dunn, Crystal S.

Stonesifer, David E. Calkin

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Type: Document

Book or Chapter or Journal Article

Resident and community recovery after wildfires [Chapter 9]

www.nrfirescience.org/resource/21834

Recovery after a wildfire is a process, both at the community or larger scale and for individuals. The United Nations Office for Disaster Risk Reduction (UNISDR) defines recovery as, "The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and..."

Author(s): Tara K. McGee, Sarah M. McCaffrey, Fantina Tedim

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Book or Chapter or Journal Article

All-hazards dataset mined from the US National Incident Management System 1999-2014

www.nrfirescience.org/resource/21524

This paper describes a new dataset mined from the public archive (1999–2014) of the U.S. National Incident Management System/Incident Command System Incident Status Summary Form (a total of 124,411 reports for 25,083 incidents, including 24,608 wildfires). This system captures detailed information on incident management costs,...

Author(s): Lise A. St. Denis, Nathan Mietkiewicz, Karen C. Short, Mollie Buckland, Jennifer Balch

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Book or Chapter or Journal Article

Prototyping a Geospatial Atlas for Wildfire Planning and Management

www.nrfirescience.org/resource/21957

Wildland fire managers are increasingly embracing risk management principles by being more anticipatory, proactive, and "engaging the fire before it starts". This entails investing in pre-season, cross-boundary, strategic fire response planning with partners and stakeholders to build a shared understanding of wildfire risks and...

Author(s): Matthew P. Thompson, Benjamin Gannon, Michael D. Caggiano, Christopher D. O'Connor, April Brough, Julie W. Gilbertson-Day, Joe H. Scott

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Type: Document
Book or Chapter or Journal Article

Downscaling fire weather extremes from historical and projected climate models

www.nrfirescience.org/resource/22297

An important aspect of predicting future wildland fire risk is estimating fire weather-weather conducive to the ignition and propagation of fire-under realistic climate change scenarios. Because the majority of area burned occurs on a few days of extreme fire weather, this task should be able to resolve fire weather extremes. In...

Author(s): Piyush Jain, Mari R. Tye, Debasish Paimazumder, Michael D. Flannigan

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Book or Chapter or Journal Article

Reclassifying the wildland-urban interface using fire occurrences for the United States

www.nrfirescience.org/resource/21831

The wildland-urban interface (WUI) occurs at the intersection of houses and undeveloped wildlands, where fire is a safety concern for communities, motivating investment in planning, protection, and risk mitigation. Because there is no operational definition of WUI based on where fires in fact have occurred, I used fire occurrences...

Author(s): Brice B. Hanberry

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Book or Chapter or Journal Article

Assessing preferences for wildfire prevention policies in Spain

www.nrfirescience.org/resource/21461

Recent data show that fire concentration is becoming rather predominant in Southern European areas. Specifically, 2017–2018 were some of the worst years on record for fires in Europe. We conduct a survey among households in order to understand citizens' preferences towards fire prevention programs in Spain, aiming to reduce the...

Author(s): Maria Alló, Maria L. Loureiro

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Type: Document
Book or Chapter or Journal Article

Responding to simultaneous crises: communications and social norms of mask behavior during wildfires and COVID-19

www.nrfirescience.org/resource/22265

The ongoing COVID-19 pandemic and the potential for co-occurring wildfires pose health threats to people around the globe. Along with the direct impacts of wildfires, exposure to fine particulate matter (PM 2.5)—pollution composed of small inhalable particles with diameters of 2.5 micrometers or smaller—from wildfire smoke is a...

Author(s): Francisca N. Santana, Stephanie L. Fischer, Marika O. Jaeger, Gabrielle Wong-Parodi

Year Published: 2020

Type: Document
Book or Chapter or Journal Article

Risk interdependency, social norms, and wildfire mitigation: a choice experiment

www.nrfirescience.org/resource/21815

Wildfire presents a growing threat across the American West. We conducted an online choice experiment in Western Colorado to assess how social interactions affect wildfire mitigation decisions through two distinct pathways: risk interdependency (neighbors' conditions affect perceived wildfire risk) and social norms (neighbors'...

Author(s): Katherine L. Dickinson, Hannah Brenkert-Smith, Greg Madonia, Nicholas Flores

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

After the fire: Perceptions of land use planning to reduce wildfire risk in eight communities across the United States

www.nrfirescience.org/resource/20997

Wildfires are increasingly common in the United States, the result of climate change, altered wildfire regimes, and expanding residential development in close proximity to wildland vegetation. Both suppression expenditures and damages are increasing as a result. Accelerating wildfire losses have been observed in other countries as...

Author(s): Miranda H. Mockrin, Hilary Fishler, Susan I. Stewart

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Finding common ground: agreement on increasing wildfire risk crosses political lines

www.nrfirescience.org/resource/21438

Wildfire is a growing threat in the western US, driven by high fuel loads, a warming climate, and rising human activity in the wildland urban interface. Diverse stakeholders must collaborate to mitigate risk and adapt to changing conditions. Communication strategies in collaborative efforts may be most effective if they align with...

Author(s): Joel Hartter, Lawrence C. Hamilton, Mark J. Ducey, Angela Boag, Jonathan D. Salerno, Nils D. Christoffersen, Paul T. Oester, Michael W. Palace, Forrest R. Stevens

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Toward Fire-Adapted Rangeland Communities: A Policy Analysis of Outcome-Based Approaches to Managing Fire Risk in Idaho

www.nrfirescience.org/resource/22240

Policy approaches to rangeland fire management may be most effective if they seek to utilize a full suite of options, including promoting the social and economic wellbeing of working ranches. One avenue for this includes the administration of federal permits livestock producers depend on for their annual forage needs. Permits include...

Author(s): Dennis Becker, Chloe B. Wardropper, Katherine Wollstein

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Technical Report or White Paper

SAR-enhanced mapping of live fuel moisture content

www.nrfirescience.org/resource/21804

Assessing wildfire risk presents several challenges due to uncertainty in fuel flammability and ignition potential. Live fuel moisture content (LFMC) - the mass of water per unit dry biomass in vegetation - exerts a direct control on fuel ignitability, fuel availability and fire spread, and is thus an important parameter in...

Author(s): Krishna Rao, A. Park Williams, Jacqueline Fortin Flefil, Alexandra G. Konings
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/22500

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

Author(s): Sean A. Parks, John T. Abatzoglou
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Mapping forest canopy fuels in the western United States with LiDAR-Landsat Covariance

www.nrfirescience.org/resource/20966

Comprehensive spatial coverage of forest canopy fuels is relied upon by fire management in the US to predict fire behavior, assess risk, and plan forest treatments. Here, a collection of light detection and ranging (LiDAR) datasets from the western US are fused with Landsat-derived spectral indices to map the canopy fuel attributes...

Author(s): Christopher J. Moran, Van R. Kane, Carl A. Seielstad
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Can we manage a future with more fire? Effectiveness of defensible space treatment depends on housing amount and configuration

www.nrfirescience.org/resource/22211

Context: Fire in forested wildland urban interface (WUI) landscapes is increasing throughout the western United States. Spatial patterns of fuels treatments affect fire behavior, but it is unclear how fire risk and fuel treatment effectiveness will change under future conditions. Objectives: (1) How do area burned, forest and fuel...

Author(s): Kristin H. Braziunas, Rupert Seidl, Werner Rammer, Monica G. Turner
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Estimation of surface dead fine fuel moisture using automated fuel moisture sticks across a range of forests worldwide

www.nrfirescience.org/resource/21423

Field measurements of surface dead fine fuel moisture content (FFMC) are integral to wildfire management, but conventional measurement techniques are limited. Automated fuel sticks offer a potential solution, providing a standardised, continuous and real-time measure of fuel moisture. As such, they are used as an analogue for...

Author(s): Jane G. Cawson, Petter Nyman, Christian Schunk, Gary J. Sheridan, Thomas J. Duff, Kelsy E. Gibos, William D. Bovill, Marco Conedera, Gianni B. Pezzatti, Annette Menzel
Year Published: 2020
Type: Document

Book or Chapter or Journal Article

Navigating the Wildfire–Pandemic Interface: Public Perceptions of COVID-19 and the 2020 Wildfire Season in Arizona

www.nrfirescience.org/resource/21769

COVID-19 has complicated wildfire management and public safety for the 2020 fire season. It is unclear whether COVID-19 has impacted the ability of residents in the wildland–urban interface to prepare for and evacuate from wildfire, or the extent to which residents feel their household’s safety has been affected. Several areas...

Author(s): Catrin Edgeley, Jack T. Burnett

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Commentary on the article “Burn probability simulation and subsequent wildland fire activity in Alberta, Canada - Implications for risk assessment and strategic planning” by J. L. Beverly and N. McLoughlin

www.nrfirescience.org/resource/22490

Monte Carlo simulations using wildland fire spread models have been conducted to produce numerical estimates of fire likelihood, project potential fire effects, and produce event sets of realistic wildfires (Parisien et al., 2019). The application of these methods has greatly expanded over the last few decades as a result of...

Author(s): Marc-Andre Parisien, Alan A. Ager, Ana M. G. Barros, Denyse A. Dawe, Sandy Erni, Mark A. Finney, Charles W. McHugh, Carol Miller, Sean A. Parks, Karen L. Riley, Karen C. Short, Christopher A. Stockdale, Xianli Wang, Ellen Whitman

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Book or Chapter or Journal Article

Resistance and representation in a wildland-urban interface fuels treatment conflict: the case of the Forsythe II project in the Arapaho-Roosevelt National Forest

www.nrfirescience.org/resource/20938

Land treatments in wildland-urban interface (WUI) areas are highly visible and subject to public scrutiny and possible opposition. This study examines a contested vegetation treatment-Forsythe II-in a WUI area of the Arapaho-Roosevelt National Forest in Colorado. An initial phase of the research found vocal opposition to Forsythe II...

Author(s): Hannah Brenkert-Smith, Jody L. Jahn, Eric A. Vance, Juan Ahumada

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Type: Document

Book or Chapter or Journal Article

Bayesian decision network modeling for environmental risk management: a wildfire case study

www.nrfirescience.org/resource/22173

Environmental decision-making requires an understanding of complex interacting systems across scales of space and time. A range of statistical methods, evaluation frameworks and modeling approaches have been applied for conducting structured environmental decision-making under uncertainty. Bayesian Decision Networks (BDNs) are a...

Author(s): Trent D. Penman, Brett Cirulis, Bruce G. Marcot

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Mitigating Source Water Risks with Improved Wildfire Containment

www.nrfirescience.org/resource/21765

In many fire-prone watersheds, wildfire threatens surface drinking water sources with eroded contaminants. We evaluated the potential to mitigate the risk of degraded water quality by limiting fire sizes and contaminant loads with a containment network of manager-developed Potential fire Operational Delineations (PODs) using...

Author(s): Benjamin Gannon, Yu Wei, Matthew P. Thompson

Year Published: 2020

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Book or Chapter or Journal Article

Microwave retrievals of soil moisture improve grassland wildfire predictions

www.nrfirescience.org/resource/22465

Statistical analyses of wildfires demonstrate that vapor pressure deficit (VPD) allows for skillful predictions, likely because it reflects fuel moisture content. Soil moisture provides a potentially complimentary measure of water availability but has been less explored because of sparse measurements. Using measurements from the...

Author(s): Angela J. Ridgen, Robert S. Powell, Aleyda Trevino, Kaighin A. McColl, Peter Huybers

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Book or Chapter or Journal Article

Fostering collective action to reduce wildfire risk across property boundaries in the American West

www.nrfirescience.org/resource/20879

Large-scale, high-severity wildfires are a major challenge to the future social-ecological sustainability of fire-adapted forest ecosystems in the American West. Managing forests to mitigate this risk is a collective action problem requiring landowners and stakeholders within multi-ownership landscapes to plan and implement...

Author(s): Susan Charnley, Erin C. Kelly, A. Paige Fischer

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Terrestrial Image-Based Point Clouds for Mapping Near-Ground Vegetation Structure: Potential and Limitations

www.nrfirescience.org/resource/22106

Site-specific information concerning fuel hazard characteristics is needed to support wildfire management interventions and fuel hazard reduction programs. Currently, routine visual assessments provide subjective information, with the resulting estimate of fuel hazard varying due to observer experience and the rigor applied in...

Author(s): Luke Wallace, Bryan Hally, Samuel Hillman, Simon D. Jones, Karin J. Reinke

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Fire deficit increases wildfire risk for many communities in the Canadian boreal forest

www.nrfirescience.org/resource/22832

The top priority of fire management agencies in Canada is to protect human life and property. Here we

investigate if decades of aggressive fire suppression in the boreal biome of Canada has reduced the proportion of recently burned forests (RBF; <30 years) near human communities, and thereby inadvertently increased the risk of...

Author(s): Marc-Andre Parisien, Quinn E. Barber, Kelvin G. Hirsch, Christopher A. Stockdale, Sandy Erni, Xianli Wang, Dominique Arseneault, Sean A. Parks

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Using a statistical model of past wildfire spread to quantify and map the likelihood of fire reaching assets and prioritise fuel treatments

www.nrfirescience.org/resource/21155

We present a method to quantify and map the probability of fires reaching the vicinity of assets in a wildfire-prone region, by extending a statistical fire spread model developed on historical fire patterns in the Sydney region, Australia. It calculates the mean probability of fire spreading along sample lines around assets,...

Author(s): Owen F. Price, Michael Bedward

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Cognitive maps reveal diverse perceptions of how prescribed fire affects forests and communities

www.nrfirescience.org/resource/21653

The potential for prescribed fire to address fuel management and forest restoration goals has received considerable attention. However, many wildfire risk mitigation practitioners and researchers consider prescribed fire to be an underutilized tool for forest and fire management. Prescribed fire can affect a broad range of values (e...

Author(s): Matthew Hamilton, Jonathan D. Salerno

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Building Loss in WUI Disasters: Evaluating the Core Components of the Wildland–Urban Interface Definition

www.nrfirescience.org/resource/22399

Accurate maps of the wildland-urban interface (WUI) are critical for the development of effective land management policies, conducting risk assessments, and the mitigation of wildfire risk. Most WUI maps identify areas at risk from wildfire by overlaying coarse-scale housing data with land cover or vegetation data. However, it is...

Author(s): Michael D. Caggiano, Todd J. Hawbaker, Benjamin Gannon, Chad M. Hoffman

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Measuring acute pulmonary responses to occupational wildland fire smoke exposure using exhaled breath condensate

www.nrfirescience.org/resource/20850

Wildland firefighters are directly exposed to elevated levels of wildland fire (WF) smoke. Although studies demonstrate WF smoke exposure is associated with lung function changes, few studies that use invasive sample collection methods have been conducted to investigate underlying biochemical

changes. These methods are also either...

Author(s): Chieh-Ming Wu, Anna M. Adetona, Chi Song, Luke P. Naeher, Olorunfemi Adetona

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Resistance and Representation in a Wildland–Urban Interface Fuels Treatment Conflict: The Case of the Forsythe II Project in the Arapaho-Roosevelt National Forest

www.nrfirescience.org/resource/21881

Land treatments in wildland-urban interface (WUI) areas are highly visible and subject to public scrutiny and possible opposition. This study examines a contested vegetation treatment-Forsythe II-in a WUI area of the Arapaho-Roosevelt National Forest in Colorado. An initial phase of the research found vocal opposition to Forsythe II...

Author(s): Hannah Brenkert-Smith, Jody L. Jahn, Eric A. Vance, Juan Ahumada

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

When the fire starts: A science-based framework for risk-based incident response

www.nrfirescience.org/resource/22045

Potential Operational Delineations (PODs) is a spatial wildfire planning framework that brings together operational fire responses and landscape management goals from Forest Planning documents. It was developed by scientists at the Rocky Mountain Research Station (RMRS) Wildfire Risk Management Science Team, Colorado Forest...

Author(s): Rocky Mountain Research Station, Colorado Forest Restoration Institute

Year Published: 2020

Type: Document

Research Brief or Fact Sheet

A framework for prioritising prescribed burning on public land in western Australia

www.nrfirescience.org/resource/21134

A risk-based framework for targeting investment in prescribed burning in Western Australia is presented. Bushfire risk is determined through a risk assessment and prioritisation process. The framework provides principles and a rationale for programming fuel management with indicators to demonstrate that bushfire risk has been...

Author(s): Trevor Howard, Neil D. Burrows, Tony Smith, Glen Daniel, Lachlan McCaw

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Effects of scale for assessing fuel treatment effectiveness and recovery post-fire in ponderosa pine

www.nrfirescience.org/resource/21596

With the past century of fire suppression in ponderosa pine (*Pinus ponderosa*) forests, there has been an accumulation of surface fuels, causing decreases in understory vegetation and increasing high severity fire risk. However, fire size and location can make it costly and unsafe to obtain ground measurements of understory...

Author(s): Eva K. Strand, Jessie M. Dodge

Year Published: 2020

Type: Document

Technical Report or White Paper

Fire danger observed from space

www.nrfirescience.org/resource/22318

Biomass burning is one of the critical components of the Earth system, significantly affecting atmospheric emissions and carbon budgets. Fires occurring in the interface between wildland and urban areas also have important socioeconomic effects, affecting people's lives and resources. Even though fires are natural in many...

Author(s): M. Lucrecia Pettinari, Emilio Chuvieco

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Wildfire risk science facilitates adaptation of fire-prone social-ecological systems to the new fire reality

www.nrfirescience.org/resource/20810

Large and severe wildfires are an observable consequence of an increasingly arid American West. There is increasing consensus that human communities, land managers, and fire managers need to adapt and learn to live with wildfires. However, a myriad of human and ecological factors constrain adaptation, and existing science-based...

Author(s): Christopher J. Dunn, Christopher D. O'Connor, Jesse Abrams, Matthew P. Thompson, David E. Calkin, James D. Johnstone, Richard D. Stratton, Julie W. Gilbertson-Day

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Landscape and Wildfires Seminary: Diagnosis and suppression, methodological advances

www.nrfirescience.org/resource/21839

In 2015, researchers from the U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station, Human Dimensions Program (hereafter U.S. Forest Service), and the University of Córdoba, Forest Engineering Department, Forest Fire Laboratory, Spain (hereafter University of Cordoba), entered into an official Memorandum of...

Author(s): Francisco Rodriguez y Silva, Juan Ramón Molina Martínez, Matthew P. Thompson, Kit O'Connor

Year Published: 2020

Type: Document

Technical Report or White Paper

Quantification of inter-regional differences in risk mitigation from prescribed burning across multiple management values

www.nrfirescience.org/resource/21090

Fire agencies are moving towards planning systems based on risk assessment; however, knowledge of the most effective way to quantify changes in risk to key values by application of prescribed fire is generally lacking. We present a quantification and inter-regional comparison of how risk to management values responds to variations...

Author(s): Brett Cirulis, Hamish G. Clarke, Matthias M. Boer, Trent D. Penman, Owen F. Price, Ross A. Bradstock

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Burning without borders: Cooperatively managing wildfire risk in Northern Colorado

www.nrfirescience.org/resource/21529

Because wildfires don't stop at ownership boundaries, managers from governmental and nongovernmental organizations in Northern Colorado are taking steps to pro-actively "co-manage" wildfire risk through the Northern Colorado Fireshed Collaborative (NCFC). For this research project, co-management refers to the collective actions...

Author(s): Tony S. Cheng, Michael D. Caggiano

Year Published: 2020

Type: Document

Research Brief or Fact Sheet

Response of planted sagebrush seedlings to cattle grazing applied to decrease fire probability

www.nrfirescience.org/resource/21960

Restoration of non-sprouting shrubs after wildfire is increasingly becoming a management priority. In the western U.S., Wyoming big sagebrush (*Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young) restoration is a high priority, but sagebrush establishment from seed is sporadic. In contrast, planting seedlings often...

Author(s): Kirk W. Davies, Jonathan D. Bates, Chad S. Boyd

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

A smart disaster management framework for wildfire detection and prediction

www.nrfirescience.org/resource/22298

Wildfires are exorbitantly cataclysmic disasters that lead to the destruction of forest cover, wildlife, land resources, human assets, reduced soil fertility and global warming. Every year wildfires wreck havoc across the globe. Therefore, there is a need of an efficient and reliable system for real-time wildfire monitoring to...

Author(s): Harkiran Kaur, Sandeep K. Sood

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Resistance and Representation in a Wildland–Urban Interface Fuels Treatment Conflict: The Case of the Forsythe II Project in the Arapaho-Roosevelt National Forest

www.nrfirescience.org/resource/20801

Land treatments in wildland-urban interface (WUI) areas are highly visible and subject to public scrutiny and possible opposition. This study examines a contested vegetation treatment-Forsythe II-in a WUI area of the Arapaho-Roosevelt National Forest in Colorado. An initial phase of the research found vocal opposition to Forsythe II...

Author(s): Hannah Brenkert-Smith, Jody L. Jahn, Eric A. Vance, Juan Ahumada

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Understanding wildfire mitigation and preparedness in the context of extreme wildfires and disasters [Chapter 8]

www.nrfirescience.org/resource/21833

Recent years have witnessed a growing number of stories about extreme wildfires that have had significant social impacts, from Australia to Portugal to California. Although this has heightened the call to find ways to better "coexist with fire," it must be recognized that wildfire-human interactions are as

old as humanity itself...

Author(s): Sarah M. McCaffrey, Tara K. McGee, Michael R. Coughlan, Fantina Tedim

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Satellite remote sensing contributions to wildland fire science and management

www.nrfirescience.org/resource/21475

Purpose: This paper reviews the most recent literature related to the use of remote sensing (RS) data in wildland fire management. Recent Findings: Studies dealing with pre-fire assessment, active fire detection, and fire effect monitoring are reviewed in this paper. The analysis follows the different fire management categories:...

Author(s): Emilio Chuvieco, Inmaculada Aguado, Javier Salas, Mariano Garcia, Marta Yebra, Patricia Oliva

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Engineering A Safer Crew Protection System

www.nrfirescience.org/resource/22268

Burn-over crew protection systems have been installed into fleets of rural wildland Fire-Fighting Vehicles (FFVs) in parts of Australia, successfully providing protection for crews in recent large fires. Research out of the Country Fire Authority (CFA) in Victoria is leading the change in vehicles carrying more than 1000 litres of...

Author(s): Andrew Webb, Andy Gooden

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Resistance and Representation in a Wildland–Urban Interface Fuels Treatment Conflict: The Case of the Forsythe II Project in the Arapaho-Roosevelt National Forest

www.nrfirescience.org/resource/20675

Land treatments in wildland-urban interface (WUI) areas are highly visible and subject to public scrutiny and possible opposition. This study examines a contested vegetation treatment-Forsythe II-in a WUI area of the Arapaho-Roosevelt National Forest in Colorado. An initial phase of the research found vocal opposition to Forsythe II...

Author(s): Hannah Brenkert-Smith, Jody L. Jahn, Eric A. Vance, Juan Ahumada

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Development of a Severe Fire Potential map for the contiguous United States

www.nrfirescience.org/resource/21829

Burn severity is the ecological change resulting from wildland fires. It is often mapped by using prefire and postfire satellite imagery and classified as low, moderate, or high. Areas burned with high severity are of particular concern to land managers and others because postfire vegetation, soil, and other important ecosystem...

Author(s): Gregory K. Dillon, Matthew Panunto, Brett Davis, Penelope Morgan, Donovan Birch, William Matt Jolly

Year Published: 2020

Type: Document

Compounded heat and fire risk for future U.S. populations

www.nrfirescience.org/resource/21442

Climate change is increasing the risk of extreme events, resulting in social and economic challenges. I examined recent past (1971–2000), current and near future (2010-2039), and future (2040-2069) fire and heat hazard combined with population growth by different regions and residential densities (i.e., exurban low and high...

Author(s): Brice B. Hanberry

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Developing Behavioral and Evidence-Based Programs for Wildfire Risk Mitigation

www.nrfirescience.org/resource/22260

The actions of residents in the wildland–urban interface can influence the private and social costs of wildfire. Wildfire programs that encourage residents to take action are often delivered without evidence of effects on behavior. Research from the field of behavioral science shows that simple, often low-cost changes to program...

Author(s): Hilary Byerly, James R. Meldrum, Hannah Brenkert-Smith, Patricia A. Champ, Jamie Gomez, Lilia C. Falk, Christopher M. Barth

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

An examination of the social-psychological drivers of homeowner wildfire mitigation

www.nrfirescience.org/resource/21809

Wildfire events have been impacting many parts of the United States. Of particular importance are the Wildland-Urban Interface (WUI) areas, where residential development exposes residents to increased risk from the threat of wildfire. However, evidence shows that WUI homeowners do not adequately mitigate risk through participation...

Author(s): Benjamin Ghasemi, Gerard T. Kyle, James D. Absher

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

If you love it, let it go: the role of home attachment in wildfire evacuation decisions

www.nrfirescience.org/resource/20985

Evacuation is the preferred method in the U.S. for preserving public safety in wildfire. However, alternatives such as staying and defending are used both in North America and Australia. Dangerous delays in the decision to evacuate are also common. One contributor to the evacuation decision is attachment to the home, however, little...

Author(s): Hugh D. Walpole, Robyn S. Wilson, Sarah M. McCaffrey

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Microbial communities of upland peat swamps were no different 1 year after a hazard reduction burn

www.nrfirescience.org/resource/22227

Fire in wetlands is poorly understood, yet hazard reduction burns are a common management practice and bushfires are becoming increasingly prevalent because of climate change. Fire may have long-lasting implications for the microbial component of these wetland ecosystems that regulate carbon and nutrient cycling. The extremely fire-...

Author(s): Nicole A. Christiansen, Kirstie A. Fryirs, Timothy J. Green, Grant C. Hose

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Corrigendum to: Estimation of surface dead fine fuel moisture using automated fuel moisture sticks across a range of forests worldwide

www.nrfirescience.org/resource/21424

Field measurements of surface dead fine fuel moisture content (FFMC) are integral to wildfire management, but conventional measurement techniques are limited. Automated fuel sticks offer a potential solution, providing a standardised, continuous and real-time measure of fuel moisture. As such, they are used as an analogue for...

Author(s): Jane G. Cawson, Petter Nyman, Christian Schunk, Gary J. Sheridan, Thomas J. Duff, Kelsy E. Gibos, William D. Bovill, Marco Conedera, Gianni B. Pezzatti, Annette Menzel

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Managing fire risk at the wildland-urban interface requires reconciliation of tradeoffs between regulating and cultural ecosystem services

www.nrfirescience.org/resource/21796

Forest fires at the wildland-urban interface are generating increasing losses due to the expansion of cities into adjacent forests. At the same time, urban green open spaces are highly valuable as sources of recreational, educational and aesthetic benefits. Tradeoffs may arise between the desire to preserve peri-urban forests for...

Author(s): Yaella Depietri, Daniel E. Orenstein

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Comparing contingency fire containment strategies using simulated random scenarios

www.nrfirescience.org/resource/22496

Contingency firelines can be used to back up primary lines to increase probability of fire containment, decrease fire losses, and improve firefighter safety. In this study, we classify firelines into primary, contingency, and response lines. We design a modeling process to iteratively implement a mixed integer programming model to...

Author(s): Yu Wei, Matthew P. Thompson, Erin J. Belval, Benjamin Gannon, David E. Calkin, Christopher D. O'Connor

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Reducing wooden structure and wildland-urban interface fire disaster risk through dynamic risk assessment and management

www.nrfirescience.org/resource/20965

In recent years, severe and deadly wildland-urban interface (WUI) fires have resulted in an increased focus on this particular risk to humans and property, especially in Canada, USA, Australia, and

countries in the Mediterranean area. Also, in areas not previously accustomed to wildfires, such as boreal areas in Sweden, Norway, and...

Author(s): Torgrim Log, Vigdis Vandvik, Liv G. Velle, Maria-Monika Metallinou

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Role of accumulation for ignition of fuel beds by firebrands

www.nrfirescience.org/resource/22174

Large outdoor fires are one of the prominent fire problems in the world. Spot fires, caused by firebrands, are known as a key mechanism of rapid fire spread. Firebrands ignite unburned fuels far ahead of the fire front. In large outdoor fires, firebrands are thought to accumulate and ignite unburned fuel which cannot be ignited by a...

Author(s): Sayaka Suzuki, Sam Manzello

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Modelling suppression difficulty: Current and future applications

www.nrfirescience.org/resource/21320

Improving decision processes and the informational basis upon which decisions are made in pursuit of safer and more effective fire response have become key priorities of the fire research community. One area of emphasis is bridging the gap between fire researchers and managers through development of application-focused,...

Author(s): Francisco Rodriguez y Silva, Christopher D. O'Connor, Matthew P. Thompson, Juan Ramón Molina Martínez, David E. Calkin

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

A Geospatial Framework to Assess Fireline Effectiveness for Large Wildfires in the Western USA

www.nrfirescience.org/resource/21767

Quantifying fireline effectiveness (FLE) is essential to evaluate the efficiency of large wildfire management strategies to foster institutional learning and improvement in fire management organizations. FLE performance metrics for incident-level evaluation have been developed and applied to a small set of wildfires, but there is a...

Author(s): Benjamin Gannon, Matthew P. Thompson, Kira Z. Deming, Jude Bayham, Yu Wei, Christopher D. O'Connor

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Living with wildfire in the Squilchuck Drainage-Chelan County, Washington: 2020 data report

www.nrfirescience.org/resource/22488

The Wildfire Research Center (WiRe Center) works with wildfire practitioners seeking to create communities that are adapted to wildfire using an evidenced-based approach. Historically, immediate threats and wildfire suppression have garnered much attention and resources. While these efforts remain critical, getting in front of the...

Author(s): Hannah Brenkert-Smith, Patricia A. Champ, Jonathan Riley, Christopher M. Barth, Colleen Donovan, James R. Meldrum, Carolyn Wagner

Year Published: 2020
Type: Document
Technical Report or White Paper

Wildfires in the wildland-urban interface: key concepts and evaluation methodologies

www.nrfirescience.org/resource/20937

Over the last decades, the different issues regarding the expansion of the wildland-urban interface (WUI) - particularly those related to fires - have spread around the world with particular exposure in the USA, Canada, Australia, and, more recently, in southern European countries (e.g. Portugal and Greece). It has been receiving...

Author(s): A. Bento-Gonçalves, A. Vieira

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Awareness and adoption of FireSmart Canada: barriers and incentives

www.nrfirescience.org/resource/22133

Homeowners in the Wildland Urban Interface (WUI) are strongly encouraged to protect their property from the risk of damage from forest fires. FireSmart Canada, similar to Firewise used in the United States, and Community Fireguard, Community FireWise, Community FireSafe and the Bushfire Ready Action Groups in Australia, provides...

Author(s): Mohamed Ergibi, Hayley Hesseln

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

Corrigendum to: Modelling suppression difficulty: current and future applications

www.nrfirescience.org/resource/21755

Improving decision processes and the informational basis upon which decisions are made in pursuit of safer and more effective fire response have become key priorities of the fire research community. One area of emphasis is bridging the gap between fire researchers and managers through development of application-focused,...

Author(s): Francisco Rodriguez y Silva, Christopher D. O'Connor, Matthew P. Thompson, Juan Ramón Molina Martínez, David E. Calkin

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

The changing nature of wildfires: impacts on the health of the public

www.nrfirescience.org/resource/22419

[from the text] The danger of catastrophic wildfires is increasing around the globe, with large fires occurring in Australia, Canada, Chile, Indonesia, Portugal, Russia, as well as in the United States over the past decade. A major driver globally is climate change, which is expected to increase the frequency and severity of...

Author(s): John R. Balmes

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

The Path to Strategic Wildland Fire Management Planning

www.nrfirescience.org/resource/20870

SUMMARY: For more than a century in the US we have been suppressing fires, with unexpected and undesirable outcomes particularly in fire adapted and dependent ecosystems. Fires are increasing in size and duration, resulting in substantial loss of life and property. It is time for a different approach in wildland fire management....

Author(s): Richard D. Stratton

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Exploring the 'issue-attention cycle': does length of time since wildfire predict social acceptability of prescribed burning?

www.nrfirescience.org/resource/21148

Social acceptability of environmental management actions, such as prescribed burning used to reduce wildfire risk, is critical to achieving positive outcomes. However, environmental managers often need to implement strategies over a long time period, and sustaining long-term community support can be challenging. Public attention to...

Author(s): Melinda R. Mylek, Jacki Schirmer

Year Published: 2020

Type: Document

Book or Chapter or Journal Article

Cross-boundary wildfire and community exposure: A framework and application in the western U.S.

www.nrfirescience.org/resource/19663

In this report we provide a framework for assessing cross-boundary wildfire exposure and a case study application in the western U.S. The case study provides detailed mapping and tabular decision support materials for prioritizing fuel management investments aimed at reducing wildfire exposure to communities located proximal to...

Author(s): Alan A. Ager, Michelle A. Day, Palaiologos Palaiologou, Rachel M. Houtman, Chris Ringo, Cody Evers

Year Published: 2019

Type: Document

Technical Report or White Paper

Risk factor as a strategy to validate the prioritization of areas for wildfire protection

www.nrfirescience.org/resource/19073

The limited availability of resources for wildfire management necessitates prioritizing forest areas for protection. For this purpose, criteria such as fire risk are used to generate thematic maps intended to support decision-making. However, prior to this, the information must be validated under a statistically

robust process....

Author(s): José G. Flores Garnica, Alejandra Macías, Uri D. Casillas

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Stakeholder perceptions and scientific evidence linking wildfire mitigation treatments to societal outcomes

www.nrfirescience.org/resource/20350

A number of watershed partnerships have emerged in the western US to address the impacts of wildfire through investing in wildfire mitigation activities. To motivate collective action and design effective risk mitigation programs, these stakeholders draw on evidence linking wildfire mitigation to outcomes of interest. To advance...

Author(s): Ryan M. Roberts, Kelly W. Jones, Esther Duke, Xoco Shinbrot, Erin E. Harper, Erin Fons, Anthony S. Cheng, Brett Wolk

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Beyond ICS: how should we govern complex disasters in the United States?

www.nrfirescience.org/resource/19567

The complexity of large-scale disasters requires governance structures that can integrate numerous responders quickly under often chaotic conditions. Complex disasters – by definition – span multiple jurisdictions and activate numerous response functions carried out by numerous legally autonomous public, nonprofit, and private...

Author(s): Branda Nowell, Toddi A. Steelman

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Fine-scale assessment of cross-boundary wildfire events in the western United States

www.nrfirescience.org/resource/20193

We report a fine-scale assessment of cross-boundary wildfire events for the western US. We used simulation modeling to quantify the extent of fire exchange among major federal, state, and private land tenures and mapped locations where fire ignitions can potentially affect populated places. We examined how parcel size affects...

Author(s): Palaiologos Palaiologou, Alan A. Ager, Cody Evers, Max W. Nielsen-Pincus, Michelle A. Day, Haiganoush K. Preisler

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A Socio-Ecological Approach to Mitigating Wildfire Vulnerability in the Wildland Urban Interface: A Case Study from the 2017 Thomas Fire

www.nrfirescience.org/resource/19058

Wildfire disasters are one of the many consequences of increasing wildfire activities globally, and much effort has been made to identify strategies and actions for reducing human vulnerability to wildfire. While many individual homeowners and communities have enacted such strategies, the number subjected to a subsequent wildfire is...

Author(s): Crystal A. Kolden, Carol Henson

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Turning down the heat: vegetation feedbacks limit fire regime responses to global warming

www.nrfirescience.org/resource/20712

Climate change is projected to dramatically increase boreal wildfire activity, with broad ecological and socioeconomic consequences. As global temperatures rise, periods with elevated fire weather are expected to increase in frequency and duration, which would be expected to increase the number and size of fires. Statistical...

Author(s): Jean Marchal, Steve G. Cumming, Eliot J. B. McIntire

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Wildfire exposure to the wildland urban interface in the western US

www.nrfirescience.org/resource/20189

Predicting wildfire disasters presents a major challenge to the field of risk science, especially when fires propagate long distances through diverse fuel types and complex terrain. A good example is in the western US where large tracts of public lands routinely experience large fires that spread from remote wildlands into developed...

Author(s): Alan A. Ager, Palaiologos Palaiologou, Cody Evers, Michelle A. Day, Chris Ringo, Karen C. Short

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Tradeoffs between US national forest harvest targets and fuel management to reduce wildfire transmission to the wildland urban interface

www.nrfirescience.org/resource/19031

US public land management agencies are faced with multiple, often conflicting objectives to meet management targets and produce a wide range of ecosystem services expected from public lands. One example is managing the growing wildfire risk to human and ecological values while meeting programmatic harvest targets for economic...

Author(s): Alan A. Ager, Rachel M. Houtman, Michelle A. Day, Chris Ringo, Palaiologos Palaiologou

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Dynamic wildfire navigation system

www.nrfirescience.org/resource/19498

Wildfire, a natural part of many ecosystems, has also resulted in significant disasters impacting ecology and human life in Australia. This study proposes a prototype of fire propagation prediction as an extension of preceding research; this system is called "Cloud computing based bushfire prediction", the computational...

Author(s): Mitsuhiro Ozaki, Jagannath Aryal, Paul Fox-Hughes

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Risk management and analytics in wildfire response

www.nrfirescience.org/resource/20612

Purpose of Review: The objectives of this paper are to briefly review basic risk management and analytics concepts, describe their nexus in relation to wildfire response, demonstrate real-world application of analytics to support response decisions and organizational learning, and outline an analytics strategy for the future....

Author(s): Matthew P. Thompson, Yu Wei, David E. Calkin, Christopher D. O'Connor, Christopher J. Dunn, Nathaniel M. Anderson, John S. Hogland

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Fine scale assessment of cross boundary wildfire events in the Western United States

www.nrfirescience.org/resource/20028

We report a fine scale assessment of cross-boundary wildfire events for the western US. We used simulation modeling to quantify the extent of fire exchange among major federal, state, and private land tenures and mapped locations where fire ignitions can potentially affect populated places. We examined how parcel size effects the...

Author(s): Palaiologos Palaiologou, Alan A. Ager, Cody Evers, Max W. Nielsen-Pincus, Michelle A. Day, Haiganoush K. Preisler

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Managing for Fire Refugia in the Northwestern United States

www.nrfirescience.org/resource/19399

Fire refugia are defined as areas less frequently or less severely affected by wildfire relative to the surrounding landscape and important for the persistence of biota. Land managers and researchers were invited to participate in a two half-day workshop to gain insight on the factors that influence land management strategies on...

Author(s): Arjan J. H. Meddens, Anthony Martinez

Year Published: 2019

Type: Document

Research Brief or Fact Sheet

Measuring Initial Attack Suppression Effectiveness through Burn Probability

www.nrfirescience.org/resource/20549

Most wildfires in North America are quickly extinguished during initial attack (IA), the first phase of suppression. While rates of success are high, it is not clear how much IA suppression reduces annual fire risk across landscapes. This study introduces a method of estimating IA effectiveness by pairing burn probability (BP)...

Author(s): Jonathan Reimer, Dan K. Thompson, Nicholas A. Povak

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Severe Fire Danger Index: A Forecastable Metric to Inform Firefighter and Community Wildfire Risk Management

www.nrfirescience.org/resource/20001

Despite major advances in numerical weather prediction, few resources exist to forecast wildland fire danger conditions to support operational fire management decisions and community early-warning systems. Here we present the development and evaluation of a spatial fire danger index that can be

used to assess historical events,...

Author(s): William Matt Jolly, Patrick H. Freeborn, Wesley G. Page, Bret W. Butler

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Thermal characterization of firebrand piles

www.nrfirescience.org/resource/19225

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

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

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A Double Whammy: Climate Change and Stand-Replacing Wildfires

www.nrfirescience.org/resource/20493

In the Intermountain region of the Western United States, most forested landscapes are fire prone and adapted to a semiarid climate. With the severity of wildfires increasing as a result of excessive fuels, land managers are concerned about forest converting to non-forest types such as shrubland or grassland. "And then when you..."

Author(s): Rocky Mountain Research Station

Year Published: 2019

Type: Document

Research Brief or Fact Sheet

Exploring influences on intended evacuation behaviors during wildfire: what roles for pre-fire actions and event-based cues?

www.nrfirescience.org/resource/19902

Fire management professionals across multiple countries advocate evacuation as the safest action residents can take when threatened by a wildfire. However, existing research notes that while some residents may opt to evacuate to a safer place, others may choose alternatives to evacuation, including staying and actively defending...

Author(s): Catrin Edgeley, Travis B. Paveglio

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

Forest fire induced Natech risk assessment: a survey of geospatial technologies

www.nrfirescience.org/resource/20469

Forest fires threaten a large part of the world's forests, communities, and industrial plants, triggering technological accidents (Natechs). Forest fire modelling with respect to contributing spatial parameters is one of the well-known ways not only to predict the fire occurrence in forests, but also to assess the risk of forest-...

Author(s): Mohsen Naderpour, Hossein Mojaddadi Rizeei, Nima Khakzad, Biswajeet Pradhan

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Fire risk in revegetated bunchgrass communities infested with *Bromus tectorum*

www.nrfirescience.org/resource/21240

In rangeland ecosystems, invasive annual grass replacement of native perennials is associated with higher fire risk. Large bunchgrasses are often seeded to reduce cover of annuals such as *Bromus tectorum* L. (cheatgrass), but there is limited information about how revegetation reduces fire risk over the long term. We assessed how...

Author(s): Steven O. Link, Randal W. Hill, Sheel Bansal

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Deriving forest fire probability maps from the fusion of visible/infrared satellite data and geospatial data mining

www.nrfirescience.org/resource/19818

Information on fire probability is of vital importance to environmental and ecological studies as well as to fire management. This study aimed at comparing two forest fire probability mapping techniques, one based primarily on freely distributed EO (Earth observation) data from Landsat imagery, and another one based purely on GIS...

Author(s): Prashant K. Srivastava, George P. Petropoulos, Manika Gupta, Sudhir K. Singh, Tanvir Islam, Dimitra Loka

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Archetypes of community wildfire exposure from national forests of the western US

www.nrfirescience.org/resource/19098

Risk management typologies and their resulting archetypes can structure the many social and biophysical drivers of community wildfire risk into a set number of strategies to build community resilience. Existing typologies omit key factors that determine the scale and mechanism by which exposure from large wildfires occur. These...

Author(s): Cody Evers, Alan A. Ager, Max W. Nielsen-Pincus, Palaiologos Palaiologou, Ken Bunzel

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Burn probability simulation and subsequent wildland fire activity in Alberta, Canada – Implications for risk assessment and strategic planning

www.nrfirescience.org/resource/20395

Burn probability maps produced by Monte Carlo methods involve repeated simulations of fire ignition and spread across a study area landscape to identify locations that burn more frequently than others. These maps have achieved broad acceptance for research investigations and strategic fire management planning. In this study, we...

Author(s): Jennifer L. Beverly, Neal McLoughlin

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Perception and management of sociopolitical risks on large fires

www.nrfirescience.org/resource/19086

This work examines the perceived impact of sociopolitical factors on large fire decision making. The study is based on a set of 74 large fires in USDA Forest Service Regions 5 and 6 for the years 2009-2013. All participants were fire managers, some as part of units affected by incidents and others associated with incident management...

Author(s): Armando Gonzalez-Caban, Donald G. MacGregor

Year Published: 2019

Type: Document

Conference Proceedings

Impacts of wildland fire effects on resources and assets through expert elicitation to support fire response decisions

www.nrfirescience.org/resource/20375

A modelling framework to spatially score the impacts from wildland fire effects on specific resources and assets was developed for and applied to the province of Ontario, Canada. This impact model represents the potential 'loss', which can be used in the different decision-making methods common in fire response operations (e.g....

Author(s): Colin B. McFayden, Den Boychuk, Douglas G. Woolford, Melanie J. Wheatley, Lynn Johnston

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

We're not doing enough prescribed fire in the western United States to mitigate wildfire risk

www.nrfirescience.org/resource/19637

Prescribed fire is one of the most widely advocated management practices for reducing wildfire hazard and has a long and rich tradition rooted in indigenous and local ecological knowledge. The scientific literature has repeatedly reported that prescribed fire is often the most effective means of achieving such goals by reducing...

Author(s): Crystal A. Kolden

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Defining "Resilient Landscapes" From Multiple Stakeholder Perspectives in a Wildland Urban Interface (WUI) Area - Final Report for JFSP

www.nrfirescience.org/resource/20249

Fuel treatment projects in wildland urban interface (WUI) areas are highly visible to public scrutiny, which can lead to intractable conflicts between land managers and the public that could block the implementation of those treatments. If agencies and publics are not able to reach adequate consensus regarding the definition of "...

Author(s): Jody L. Jahn, Hannah Brenkert-Smith
Year Published: 2019
Type: Document
Technical Report or White Paper

Engaging the fire before it starts: A case study from the 2017 Pinal Fire (Arizona)

www.nrfirescience.org/resource/19069

How did the forest and community get to the point where they were willing to take on managing a fire of this size and duration for resource benefit and hazard reduction? Science has recognized for decades that many forested ecosystems of the American West are shifting away from historically fire-adapted conditions. Beginning in the...

Author(s): Christopher D. O'Connor, David E. Calkin
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

A social-ecological network approach for understanding wildfire risk governance

www.nrfirescience.org/resource/20191

Large wildfire events (e.g. >100 square km) highlight the importance of governance systems that address wildfire risk at landscape scales and among multiple land owners and institutions. A growing body of empirical work demonstrates that environmental governance outcomes depend upon how well patterns of interaction among actors...

Author(s): Matthew Hamilton, A. Paige Fischer, Alan A. Ager
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Could restoration of a landscape to a pre-European historical vegetation condition reduce burn probability?

www.nrfirescience.org/resource/19046

Montane regions throughout western North America have experienced increases in forest canopy closure and forest encroachment into grasslands over the past century; this has been attributed to climate change and fire suppression/exclusion. These changes threaten ecological values and potentially increase probabilities of intense...

Author(s): Christopher A. Stockdale, Neal McLoughlin, Michael D. Flannigan, Ellen Macdonald
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Forest Fire Susceptibility and Risk Mapping Using Social/Infrastructural Vulnerability and Environmental Variables

www.nrfirescience.org/resource/20139

Forest fires in northern Iran have always been common, but the number of forest fires has been growing over the last decade. It is believed, but not proven, that this growth can be attributed to the increasing temperatures and droughts. In general, the vulnerability to forest fire depends on infrastructural and social factors...

Author(s): Omid Ghorbanzadeh, Thomas Blaschke, Khalil Gholamnia, Jagannath Aryal
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/18999

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

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

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Forest Service fire management and the elusiveness of change

www.nrfirescience.org/resource/19433

Background: There is broad recognition that fire management in the United States must fundamentally change and depart from practices that have led to an over-emphasis on suppression and limited the presence of fire in forested ecosystems. In this paper, we look at competing problem definitions in US Forest Service policy for fire...

Author(s): Courtney Schultz, Matthew P. Thompson, Sarah M. McCaffrey

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Exposure Complexity and Community Capacity to Manage Wildfire Risk: A Coupled Biophysical and Social Analysis of 60 Communities in the Western United States

www.nrfirescience.org/resource/20550

Coordinated approaches to wildfire risk mitigation strategies that cross-ownership and management boundaries are found in many policies and programs worldwide. The 'all lands' approach of the United States (US) National Cohesive Strategy, for example, attempts to address the mismatches between biophysical risk and the social...

Author(s): Max W. Nielsen-Pincus, Cody Evers, Alan A. Ager

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Interactions between Resident Risk Perceptions and Wildfire Risk Mitigation: Evidence from Simultaneous Equations Modeling

www.nrfirescience.org/resource/20003

Fire science emphasizes that mitigation actions on residential property, including structural hardening and maintaining defensible space, can reduce the risk of wildfire at a home. Accordingly, a rich body of social science literature investigates the determinants of wildfire risk mitigation behaviors of residents living in fire-...

Author(s): James R. Meldrum, Hannah Brenkert-Smith, Patricia A. Champ, Jamie Gomez, Lilia C. Falk, Christopher M. Barth

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Interagency Standards for Fire and Fire Aviation Operations

www.nrfirescience.org/resource/18907

Scope: The Interagency Standards for Fire and Fire Aviation Operations states, references, or supplements policy for Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, and Bureau of Indian Affairs fire and fire aviation program management. Original source policy is stated or...

Author(s): Interagency Standards for Fire and Fire Aviation Operations Group

Year Published: 2019

Type: Document

Technical Report or White Paper

Designing operationally relevant daily large fire containment strategies using risk assessment results

www.nrfirescience.org/resource/19301

In this study, we aim to advance the optimization of daily large fire containment strategies for ground-based suppression resources by leveraging fire risk assessment results commonly used by fire managers in the western USA. We begin from an existing decision framework that spatially overlays fire risk assessment results with pre-

Author(s): Yu Wei, Matthew P. Thompson, Joe H. Scott, Christopher D. O'Connor, Christopher J. Dunn

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Applications of simulation-based burn probability modelling: a review

www.nrfirescience.org/resource/20540

Wildland fire scientists and land managers working in fire-prone areas require spatial estimates of wildfire potential. To fulfill this need, a simulation-modelling approach was developed whereby multiple individual wildfires are modelled in an iterative fashion across a landscape to obtain location-based measures of fire likelihood...

Author(s): Marc-Andre Parisien, Denyse A. Dawe, Carol Miller, Christopher A. Stockdale, O. Bradley Armitage

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Rethinking resilience to wildfire

www.nrfirescience.org/resource/19928

Record-breaking fire seasons are becoming increasingly common worldwide, and large wildfires are having extraordinary impacts on people and property, despite years of investments to support social-ecological resilience to wildfires. This has prompted new calls for land management and policy reforms as current land and fire...

Author(s): Dave McWethy, Tania L. Schoennagel, Philip E. Higuera, Meg A. Krawchuk, Brian J. Harvey, Elizabeth C. Metcalf, Courtney Schultz, Carol Miller, Alexander L. Metcalf, Brian Buma, Arika Virapongse, Judith C. Kulig, Richard C. Stedman, Zakary Ratajczak, Cara R. Nelson, Crystal A. Kolden

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Determinants of perceived risk and liability concerns associated with prescribed burning in the United States

www.nrfirescience.org/resource/19212

While prescribed burning is a proven tool in the management of forests and grasslands, its use has been limited due, in part, to potential risks that may result in legal liability, property damage, and

personal injury. The purpose of this study is to understand the factors that shape landowners' and fire professionals' perceptions...

Author(s): Omkar Joshi, Neelam C. Poudyal, John R. Weir, Samuel D. Fuhlendorf, Thomas O. Ochuodho

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

A review of the applications of remote sensing in fire ecology

www.nrfirescience.org/resource/20491

Wildfire plays an important role in ecosystem dynamics, land management, and global processes. Understanding the dynamics associated with wildfire, such as risks, spatial distribution, and effects is important for developing a clear understanding of its ecological influences. Remote sensing technologies provide a means to study fire...

Author(s): David M. Szpakowski, Jennifer L. Rooker Jensen

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

Living with wildfire in Archeluta County, Colorado: 2015 data report

www.nrfirescience.org/resource/19839

Residents in the wildland-urban interface (WUI) can play an important role in reducing wildfire's negative effects by performing wildfire risk mitigation on their property. This report offers insight into the wildfire risk mitigation activities and related considerations, such as attitudes, experiences, and concern about wildfire...

Author(s): James R. Meldrum, Hannah Brenkert-Smith, Pamela Wilson, Patricia A. Champ, Christopher M. Barth, Angela Boag

Year Published: 2019

Type: Document

Technical Report or White Paper

Modeling the cost effectiveness of fire protection resource allocation in the United States: models and a 1980-2014 case study

www.nrfirescience.org/resource/19184

The estimated cost of fire in the United States is about \$329 billion a year, yet there are gaps in the literature to measure the effectiveness of investment and to allocate resources optimally in fire protection. This article fills these gaps by creating data-driven empirical and theoretical models to study the effectiveness of...

Author(s): Adam Behrendt, Vineet M. Payyappalli, Jun Zhuang

Year Published: 2019

Type: Document

Book or Chapter or Journal Article

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

Spatial and temporal assessment of responder exposure to snag hazards in post-fire environments

www.nrfirescience.org/resource/19733

Researchers and managers increasingly recognize enterprise risk management as critical to addressing contemporary fire management challenges. Quantitative wildfire risk assessments contribute by parsing and mapping potentially contradictory positive and negative fire effects. However, these assessments disregard risks to fire...

Author(s): Christopher J. Dunn, Christopher D. O'Connor, Matthew J. Reilly, David E. Calkin, Matthew P. Thompson

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Pathways of change: predicting the effects of fire on flammability

www.nrfirescience.org/resource/19090

Impacts of wildfire on humans are increasing as urban populations continue to expand into fire prone landscapes. Effective fire risk management can only be achieved if we understand and quantify how ecosystems change in response to fire and how these changes affect flammability. However, there have been limited studies to this...

Author(s): Sarah C. McColl-Gausden, Trent D. Penman

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Understanding homeowners' decisions to mitigate wildfire risk and create defensible space

www.nrfirescience.org/resource/20377

This article analyses homeowners' decisions to undertake fire-safe investments and create defensible space on their property using a unique dataset from 35 wildland–urban interface communities in Nevada. The dataset combines homeowner information from a mail survey with their observed fire-safe investments obtained through...

Author(s): Angelo M. Sisante, Michael H. Taylor, Kimberly Rollins

Year Published: 2019

Type: Document
Book or Chapter or Journal Article

Spatial optimization of operationally relevant large fire confine and point protection strategies: Model development and test cases

www.nrfirescience.org/resource/17539

This study introduces a large fire containment strategy that builds upon recent advances in spatial fire planning, notably the concept of potential wildland fire operation delineations (PODs). Multiple PODs can be clustered together to form a “box” that is referred as the “response POD” (or rPOD). Fire lines would be built...

Author(s): Yu Wei, Matthew P. Thompson, Jessica R. Haas, Gregory K. Dillon, Christopher D. O'Connor

Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Guidelines for risk management in forest planning — what is risk and when is risk management useful?

www.nrfirescience.org/resource/17158

Managing forest resources occurs under various sources of uncertainty. Depending on the management problem, this uncertainty may have a substantial impact on the quality of the solution. As our knowledge on the sources and magnitude of uncertainty improves, integrating this knowledge into the development of management plans becomes...

Author(s): Kyle Eyvindson, Annika Kangas

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Collaboration across boundaries: a policy perspective on the state of wildland fire

www.nrfirescience.org/resource/18283

The topic of collaboration across boundaries is fitting for me and for the Forest Service because our national priorities revolve around just that—collaboration across boundaries—especially when it comes to wildland fire. We are committed to improving the conditions of the Nation's forests, being good neighbors, and sharing...

Author(s): Vicki Christiansen

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Values of the public at risk of wildfire and its management

www.nrfirescience.org/resource/18242

Wildfire management agencies increasingly seek to understand what the public values and expects to be protected from wildfire and its management. Recent conceptual development demonstrates the utility of considering values at three levels of abstraction: localized valued entities such as people, places and objects; valued attributes...

Author(s): Kathryn J. Williams, Rebecca M. Ford, Andrea Rawluk

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Where wildfires destroy buildings in the US relative to the wildland-urban interface and national fire outreach programs

www.nrfirescience.org/resource/17901

Over the past 30 years, the cost of wildfire suppression and homes lost to wildfire in the US have increased dramatically, driven in part by the expansion of the wildland-urban interface (WUI), where buildings and wildland vegetation meet. In response, the wildfire management community has devoted substantial effort to better...

Author(s): Heather A. Kramer, Miranda H. Mockrin, Patricia M. Alexandre, Susan I. Stewart, Volker C. Radeloff

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Wildfire risk reduction in the United States: Leadership staff perceptions of local fire department roles and responsibilities

www.nrfirescience.org/resource/16481

As wildland fires have had increasing negative impacts on a range of human values, in many parts of the United States (U.S.) and around the world, collaborative risk reduction efforts among agencies, homeowners, and fire departments are needed to improve wildfire safety and mitigate risk. Using interview data from 46 senior officers...

Author(s): Rachel S. Madsen, Hylton J. G. Haynes, Sarah M. McCaffrey

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

Marshall Woods Restoration Project - Challenges to building consensus and conveying fire hazard mitigation and ecological restoration needs to the public

www.nrfirescience.org/resource/19686

The 28,000-acre Rattlesnake National Recreation Area (RNRA) lies immediately northwest of Missoula, Montana, and is a highly popular recreation destination with an estimated 60,000 annual visitors. The immediate area also contains thousands of residences situated within the Wildland Urban Interface (WUI). In 2005, Missoula County'...

Author(s): Megan P. Keville

Year Published: 2018

Type: Document

Research Brief or Fact Sheet

How does information affect fire risk reduction behaviors? Mediating effects of cognitive processes and subjective knowledge

www.nrfirescience.org/resource/17341

Communicating risk information is crucial in policy making regarding hazardous events. The influencing mechanism of risk information in generating behavioral reactions is considered in the context of fire risk. We investigate homeowners' responses to risk information and how their cognitive processes influence their risk reduction...

Author(s): Tianzhuo Liu, Huifang Jiao

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Responding to risky neighbors: Testing for spatial spillover effects for defensible space in a fire-prone WUI community

www.nrfirescience.org/resource/18318

Often, factors that determine the risk of an environmental hazard occur at landscape scales, and risk mitigation requires action by multiple private property owners. How property owners respond to risk mitigation on neighboring lands depends on whether mitigation actions are strategic complements or strategic substitutes. We test...

Author(s): Travis Warziniack, Patricia A. Champ, James R. Meldrum, Hannah Brenkert-Smith, Christopher M. Barth, Lilia C. Falk
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Wildfire risk mitigation: Local solutions to a national problem

www.nrfirescience.org/resource/18279

As fire professionals, we talk about suppression tactics, aircraft, and the armies of fearless men and women who risk their lives to save homes and lives. We hear citizens, elected officials, and the media making broad statements like “This was a once-in-a-lifetime event” or “We have never seen anything like this before and it...”

Author(s): Jonathan Bruno
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Social Factors in Wildland Fire

www.nrfirescience.org/resource/18158

The socio-environmental dimension in wildland fire management is critical for moving towards a baseline of firewise planning. Wildland fire risk planning is a land use planning tool that should be able to keep pace with rapid rates of social and environmental change. Changes in land use and climate bring alterations in fire regimes...

Author(s): David Martín Gallego, Eduard Plana Bach, Domingo Molina Terrén
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Incorporating social diversity into wildfire management: proposing 'pathways' for fire adaptation

www.nrfirescience.org/resource/17900

Existing research suggests that adoption or development of various wildfire management strategies may differ across communities. However, there have been few attempts to design diverse strategies for local populations to better “live with fire.” This article extends an existing approach by articulating how characteristic...

Author(s): Travis B. Paveglio, Matthew S. Carroll, Amanda M. Stasiewicz, Daniel R. Williams, Dennis Becker
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

A model-based framework to evaluate alternative wildfire suppression strategies

www.nrfirescience.org/resource/16478

The complexity and demands of wildland firefighting in the western U.S. have increased over recent decades due to factors including the expansion of the wildland-urban interface, lengthening fire seasons associated with climate change, and changes in vegetation due to past fire suppression and timber harvest. In light of these...

Author(s): Karen L. Riley, Matthew P. Thompson, Joe H. Scott, Julie W. Gilbertson-Day
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Should I stay or should I go now? Or should I wait and see? Influences on wildfire evacuation decisions

www.nrfirescience.org/resource/16390

As climate change has contributed to longer fire seasons and populations living in fire-prone ecosystems increase, wildfires have begun to affect a growing number of people. As a result, interest in understanding the wildfire evacuation decision process has increased. Of particular interest is understanding why some people leave...

Author(s): Sarah M. McCaffrey, Robyn S. Wilson, Avishek Konar

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Systems thinking and wildland fire management

www.nrfirescience.org/resource/16148

A changing climate, changing development and land use patterns, and increasing pressures on ecosystem services raise global concerns over growing losses associated with wildland fires. New management paradigms acknowledge that fire is inevitable and often uncontrollable, and focus on living with fire rather than attempting to...

Author(s): Matthew P. Thompson, Christopher J. Dunn, David E. Calkin

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/16996

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

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

Year Published: 2017

Type: Document

Technical Report or White Paper

A review of challenges to determining and demonstrating efficiency of large fire management

www.nrfirescience.org/resource/16145

Characterizing the impacts of wildland fire and fire suppression is critical information for fire management decision-making. Here, we focus on decisions related to the rare larger and longer-duration fire events, where the scope and scale of decision-making can be far broader than initial response efforts, and where determining and...

Author(s): Matthew P. Thompson, Francisco Rodriguez y Silva, David E. Calkin, Michael S. Hand

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Interacting effects of topography, vegetation, human activities and wildland-urban interfaces on wildfire ignition risk

www.nrfirescience.org/resource/16679

Effective fire prevention requires a better understanding of the patterns and causes of fire ignition. In this study, we focus on the interacting factors known to influence fire ignition risk, such as the type of vegetation, topographical features and the wildland-urban interface (WUI; i.e. where urban development meet or...

Author(s): María Calviño-Cancela, María L. Chas-Amil, Eduardo D. García-Martínez, Julia Touza

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Natural hazard modeling and uncertainty analysis [Chapter 2]

www.nrfirescience.org/resource/16564

Modeling can play a critical role in assessing and mitigating risks posed by natural hazards. These modeling efforts generally aim to characterize the occurrence, intensity, and potential consequences of natural hazards. Uncertainties surrounding the modeling process can have important implications for the development, application,...

Author(s): Matthew P. Thompson, Jord J. Warmink

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Examining the influence of biophysical conditions on wildland-urban interface homeowners' wildfire risk mitigation activities in fire-prone landscapes

www.nrfirescience.org/resource/16539

Expansion of the wildland–urban interface (WUI) and the increasing size and number of wildfires has policy-makers and wildfire managers seeking ways to reduce wildfire risk in communities located near fire-prone forests. It is widely acknowledged that homeowners can reduce their exposure to wildfire risk by using nonflammable...

Author(s): Christine Olsen, Jeffrey D. Kline, Alan A. Ager, Keith A. Olsen, Karen C. Short

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

An empirical machine learning method for predicting potential fire control locations for pre-fire planning and operational fire management

www.nrfirescience.org/resource/15490

During active fire incidents, decisions regarding where and how to safely and effectively deploy resources to meet management objectives are often made under rapidly evolving conditions, with limited time to assess management strategies or for development of backup plans if initial efforts prove unsuccessful. Under all but the most...

Author(s): Christopher D. O'Connor, David E. Calkin, Matthew P. Thompson

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Uncertainty and probability in wildfire management decision support: An example from the United States [Chapter 4]

www.nrfirescience.org/resource/14998

Wildfire risk assessment is increasingly being adopted to support federal wildfire management decisions in the United States. Existing decision support systems, specifically the Wildland Fire Decision Support System (WFDSS), provide a rich set of probabilistic and risk-based information to support the management of active wildfire...

Author(s): Matthew P. Thompson, David E. Calkin, Joe H. Scott, Michael S. Hand
Year Published: 2017
Type: Document
Technical Report or White Paper

Risk aversion and risk seeking in multicriteria forest management: a Markov decision process approach

www.nrfirescience.org/resource/16448

Markov decision process models were extended to reflect some consequences of the risk attitude of forestry decision makers. One approach consisted of maximizing the expected value of a criterion subject to an upper bound on the variance or, symmetrically, minimizing the variance subject to a lower bound on the expected value. The...

Author(s): Joseph Buongiorno, Mo Zhou, Craig Johnston
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Uncertainty in natural hazards: modeling and decision support (Introduction)

www.nrfirescience.org/resource/16149

Uncertainties are pervasive in natural hazards, and it is crucial to develop robust and meaningful approaches to characterize and communicate uncertainties to inform modeling efforts. In this monograph we provide a broad, cross-disciplinary overview of issues relating to uncertainties faced in natural hazard and risk assessment. We...

Author(s): Karen L. Riley, Matthew P. Thompson, Peter Webley, Kevin D. Hyde
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Is the whole greater than the sum of its parts? Homeowner wildfire risk mitigation, community heterogeneity, and fire adaptedness - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17000

In this project we posed the question "Is the whole greater than the sum of its parts?" We focused on homeowner wildfire risk mitigation, community heterogeneity, and fire adaptedness. One of the unique aspects of this project was that the team was a research and practice collaboration. This collaboration facilitated...

Author(s): Patricia A. Champ, Hannah Brenkert-Smith, James R. Meldrum, Christopher M. Barth, Travis Warziniack
Year Published: 2017
Type: Document
Technical Report or White Paper

Natural hazard modeling and uncertainty analysis (Chapter 2)

www.nrfirescience.org/resource/16147

Modeling can play a critical role in assessing and mitigating risks posed by natural hazards. These modeling efforts generally aim to characterize the occurrence, intensity, and potential consequences of natural hazards. Uncertainties surrounding the modeling process can have important implications for the development, application,...

Author(s): Matthew P. Thompson, Jord J. Warmink
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Advancing characterization of social diversity in the wildland-urban interface: an indicator approach for wildfire management

www.nrfirescience.org/resource/21904

A growing body of research indicates that communities at risk from wildfire differ in terms of the local social context that influences adaptive planning, mitigations or collective actions. Less work has attempted to document critical differences in that local social context across large samples. The research presented here explores...

Author(s): Travis B. Paveglio, Max W. Nielsen-Pincus, Jesse Abrams, Cassandra Moseley

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

A framework for developing safe and effective large-fire response in a new fire management paradigm

www.nrfirescience.org/resource/16144

The impacts of wildfires have increased in recent decades because of historical forest and fire management, a rapidly changing climate, and an increasingly populated wildland urban interface. This increasingly complex fire environment highlights the importance of developing robust tools to support risk-informed decision making....

Author(s): Christopher J. Dunn, Matthew P. Thompson, David E. Calkin

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Uncertainty in natural hazards, modeling and decision support: An introduction to this volume [Chapter 1]

www.nrfirescience.org/resource/16565

Given the expanding vulnerability of human populations and natural systems, management professionals are ever more frequently called upon to apply natural hazard modeling in decision support. When scientists enter into predictive services, they share professional, moral, legal, and ethical responsibilities to account for the...

Author(s): Karen L. Riley, Matthew P. Thompson, Peter Webley, Kevin D. Hyde

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

A spatial evaluation of global wildfire-water risks to human and natural systems

www.nrfirescience.org/resource/16561

The large mediatic coverage of recent massive wildfires across the world has emphasized the vulnerability of freshwater resources. The extensive hydrogeomorphic effects from a wildfire can impair the ability of watersheds to provide safe drinking water to downstream communities and high-quality water to maintain riverine ecosystem...

Author(s): Francois-Nicolas Robinne, Kevin D. Bladon, Carol Miller, Marc-Andre Parisien, Jerome Mathieu, Michael D. Flannigan

Year Published: 2017

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

Towards enhanced risk management: planning, decision making and monitoring of US wildfire response

www.nrfirescience.org/resource/15485

This paper is the preface to a special issue focused on US wildfire response. The nine papers included build from a 2016 conference special session on monitoring, modelling and accountability of fire management policies and practices. Here we provide the unifying theme for these papers, summarise each from this perspective, and...

Author(s): Christopher J. Dunn, David E. Calkin, Matthew P. Thompson

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Relational risk assessment and management: investigating capacity in wildfire response networks - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/14925

Relational Risk Assessment and Management (RRAM) is about developing a new set of concepts and rapid assessment tools for assessing risk for problems that occur in inter-agency communication and coordination on complex fire events. Failures in effective communication and coordination within the network of responding organizations...

Author(s): Branda Nowell, Sarah M. McCaffrey, Toddi A. Steelman

Year Published: 2017

Type: Document

Technical Report or White Paper

Wildfire risk as a socioecological pathology

www.nrfirescience.org/resource/14461

Wildfire risk in temperate forests has become a nearly intractable problem that can be characterized as a socioecological 'pathology': that is, a set of complex and problematic interactions among social and ecological systems across multiple spatial and temporal scales. Assessments of wildfire risk could benefit from recognizing and...

Author(s): A. Paige Fischer, Thomas A. Spies, Toddi A. Steelman, Cassandra Moseley, Bart R. Johnson, John D. Bailey, Alan A. Ager, Patrick S. Bourgeron, Susan Charnley, Brandon M. Collins, Jeffrey D. Kline, Jessica E. Leahy, Jeremy S. Littell, James D.A. Millington, Max W. Nielsen-Pincus, Christine Olsen, Travis B. Paveglio, Christopher I. Roos, David M. J. S. Bowman

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Risk terminology primer: basic principles and a glossary for the wildland fire management community

www.nrfirescience.org/resource/14409

Risk management is being increasingly promoted as an appropriate method for addressing wildland fire management challenges. However, a lack of a common understanding of risk concepts and terminology is hindering effective application. In response, this General Technical Report provides a set of clear, consistent, understandable, and...

Author(s): Matthew P. Thompson, Tom Zimmerman, Dan Mindar, Mary A. Taber

Year Published: 2016

Type: Document

Technical Report or White Paper

Uncertainty is information, too

www.nrfirescience.org/resource/16151

How accounting for doubt helps inform decision making.

Author(s): Bruce G. Marcot, Matthew P. Thompson, Thomas W. Bonnot, Frank R. Thompson

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Polishing the prism: improving wildfire mitigation planning by coupling landscape and social dimensions

www.nrfirescience.org/resource/19560

Effectively addressing wildfire risk to communities on large multi-owner landscapes requires an understanding of the biophysical factors that influence risk, such as fuel loads, topography, and weather, and social factors such as the capacity and willingness for communities to engage in fire-mitigation activities. Biophysical and...

Author(s): Geoffrey Koch

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Application of wildfire risk assessment results to wildfire response planning in the southern Sierra Nevada, California, USA

www.nrfirescience.org/resource/14351

How wildfires are managed is a key determinant of long-term socioecological resiliency and the ability to live with fire. Safe and effective response to fire requires effective pre-fire planning, which is the main focus of this paper. We review general principles of effective federal fire management planning in the U.S., and...

Author(s): Matthew P. Thompson, Phil Bowden, April Brough, Julie W. Gilbertson-Day, Alan H. Taylor, Jessica R. Haas

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Wicked Problem, New Solutions: Our Fire, Our Problem

www.nrfirescience.org/resource/18393

This conference is being presented to bring focus to the many issues associated with fuels, fire behavior, large wildfires, and the future of fire management. Much attention is being given to wildland fire management. It seems with each passing year we recognize escalating complexity, increasing risk, and mounting challenges....

Year Published: 2016

Type: Document

Resolving future fire management conflicts using multicriteria decision making

www.nrfirescience.org/resource/13893

Management strategies to reduce the risks to human life and property from wildfire commonly involve burning native vegetation. However, planned burning can conflict with other societal objectives such as human health and biodiversity conservation. These conflicts are likely to intensify as fire regimes change under future climates...

Author(s): Don A. Driscoll, Michael Bode, Ross A. Bradstock, David A. Keith, Trent D. Penman, Owen F. Price

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Getting ahead of the wildfire problem: quantifying and mapping management challenges and opportunities

www.nrfirescience.org/resource/14688

Wildfire is a global phenomenon that plays a vital role in regulating and maintaining many natural and human-influenced ecosystems but that also poses considerable risks to human populations and infrastructure. Fire managers are charged with balancing the short-term protection of human assets sensitive to fire exposure against the...

Author(s): Christopher D. O'Connor, Matthew P. Thompson, Francisco Rodriguez y Silva

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Enterprise risk management: selected agencies' experiences illustrate good practices in managing risk

www.nrfirescience.org/resource/18860

We performed our work for this report under the authority of the Comptroller General to conduct evaluations to assist Congress with its oversight responsibilities. Our objectives were to (1) update our risk management framework to more fully include evolving requirements and essential elements for federal ERM, and (2) identify good...

Year Published: 2016

Type: Document

Technical Report or White Paper

Risk management: core principles and practices, and their relevance to wildland fire

www.nrfirescience.org/resource/14411

The Forest Service, U.S. Department of Agriculture faces a future of increasing complexity and risk, pressing financial issues, and the inescapable possibility of loss of human life. These issues are perhaps most acute for wildland fire management, the highest risk activity in which the Forest Service engages. Risk management (RM)...

Author(s): Matthew P. Thompson, Donald G. MacGregor, David E. Calkin

Year Published: 2016

Type: Document

Technical Report or White Paper

Examining alternative fuel management strategies and the relative contribution of National Forest System land to wildfire risk to adjacent homes - a pilot assessment on the Sierra National

Forest, California, USA

www.nrfirescience.org/resource/14352

Determining the degree of risk that wildfires pose to homes, where across the landscape the risk originates, and who can best mitigate risk are integral elements of effective co-management of wildfire risk. Developing assessments and tools to help provide this information is a high priority for federal land management agencies such...

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

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Is seeing believing? Perceptions of wildfire risk over time

www.nrfirescience.org/resource/14317

Ongoing challenges to understanding how hazard exposure and disaster experiences influence perceived risk lead us to ask: Is seeing believing? We approach risk perception by attending to two components of overall risk perception: perceived probability of an event occurring and perceived consequences if an event occurs. Using a two-...

Author(s): Patricia A. Champ, Hannah Brenkert-Smith

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Achievable future conditions as a framework for guiding forest conservation and management

www.nrfirescience.org/resource/13788

We contend that traditional approaches to forest conservation and management will be inadequate given the predicted scale of social-economic and biophysical changes in the 21st century. New approaches, focused on anticipating and guiding ecological responses to change, are urgently needed to ensure the full value of forest ecosystem...

Author(s): Stephen W. Golladay, Katherine L. Martin, James M. Vose, David N. Wear, Alan P. Covich, Richard J. Hobbs, Kier D. Klepzig, Gene E. Likens, Robert J. Naiman, Allan W. Shearer

Year Published: 2016

Type: Document

Book or Chapter or Journal Article, Synthesis

Risk perception, sense-making and resilient performance: the sounds of wildland firefighting in action - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/15572

Managing wildland fire is an exercise in risk perception, sensemaking and resilient performance. Risk perception begins with individual size up of a wildfire to determine a course of action, and then becomes collective as the fire management team builds and continuously updates their common perception of risk. Karl Weick has called...

Author(s): Anne E. Black, David Thomas, J. Ziegler, Elena Gabor, Rebekah L. Fox

Year Published: 2016

Type: Document

Technical Report or White Paper

Using risk analysis to reveal opportunities for the management of unplanned ignitions in wilderness

www.nrfirescience.org/resource/16049

A goal of fire management in wilderness is to allow fire to play its natural ecological role without intervention. Unfortunately, most unplanned ignitions in wilderness are suppressed, in part because of

the risk they might pose to values, outside of the wilderness. We capitalize on recent advances in fire risk analysis to...

Author(s): Kevin M. Barnett, Carol Miller, Tyron J. Venn

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

A mixed integer program to model spatial wildfire behavior and suppression placement decisions

www.nrfirescience.org/resource/13272

Wildfire suppression combines multiple objectives and dynamic fire behavior to form a complex problem for decision makers. This paper presents a mixed integer program designed to explore integrating spatial fire behavior and suppression placement decisions into a mathematical programming framework. Fire behavior and suppression...

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

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Risk preferences, probability weighting, and strategy tradeoffs in wildfire management

www.nrfirescience.org/resource/16154

Wildfires present a complex applied risk management environment, but relatively little attention has been paid to behavioral and cognitive responses to risk among public agency wildfire managers. This study investigates responses to risk, including probability weighting and risk aversion, in a wildfire management context using a...

Author(s): Michael S. Hand, Matthew J. Wibbenmeyer, David E. Calkin, Matthew P. Thompson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Development and application of a probabilistic method for wildfire suppression cost modeling

www.nrfirescience.org/resource/12762

Wildfire activity and escalating suppression costs continue to threaten the financial health of federal land management agencies. In order to minimize and effectively manage the cost of financial risk, agencies need the ability to quantify that risk. A fundamental aim of this research effort, therefore, is to develop a process for...

Author(s): Matthew P. Thompson, Jessica R. Haas, Mark A. Finney, David E. Calkin, Michael S. Hand, Mark J. Browne, Martin Halek, Karen C. Short, Isaac C. Grenfell

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Categorizing the social context of the wildland urban interface: adaptive capacity for wildfire and community 'archetypes'

www.nrfirescience.org/resource/21905

Understanding the local context that shapes collective response to wildfire risk continues to be a challenge for scientists and policymakers. This study utilizes and expands on a conceptual approach for understanding adaptive capacity to wildfire in a comparison of 18 past case studies. The intent is to determine whether comparison...

Author(s): Travis B. Paveglio, Cassandra Moseley, Matthew S. Carroll, Daniel R. Williams, Emily Jane Davis, A. Paige Fischer

Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Emerging concepts in wildfire risk assessment and management

www.nrfirescience.org/resource/13948

A quantitative measure of wildfire risk across a landscape-expected net change in value of resources and assets exposed to wildfire-was established nearly a decade ago. Assessments made using that measure have been completed at spatial extents ranging from an individual county to the continental United States. The science of...

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

Catching fire? Social interactions, beliefs, and wildfire risk mitigation behaviors

www.nrfirescience.org/resource/13419

Social interactions are widely recognized as a potential influence on risk-related behaviors. We present a mediation model in which social interactions (classified as formal/informal and generic/fire-specific) are associated with beliefs about wildfire risk and mitigation options, which in turn shape wildfire mitigation behaviors....

Author(s): Patricia A. Champ, Katherine L. Dickinson, Hannah Brenkert-Smith, Nicholas Flores
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Wildfires: systemic changes required

www.nrfirescience.org/resource/16155

There needs to be a deeper, systems-level understanding of the fire management system. The behavior of fire managers is a direct and logical result of the structure of the system in which they operate, influenced by factors such as incentives, culture, and capacity. If managers are judged by fire exclusion, that will become the...

Author(s): Matthew P. Thompson, Christopher J. Dunn, David E. Calkin
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Development and application of a geospatial wildfire exposure and risk calculation tool

www.nrfirescience.org/resource/13271

Applying wildfire risk assessment models can inform investments in loss mitigation and landscape restoration, and can be used to monitor spatiotemporal trends in risk. Assessing wildfire risk entails the integration of fire modeling outputs, maps of highly valued resources and assets (HVRAs), characterization of fire effects, and...

Author(s): Matthew P. Thompson, Jessica R. Haas, Julie W. Gilbertson-Day, Joe H. Scott, Paul G. Langowski, Elise M. Bowne, David E. Calkin
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Integrating pixel- and polygon-based approaches to wildfire risk assessment: application to a

high-value watershed on the Pike and San Isabel National Forests, Colorado, USA

www.nrfirescience.org/resource/16153

We develop a novel risk assessment approach that integrates complementary, yet distinct, spatial modeling approaches currently used in wildfire risk assessment. Motivation for this work stems largely from limitations of existing stochastic wildfire simulation systems, which can generate pixel-based outputs of fire behavior as well...

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

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Coupling the biophysical and social dimensions of wildfire risk to improve wildfire mitigation planning

www.nrfirescience.org/resource/19558

We describe recent advances in biophysical and social aspects of risk and their potential combined contribution to improve mitigation planning on fire-prone landscapes. The methods and tools provide an improved method for defining the spatial extent of wildfire risk to communities compared to current planning processes. They also...

Author(s): Alan A. Ager, Jeffrey D. Kline, A. Paige Fischer

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Proceedings of the large wildland fires conference

www.nrfirescience.org/resource/18395

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

Year Published: 2015

Type: Document

Conference Proceedings

Decision making under uncertainty: recommendations for the Wildland Fire Decision Support System (WFDSS)

www.nrfirescience.org/resource/13947

The management of wildfire is a dynamic, complex, and fundamentally uncertain enterprise. Fire managers face uncertainties regarding fire weather and subsequent influence on fire behavior, the effects of fire on socioeconomic and ecological resources, and the efficacy of alternative suppression actions on fire outcomes. In these...

Author(s): Matthew P. Thompson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Wildfire evacuation and its alternatives: perspectives from four United States' communities

www.nrfirescience.org/resource/21901

Recent years have seen growing interest within the United States fire management community in exploring alternatives to the standard approach of evacuating entire populations that are threatened by a wildfire. There has been particular interest in what can be learned from the Australian approach, whereby residents choose whether or...

Author(s): Sarah M. McCaffrey, Alan Rhodes, Melanie Stidham
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Wildland fire management futures: Insights from a foresight panel - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/18891

Wildland fire management faces unprecedented challenges in the 21st century: the increasingly apparent effects of climate change, more people and structures in the wildland-urban interface, growing costs associated with wildfire management, and the rise of high-impact fires, to name a few. Given these significant and growing...

Author(s): Robert L. Olson, David N. Bengston, Leif A. DeVaney, Trevor A.C. Thompson
Year Published: 2015
Type: Document
Technical Report or White Paper

Understanding gaps between the risk perceptions of wildland-urban interface (WUI) residents and wildfire professionals

www.nrfirescience.org/resource/13447

Research across a variety of risk domains finds that the risk perceptions of professionals and the public differ. Such risk perception gaps occur if professionals and the public understand individual risk factors differently or if they aggregate risk factors into overall risk differently. The nature of such divergences, whether...

Author(s): James R. Meldrum, Patricia A. Champ, Hannah Brenkert-Smith, Travis Warziniack, Christopher M. Barth, Lilia C. Falk
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Developing an aviation exposure index to inform risk-based fire management decisions

www.nrfirescience.org/resource/16159

Wildland firefighting is an inherently dangerous activity, and aviation-related accidents in particular comprise a large share of firefighter fatalities. Due to limited understanding of operational factors that lead to aviation accidents, it is unclear how local decisionmakers, responsible for requesting aviation support, can...

Author(s): Crystal S. Stonesifer, David E. Calkin, Matthew P. Thompson, Jeffrey D. Kaiden
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Risk savvy: how to make good decisions

www.nrfirescience.org/resource/18883

In the age of Big Data we often believe that our predictions about the future are better than ever before. But as risk expert Gerd Gigerenzer shows, the surprising truth is that in the real world, we often get better results by using simple rules and considering less information. In Risk Savvy, Gigerenzer reveals that most of us,...

Author(s): Gerd Gigerenzer
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Understanding stochastic wildfire simulation results

www.nrfirescience.org/resource/12758

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

Author(s): Joe H. Scott

Year Published: 2014

Type: Document

Technical Report or White Paper

Examining fire-prone landscapes as coupled human and natural systems

www.nrfirescience.org/resource/18899

Fire-prone landscapes are not well studied as coupled human and natural systems (CHANS) and present many challenges for understanding and promoting adaptive behaviors and institutions. Here, we explore how heterogeneity, feedbacks, and external drivers in this type of natural hazard system can lead to complexity and can limit the...

Author(s): Thomas A. Spies, Eric M. White, Jeffrey D. Kline, A. Paige Fischer, Alan A. Ager, John D. Bailey, John P. Bolte, Jennifer Koch, Emily K. Platt, Christine Olsen, Derric B. Jacobs, Bruce A. Shindler, Michelle M. Steen-Adams, Roger B. Hammer

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Post-epidemic fire risk and behavior

www.nrfirescience.org/resource/13708

Citizens, government officials, and natural resource managers are greatly concerned about potential impacts of the mountain pine beetle (MPB) epidemic on fire hazards and risk. Some mountain towns are surrounded by dead and dying trees. In the Rocky Mountain Region of the Forest Service, the MPB epidemic threatens over 250,000 acres...

Author(s): Russell A. Parsons, William Matt Jolly, Paul G. Langowski, Megan Matonis, I. Sue Miller

Year Published: 2014

Type: Document

Conference Proceedings

Wildfire risk transmission in the Colorado Front Range, USA

www.nrfirescience.org/resource/16162

Wildfires are a global phenomenon that in some circumstances can result in human casualties, economic loss, and ecosystem service degradation. In this article we spatially identify wildfire risk transmission pathways and locate the areas of highest exposure of human populations to wildland fires under severe, but not uncommon,...

Author(s): Jessica R. Haas, David E. Calkin, Matthew P. Thompson

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Objective and perceived wildfire risk and its influence on private forest landowners fuel reduction activities in Oregon's (USA) ponderosa pine ecoregion

www.nrfirescience.org/resource/19562

Policymakers seek ways to encourage fuel reduction among private forest landowners to augment similar efforts on federal and state lands. Motivating landowners to contribute to landscape-level wildfire protection requires an understanding of factors that underlie landowner behaviour regarding wildfire. We developed a conceptual...

Author(s): A. Paige Fischer, Jeffrey D. Kline, Alan A. Ager, Susan Charnley, Keith A. Olsen

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Assessing the expected effects of wildfire on vegetation condition on the Bridger-Teton National Forest, Wyoming, USA

www.nrfirescience.org/resource/12759

Characterizing wildfire risk to a fire-adapted ecosystem presents particular challenges due to its broad spatial extent, inherent complexity, and the difficulty in defining wildfire-induced losses and benefits. Our approach couples stochastic wildfire simulation with a vegetation condition assessment framework to estimate the...

Author(s): Joe H. Scott, Don Helmbrecht, Matthew P. Thompson

Year Published: 2014

Type: Document

Technical Report or White Paper

Warning Tweets: Serial Transmission of Messages during the Warning Phase of a Disaster Event

www.nrfirescience.org/resource/21915

Serial transmission – the passing on of information from one source to another – is a phenomenon of central interest in the study of informal communication in emergency settings. Microblogging services such as Twitter make it possible to study serial transmission on a large scale and to examine the factors that make...

Author(s): Jeannette Sutton, Emma S. Spiro, Britta Johnson, Sean Fitzhugh, Ben Gibson, Carter T. Butts

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

The shape of ecosystem management to come: Anticipating risks and fostering resilience

www.nrfirescience.org/resource/16831

Global change is increasingly challenging the sustainable provisioning of ecosystem services to society. Addressing future uncertainty and risk has therefore become a central problem of ecosystem management. With risk management and resilience-based stewardship, two contrasting approaches have been proposed to address this issue....

Author(s): Rupert Seidl

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Social, institutional, and psychological factors wildfire incident decision making

www.nrfirescience.org/resource/16136

Managing wildland fire incidents can be fraught with complexity and uncertainty. Myriad human factors can exert significant influence on incident decision making, and can contribute additional uncertainty regarding programmatic evaluations of wildfire management and attainment of policy goals. This article develops a framework...

Author(s): Matthew P. Thompson
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/13615

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

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

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

www.nrfirescience.org/resource/12048

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

Author(s): Matthew P. Thompson, Joe H. Scott, Jeffrey D. Kaiden, Julie W. Gilbertson-Day
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

Appendix 2: Risk-based framework and risk case studies. Risk assessment for wildfire in the Western United States

www.nrfirescience.org/resource/11903

Wildfire is one of the two most significant disturbance agents (the other being insects) in forest ecosystems of the Western United States, and in a warmer climate, will drive changes in forest composition, structure, and function (Dale et al. 2001, McKenzie et al. 2004). Although wildfire is highly stochastic in space and time,...

Author(s): David L. Peterson, Jeremy S. Littell
Year Published: 2013
Type: Document
Technical Report or White Paper

Wildfire exposure and fuel management on western US national forests

www.nrfirescience.org/resource/12756

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

Author(s): Alan A. Ager, Michelle A. Day, Charles W. McHugh, Karen C. Short, Julie W. Gilbertson-Day, Mark A. Finney, David E. Calkin
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

Risk preferences in strategic wildfire decision making: a choice experiment with U.S. wildfire managers

www.nrfirescience.org/resource/12752

Federal policy has embraced risk management as an appropriate paradigm for wildfire management. Economic theory suggests that over repeated wildfire events, potential economic costs and risks of ecological damage are optimally balanced when management decisions are free from biases, risk aversion, and risk seeking. Of primary...

Author(s): Matthew J. Wibbenmeyer, Michael S. Hand, David E. Calkin, Tyron J. Venn, Matthew P. Thompson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Modeling wildfire incident complexity dynamics

www.nrfirescience.org/resource/16137

Wildfire management in the United States and elsewhere is challenged by substantial uncertainty regarding the location and timing of fire events, the socioeconomic and ecological consequences of these events, and the costs of suppression. Escalating U.S. Forest Service suppression expenditures is of particular concern at a time of...

Author(s): Matthew P. Thompson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Assessing watershed-wildfire risks on national forest system lands in the Rocky Mountain region of the United States

www.nrfirescience.org/resource/12750

Wildfires can cause significant negative impacts to water quality with resultant consequences for the environment and human health and safety, as well as incurring substantial rehabilitation and water treatment costs. In this paper we will illustrate how state-of-the-art wildfire simulation modeling and geospatial risk assessment...

Author(s): Matthew P. Thompson, Joe H. Scott, Paul G. Langowski, Julie W. Gilbertson-Day, Jessica R. Haas, Elise M. Bowne

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Research and development supporting risk-based wildfire effects prediction for fuels and fire management: status and needs

www.nrfirescience.org/resource/12743

Wildland fire management has moved beyond a singular focus on suppression, calling for wildfire management for ecological benefit where no critical human assets are at risk. Processes causing direct effects and indirect, long-term ecosystem changes are complex and multidimensional. Robust risk-assessment tools are required that...

Author(s): Kevin D. Hyde, Matthew B. Dickinson, Gil Bohrer, David E. Calkin, Louisa Evers, Julie W. Gilbertson-Day, Tessa Nicolet, Kevin C. Ryan, Christina Tague

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Creating “Community”? Preparing for Bushfire in Rural Victoria

www.nrfirescience.org/resource/21896

The term “community” has a long and contested lineage in social analysis and debate. This lineage, however, is not generally recognized in policy and public debates on community and bushfire in Australia. “Community” is thought to be central to bushfire preparedness in Australia, especially in rural areas, but what “...

Author(s): Peter Fairbrother, Meagan Tyler, Alison Hart, Bernard Mees, Richard Phillips, Julie Stratford, Keith Toh

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Wildfire risk and optimal investments in watershed protection

www.nrfirescience.org/resource/16172

Following what was then one of the most destructive fire years on record, President Bush signed into law the Healthy Forests Restoration Act of 2003. The law requires no less than fifty percent of all funds allocated for hazardous fuels reductions to occur in the wildland-urban interface (WUI), with the aim of enhancing the...

Author(s): Travis Warziniack, Matthew P. Thompson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Escape probability: an alternative risk metric to support and evaluate wilderness fire management decisions

www.nrfirescience.org/resource/13478

A goal of fire management in wilderness is to allow fire to play its natural ecological role without intervention. Unfortunately, most unplanned ignitions in wilderness are suppressed, in part because of the risk they might pose to values outside of the wilderness. Although the fire management community has embraced the concept of...

Author(s): Kevin M. Barnett

Year Published: 2013

Type: Document

Dissertation or Thesis

Simulating effects of land use policies on extent of the wildland urban interface and wildfire risk in Flathead County, Montana

www.nrfirescience.org/resource/12036

This study used a wildfire loss simulation model to evaluate how different land use policies are likely to influence wildfire risk in the wildland urban interface (WUI) for Flathead County, Montana. The model accounts for the complex socio-ecological interactions among climate change, economic growth, land use change and policy,...

Author(s): Travis B. Paveglio, Tony Prato, Michael Hardy

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Characterizing wildfire hazard and risk in mountain pine beetle-affected stands and how to identify those characteristics at the landscape-scale

www.nrfirescience.org/resource/11977

The transformation of fuels resulting from the mountain pine beetle epidemic is unprecedented in its large geographic extent and the rapid pace of the transformation. This paper describes a proposed fire risk and hazard characterization system, as well as methodology for locating certain stand types on the landscape.

Author(s): Robert W. Gray

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

How risk management can prevent future wildfire disasters in the wildland-urban interface

www.nrfirescience.org/resource/12757

Recent fire seasons in the western United States are some of the most damaging and costly on record. Wildfires in the wildland-urban interface on the Colorado Front Range, resulting in thousands of homes burned and civilian fatalities, although devastating, are not without historical reference. These fires are consistent with the...

Author(s): David E. Calkin, Jack D. Cohen, Mark A. Finney, Matthew P. Thompson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Analyzing the transmission of wildfire exposure on a fire-prone landscape in Oregon, USA

www.nrfirescience.org/resource/12755

We develop the idea of risk transmission from large wildfires and apply network analyses to understand its importance on a 0.75 million ha US national forest. Wildfires in the western US frequently burn over long distances (e.g., 20-50 km) through highly fragmented landscapes with respect to ownership, fuels, management intensity,...

Author(s): Alan A. Ager, Michelle A. Day, Mark A. Finney, Ken W. Vance-Borland, Nicole M. Vaillant

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Integrated wildfire risk assessment: framework development and application on the Lewis and Clark National Forest in Montana, USA

www.nrfirescience.org/resource/12751

The financial, socioeconomic, and ecological impacts of wildfire continue to challenge federal land management agencies in the United States. In recent years, policymakers and managers have increasingly turned to the field of risk analysis to better manage wildfires and to mitigate losses to highly valued resources and...

Author(s): Matthew P. Thompson, Joe H. Scott, Don Helmbrecht, David E. Calkin

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Decision making for wildfires: a guide for applying a risk management process at the incident level

www.nrfirescience.org/resource/12748

This publication focuses on the thought processes and considerations surrounding a risk management process for decision making on wildfires. The publication introduces a six element risk management cycle designed to encourage sound risk-informed decision making in accordance with Federal wildland fire policy, although the process is...

Author(s): Mary A. Taber, Lisa M. Elenz, Paul G. Langowski

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

A national approach for integrating wildfire simulation modeling into wildland urban interface risk assessments within the United States

www.nrfirescience.org/resource/12739

Ongoing human development into fire-prone areas contributes to increasing wildfire risk to human life. It is critically important, therefore, to have the ability to characterize wildfire risk to populated places, and to identify geographic areas with relatively high risk. A fundamental component of wildfire risk analysis is...

Author(s): Jessica R. Haas, David E. Calkin, Matthew P. Thompson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Hazardous fuel treatments, suppression cost impacts, and risk mitigation

www.nrfirescience.org/resource/16170

Land management agencies face uncertain tradeoffs regarding investments in preparedness and fuels management versus future suppression costs and impacts to valued resources and assets. Prospective evaluation of fuel treatments allows for comparison of alternative treatment strategies in terms of socioeconomic and ecological impacts...

Author(s): Matthew P. Thompson, Michael S. Hand, Julie W. Gilbertson-Day, Nicole M. Vaillant, Derek J. Nalle

Year Published: 2013

Type: Document

Conference Proceedings

A wildfire risk assessment framework for land and resource management

www.nrfirescience.org/resource/12445

Wildfires can result in significant, long-lasting impacts to ecological, social, and economic systems. It is necessary, therefore, to identify and understand the risks posed by wildland fire, and to develop cost-effective mitigation strategies accordingly. This report presents a general framework with which to assess wildfire risk...

Author(s): Joe H. Scott, Matthew P. Thompson, David E. Calkin

Year Published: 2013

Type: Document

Technical Report or White Paper

Simulating avian species and foraging group responses to fuel reduction treatments in coniferous forests

www.nrfirescience.org/resource/22084

Over a century of fire suppression activities have altered the structure and composition of mixed conifer forests throughout the western United States. In the absence of fire, fuels have accumulated in these forests causing concerns over the potential for catastrophic wildfires. Fuel reduction treatments are being used on federal...

Author(s): Angela M. White, Elise F. Zipkin, Patricia N. Manley, Matthew D. Schlesinger

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

The importance of affect and perceived risk in understanding support for fuels management among wildland-urban interface residents

www.nrfirescience.org/resource/21880

One factor that is critical to human judgments about risk, and was often overlooked in past research on public support for fuels treatment, is affect or the largely unconscious negative or positive feelings invoked by a stimulus (in this case, fuels management). This study aims to test a model for public support based on individual...

Author(s): Timothy Ascher, Robyn S. Wilson, Eric Toman

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Risk complexity and the wildland firefighter

www.nrfirescience.org/resource/16402

Between 2000 and 2010 the US Forest Service and the Department of the Interior experienced 82 wildland fire fatalities. Our most recent organizational focus has been to eliminate fatalities. The chief of the USFS, in a letter to all employees, asked us to "suspend disbelief" with regard to the concept of a "zero fatality..."

Author(s): Ivan Pupulidy

Year Published: 2012

Type: Document

Conference Proceedings

The role of trust in community wildland fire protection planning

www.nrfirescience.org/resource/21899

Growing accumulations of fuel, changing climates, and residential development in forested landscapes have accelerated the risk of wildland fire, particularly in the western United States. The magnifying level of risk of fire in the urban-wildland interface requires multiple actors implementing coordinated fuel management, fire...

Author(s): Paul R. Lachapelle, Stephen F. McCool

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Wildfire triage: targeting mitigation based on social, economic, and ecological values

www.nrfirescience.org/resource/16178

Evaluating the risks of wildfire relative to the valuable resources found in any managed landscape requires an interdisciplinary approach. Researchers at the Rocky Mountain Research Station and Western Wildland Threat Assessment Center developed such a process, using a combination of techniques rooted in fire modeling and ecology,...

Author(s): Karl Malcolm, Matthew P. Thompson, David E. Calkin, Mark A. Finney, Alan A. Ager

Year Published: 2012

Type: Document

Research Brief or Fact Sheet

Probabilistic assessment of wildfire hazard and municipal watershed exposure

www.nrfirescience.org/resource/12737

The occurrence of wildfires within municipal watersheds can result in significant impacts to water quality and ultimately human health and safety. In this paper, we illustrate the application of geospatial analysis and burn probability modeling to assess the exposure of municipal watersheds to wildfire. Our

assessment of wildfire...

Author(s): Joe H. Scott, Don Helmbrecht, Matthew P. Thompson, David E. Calkin, Kate Marcille

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Wildland Fire Management Decision Making

www.nrfirescience.org/resource/21036

Wildland fire management in the United States has historically been a challenging and complex program governed by a multitude of factors including situational status, objectives, operational capability, science and technology, and changes and advances in all these factors. The improvement and advancement of risk-informed decision...

Author(s): Tom Zimmerman

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

The science and opportunity of wildfire risk assessment (Chapter 6)

www.nrfirescience.org/resource/16179

Wildfire management within the United States continues to increase in complexity, as the converging drivers of (1) increased development into fire-prone areas, (2) accumulated fuels from historic management practices, and (3) climate change potentially magnify threats to social and ecological values (Bruins et al., 2010; Gude et al...

Author(s): Matthew P. Thompson, Alan A. Ager, Mark A. Finney, David E. Calkin, Nicole M. Vaillant

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Estimating US federal wildland fire managers' preferences toward competing strategic suppression objectives

www.nrfirescience.org/resource/16174

Wildfire management involves significant complexity and uncertainty, requiring simultaneous consideration of multiple, non-commensurate objectives. This paper investigates the tradeoffs fire managers are willing to make among these objectives using a choice experiment methodology that provides three key advancements relative to...

Author(s): David E. Calkin, Tyron J. Venn, Matthew J. Wibbenmeyer, Matthew P. Thompson

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Trying not to get burned: Understanding homeowners' wildfire risk-mitigation behaviors

www.nrfirescience.org/resource/21882

Three causes have been identified for the spiraling cost of wildfire suppression in the United States: climate change, fuel accumulation from past wildfire suppression, and development in fire-prone areas. Because little is likely to be performed to halt the effects of climate on wildfire risk, and because fuel-management budgets...

Author(s): Hannah Brenkert-Smith, Patricia A. Champ, Nicholas Flores

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Quantifying the threat of unsuppressed wildfires reaching the adjacent wildland-urban interface on the Bridger-Teton National Forest, Wyoming, USA

www.nrfirescience.org/resource/8349

An important objective for many federal land management agencies is to restore fire to ecosystems that have experienced fire suppression or exclusion over the last century. Managing wildfires for resource objectives (i.e., allowing wildfires to burn in the absence of suppression) is an important tool for restoring such fire-adapted...

Author(s): Joe H. Scott, Don Helmbrecht, Sean A. Parks, Carol Miller

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Uncertainty and risk in wildland fire management: a review

www.nrfirescience.org/resource/12431

Wildland fire management is subject to manifold sources of uncertainty. Beyond the unpredictability of wildfire behavior, uncertainty stems from inaccurate/missing data, limited resource value measures to guide prioritization across fires and resources at risk, and an incomplete scientific understanding of ecological response to...

Author(s): Matthew P. Thompson, David E. Calkin

Year Published: 2011

Type: Document

Book or Chapter or Journal Article, Synthesis

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

www.nrfirescience.org/resource/12734

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

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

A comparative risk assessment framework for wildland fire management: the 2010 cohesive strategy science report

www.nrfirescience.org/resource/12728

The FLAME Act of 2009 requires the U.S. Department of Agriculture Forest Service and the U.S. Department of Interior to submit to Congress a Cohesive Wildfire Management Strategy. In this report, we explore the general science available for a risk-based approach to fire and fuels management and suggest analyses that may be applied...

Year Published: 2011

Type: Document

Technical Report or White Paper

The Wildland Fire Decision Support System: Integrating science, technology, and fire management

www.nrfirescience.org/resource/21042

Federal agency policy requires documentation and analysis of all wildland fire response decisions. In the past, planning and decision documentation for fires were completed using multiple unconnected

processes, yielding many limitations. In response, interagency fire management executives chartered the development of the Wildland...

Author(s): Morgan Pence, Tom Zimmerman

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Developing the U.S. Wildland Fire Decision Support System

www.nrfirescience.org/resource/21039

A new decision support tool, the Wildland Fire Decision Support System (WFDSS) has been developed to support risk-informed decision-making for individual fires in the United States. WFDSS accesses national weather data and forecasts, fire behavior prediction, economic assessment, smoke management assessment, and landscape databases...

Author(s): Erin Noonan-Wright, Tonja S. Opperman, Mark A. Finney, Tom Zimmerman, Robert C. Seli, Lisa M. Elenz, David E. Calkin, John R. Fiedler

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Managing wildfire events: risk-based decision making among a group of federal fire managers

www.nrfirescience.org/resource/18959

Managing wildfire events to achieve multiple management objectives involves a high degree of decision complexity and uncertainty, increasing the likelihood that decisions will be informed by experience-based heuristics triggered by available cues at the time of the decision. The research reported here tests the prevalence of three...

Author(s): Robyn S. Wilson, Patricia L. Winter, Lynn A. Maguire, Timothy Ascher

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Complexity of homeowner wildfire risk mitigation: an integration of hazard theories

www.nrfirescience.org/resource/21903

Each year wildfire affects communities in Canada, resulting in evacuations and, in some cases, loss of homes. Several Canadian wildfire management agencies have initiated mitigation programs aimed at reducing wildfire risk. Successful wildfire mitigation involves both community-level and homeowner action. This paper examines factors...

Author(s): Bonita McFarlane, Tara K. McGee

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Progress towards and barriers to implementation of a risk framework for US federal wildland fire policy and decision making

www.nrfirescience.org/resource/16180

In this paper we review progress towards the implementation of a risk management framework for US federal wildland fire policy and operations. We first describe new developments in wildfire simulation technology that catalyzed the development of risk-based decision support systems for strategic wildfire management. These systems...

Author(s): David E. Calkin, Mark A. Finney, Alan A. Ager, Matthew P. Thompson, Krista M. Gebert

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

The art of learning: wildfire, amenity migration and local environmental knowledge

www.nrfirescience.org/resource/21888

Communicating the need to prepare well in advance of the wildfire season is a strategic priority for wildfire management agencies worldwide. However, there is considerable evidence to suggest that although these agencies invest significant effort towards this objective in the lead up to each wildfire season, landholders in at-risk...

Author(s): Christine Eriksen, Timothy Prior

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Integrated national-scale assessment of wildfire risk to human and ecological values

www.nrfirescience.org/resource/12735

The spatial, temporal, and social dimensions of wildfire risk are challenging U.S. federal land management agencies to meet societal needs while maintaining the health of the lands they manage. In this paper we present a quantitative, geospatial wildfire risk assessment tool, developed in response to demands for improved risk-based...

Author(s): Matthew P. Thompson, David E. Calkin, Mark A. Finney, Alan A. Ager, Julie W. Gilbertson-Day

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Proceedings of the Second Conference on the Human Dimensions of Wildland Fire

www.nrfirescience.org/resource/17808

This proceedings contains articles, posters, and abstracts of presentations from the second Human Dimensions of Wildland Fire Conference held 27-29 April 2010 in San Antonio, Texas. The conference covered the social issues at the root of wildland fire management's most serious challenges. Specific topics included: firefighter and...

Year Published: 2011

Type: Document

Conference Proceedings

Advancing effects analysis for integrated, large-scale wildfire risk assessment

www.nrfirescience.org/resource/12729

In this article, we describe the design and development of a quantitative, geospatial risk assessment tool intended to facilitate monitoring trends in wildfire risk over time and to provide information useful in prioritizing fuels treatments and mitigation measures. The research effort is designed to develop, from a strategic view,...

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

A real-time risk assessment tool supporting wildland fire decisionmaking

www.nrfirescience.org/resource/12727

Development of appropriate management strategies for escaped wildland fires is complex. Fire managers need the ability to identify, in real time, the likelihood that wildfire will affect valuable

developed and natural resources (e.g., private structures, public infrastructure, and natural and cultural resources). These...

Author(s): David E. Calkin, Matthew P. Thompson, Mark A. Finney, Kevin D. Hyde

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Fire science application and integration in support of decision making

www.nrfirescience.org/resource/21040

Wildland fire management in the United States has historically been a challenging and complex program governed by a multitude of factors including situational status, objectives, operational capability, science and technology, and changes and advances in all these factors. The improvement and advancement of risk-informed decision...

Author(s): Tom Zimmerman

Year Published: 2011

Type: Document

Conference Proceedings

The exposure index: developing firefighter safety performance measures

www.nrfirescience.org/resource/16182

A cornerstone of effective institutional learning and accountability is the development, tracking, and analysis of informative performance measures. In a previous issue of Fire Management Today ("A New Look at Risk Management," Winter 2011), a series of articles highlighted the importance of organizational safety and risk management...

Author(s): David E. Calkin, John Phipps, Thomas P. Holmes, Jon D. Rieck, Matthew P. Thompson

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Primer on risk analysis: decision making under uncertainty

www.nrfirescience.org/resource/18895

In every decision context there are things we know and things we do not know. Risk analysis uses science and the best available evidence to assess what we know—and it is intentional in the way it addresses the importance of the things we don't know. Primer on Risk Analysis: Decision Making Under Uncertainty lays out the tasks of...

Author(s): Charles Yoe

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Reducing hazardous fuels on nonindustrial private forests: factors influencing landowner decisions

www.nrfirescience.org/resource/21897

In mixed-ownership landscapes, fuels conditions on private lands have implications for fire risk on public lands and vice versa. The success of efforts to mitigate fire risk depends on the extent, efficacy, and coordination of treatments on nearby ownerships. Understanding factors in forest owners' decisions to address the risk of...

Author(s): A. Paige Fischer

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Fire safe councils in the interface

www.nrfirescience.org/resource/21889

Legislators exhort government agencies to work with the public to reduce fire hazards in the wildland-urban interface. However, working with an unorganized 'public' is a challenge for agencies. We present survey research on fire safe councils in California, community-based groups that work to reduce wildfire hazards with a range of...

Author(s): Yvonne Everett, Michelle Fuller

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

Managing risk in government: an introduction to enterprise risk management

www.nrfirescience.org/resource/18859

Risk management is not a new concept within the federal sector. What is new is the need to integrate risk management into the strategic and decisionmaking processes that cut across the organization, and abandon the outdated practice of managing risks within functional silos and stovepipes. The purpose of this paper is to provide...

Author(s): Karen Hardy

Year Published: 2010

Type: Document

Technical Report or White Paper

Wildfire risk and hazard: procedures for the first approximation

www.nrfirescience.org/resource/12726

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

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

Year Published: 2010

Type: Document

Technical Report or White Paper

Ranching, invasive annual grasses, and the external costs of wildfire in the Great Basin: a stochastic dynamic programming approach

www.nrfirescience.org/resource/11468

The spread of invasive annual grasses and resulting escalation of wildfire frequency and severity pose a significant and growing threat to the economic and ecological viability of the rangelands in the Great

Basin. While private ranchers have the option to limit the severity of wildfires through fuels removal treatments, few...

Author(s): Mimako Kobayashi, Michael H. Taylor

Year Published: 2010

Type: Document

Conference Proceedings

Evaluating wildland fire danger and prioritizing vegetation and fuels treatments

www.nrfirescience.org/resource/11465

We present a prototype decision support system for evaluating wild-land fire danger and prioritizing subwatersheds for vegetation and fuels treatment. We demonstrate the use of the system with an example from the Rocky Mountain region in the State of Utah, which represents a planning area of about 4.8 million ha and encompasses 575...

Author(s): Paul F. Hessburg, Keith M. Reynolds, Robert E. Keane, Kevin M. James, R. Brion Salter

Year Published: 2010

Type: Document

Technical Report or White Paper

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

www.nrfirescience.org/resource/12725

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

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

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

Science and decisions: advancing risk assessment

www.nrfirescience.org/resource/18890

Risk assessment has become a dominant public policy tool for making choices, based on limited resources, to protect public health and the environment. It has been instrumental to the mission of the U.S. Environmental Protection Agency (EPA) as well as other federal agencies in evaluating public health concerns, informing regulatory...

Author(s): National Research Council

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

Risk management - principles and guidelines

www.nrfirescience.org/resource/18885

ISO 31000:2018 provides guidelines on managing risk faced by organizations. The application of these guidelines can be customized to any organization and its context. ISO 31000:2018 provides a common approach to managing any type of risk and is not industry or sector specific. ISO 31000:2018 can be used throughout the life of the...

Author(s): Geneva Switzerland International organization for standardization

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

A new process for organizing assessments of social, economic, and environmental outcomes: case study of wildland fire management in the USA

www.nrfirescience.org/resource/12416

Ecological risk assessments typically are organized using the processes of planning (a discussion among managers, stakeholders, and analysts to clarify ecosystem management goals and assessment scope) and problem formulation (evaluation of existing information to generate hypotheses about adverse ecological effects, select...

Author(s): Randall J. F. Bruins, Wayne R. Munns, Stephen J. Botti, Steve Brink, David Cleland, Larry Kapustka, Danny C. Lee, Valerie Luzadis, Laura Falk McCarthy, Naureen Rana, Douglas B. Rideout, Matthew G. Rollins, Peter Woodbury, Mike Zupko

Year Published: 2009

Type: Document

Book or Chapter or Journal Article, Management or Planning Document

The Key Decision Log: facilitating high reliability and organizational learning

www.nrfirescience.org/resource/16399

If you were involved in the 2008 fire season in the West, you may have heard the term "Key Decision Log" or "KDL." This article describes the KDL concept, it's intent (past and present), how it was applied in 2008, and where the practice is heading.

Author(s): Anne E. Black

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

Mapping tradeoffs in values at risk at the interface between wilderness and non-wilderness lands

www.nrfirescience.org/resource/11063

On the Flathead Indian Reservation in Montana, U.S., the Mission Mountains Tribal Wilderness is bordered by a buffer zone. To successfully improve forest health within that buffer zone and restore fire in the wilderness, the managing agency and the public need to work together to find solutions to increasingly threatening fuel...

Author(s): Alan E. Watson, Roian Matt, Tim Waters, Kari Gunderson, Stephen J. Carver, Brett Davis

Year Published: 2009

Type: Document

Conference Proceedings

Managing fire risk in the forests of the U.S. inland Northwest: a classic "wicked problem" in public land policy

www.nrfirescience.org/resource/11066

In their classic article published in the Journal of Forestry in 1986, Gerald Allen and Ernest Gould stated that the most daunting problems associated with public forest management have a "wicked" element: "Wicked problems share characteristics. Each can be considered as simply a symptom of some higher order problem-The definition...

Author(s): Matthew S. Carroll, Keith A. Blatner, Patricia J. Cohn, Charles E. Keegan, Todd A. Morgan

Year Published: 2008

Type: Document

Conference Proceedings, Synthesis, Technical Report or White Paper

Forests at risk: integrating risk science into fuel management strategies

www.nrfirescience.org/resource/11089

The threat from wildland fire continues to grow across many regions of the Western United States. Drought, urbanization, and a buildup of fuels over the last century have contributed to increasing wildfire risk to property and highly valued natural resources. Fuel treatments, including thinning overly dense forests to reduce fuel...

Author(s): Jonathan Thompson

Year Published: 2008

Type: Document

Research Brief or Fact Sheet

Managing the unexpected: resilient performance in an age of uncertainty

www.nrfirescience.org/resource/15972

Thousands of firefighters across the United States have been influenced by the first edition of "Managing the Unexpected". In this second edition, the authors continue their analysis of high reliability organizations (HRO's), which are organizations that routinely operate in high risk environments (where the consequences of...

Author(s): Karl E. Weick, Kathleen Sutcliffe

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

The next catastrophe: reducing our vulnerabilities to natural, industrial, and terrorist disasters

www.nrfirescience.org/resource/15885

Perrow, developer of normal accident theory, argues here that we must reduce the size of targets that are vulnerable to disasters because organizations, including political ones, cannot completely prevent all the risks associated with the potential disasters that a society might face. A basic tenant of Perrow's argument is that...

Author(s): Charles Perrow

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Improving wildfire preparedness: lessons from communities across the US

www.nrfirescience.org/resource/7947

Communities across the U.S. have been taking action to adapt to the wildfire risk they face. In a series of case studies conducted in 15 communities, researchers identified and described four elements that form the foundation for community wildfire preparedness: landscape, government, citizens, and community.

Author(s): Pamela J. Jakes, Linda E. Kruger, Martha C. Monroe, Kristen C. Nelson, Victoria Sturtevant

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Citizen-Agency Interactions in Planning and Decisionmaking After Large Fires

www.nrfirescience.org/resource/17810

This report reviews the growing literature on the concept of agency-citizen interactions after large wildfires. Because large wildfires have historically occurred at irregular intervals, research from related fields has been reviewed where appropriate. This issue is particularly salient in the West where excess fuel conditions...

Author(s): Christine Olsen, Bruce A. Shindler

Year Published: 2007

Type: Document
Technical Report or White Paper

An analytical framework for quantifying wildland fire risk and fuel treatment benefit

www.nrfirescience.org/resource/12720

Federal wildland fire management programs have readily embraced the practice of fuel treatment. Wildland fire risk is quantified as expected annual loss (\$ yr⁻¹ or \$ yr⁻¹ ac⁻¹). Fire risk at a point on the landscape is a function of the probability of burning at that point, the relative frequency of fire behaviors expected if the...

Author(s): Joe H. Scott
Year Published: 2006
Type: Document
Conference Proceedings

Shared mindfulness in cockpit crisis situations

www.nrfirescience.org/resource/15912

Research reveals that human error contributes 60 to 80 percent of error in aviation accidents and disasters. Thus, despite innovations in technology and safety materials, individuals must be able to make speedy yet intelligent decisions and be able to communicate those decisions in an efficient manner. Krieger explores the...

Author(s): Janice L. Krieger
Year Published: 2005
Type: Document
Book or Chapter or Journal Article

On becoming an artist: reinventing yourself through mindful creativity

www.nrfirescience.org/resource/15831

In this book, Langer augments her previous work on mindfulness and artistic nature with insights on creativity. Langer discusses how creativity is not a rare trait, but a part of every person's makeup. While all people have the ability to express themselves creatively, many people undervalue themselves, which serves to undermine...

Author(s): Ellen J. Langer
Year Published: 2005
Type: Document
Book or Chapter or Journal Article

Wildland fire hazard and risk: problems, definitions and context

www.nrfirescience.org/resource/12716

The risks, hazards, and relative severity of wildland fires are presented here within the ecological context of historical natural fire regimes, time, space, and process. As the public dialogue on the role and impacts of wildland fire increases, it is imperative for all partners to converge on clear and concise terminology that...

Author(s): Colin C. Hardy
Year Published: 2005
Type: Document
Book or Chapter or Journal Article

Predicting risks of uncharacteristic wildfires: application of the risk assessment process

www.nrfirescience.org/resource/12714

The National Environmental Policy Act (NEPA) mandates that the U.S. Forest Service (USFS) conduct

an Environmental Impact Assessment (EIA) as its fire management policy evolves to cope with a legacy of over 100 years of fire suppression on national forest lands and an increasing occurrence of uncharacteristically large, intense...

Author(s): Anne Fairbrother, Jessica G. Turnley

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Can behavioral decision theory explain risk-averse fire management decisions?

www.nrfirescience.org/resource/12719

Organizations managing forest land often make fire management decisions that seem overly risk-averse in relation to their stated goals for ecosystem restoration, protection of sensitive species and habitats, and protection of water and timber resources. Research in behavioral decision theory has shown that people faced with...

Author(s): Lynn A. Maguire, Elizabeth A. Albright

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

The challenge of quantitative risk analysis for wildland fire

www.nrfirescience.org/resource/12715

Quantitative fire risk analysis depends on characterizing and combining fire behavior probabilities and effects. Fire behavior probabilities are different from fire occurrence statistics (historic numbers or probabilities of discovered ignitions) because they depend on spatial and temporal factors controlling fire growth. That is,...

Author(s): Mark A. Finney

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Accepting uncertainty, assessing risk: decision quality in managing wildfire, forest resource values, and new technology

www.nrfirescience.org/resource/12711

The risks, uncertainties, and social conflicts surrounding uncharacteristic wildfire and forest resource values have defied conventional approaches to planning and decision-making. Paradoxically, the adoption of technological innovations such as risk assessment, decision analysis, and landscape simulation models by land management...

Author(s): Jeffrey G. Borchers

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Surviving the age of risk: a call for ethical management

www.nrfirescience.org/resource/15903

Ewing and Lee look at some of the ways to consider ethical risk management in a corporate context, which have changed because of recent scandals such as Enron. They give six ways to create an ethical risk management environment (the six Cs): 1) Champions: find a spokesperson, someone to "champion" risk management; 2) Commitment...

Author(s): Lance J. Ewing, Ryan B. Lee

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

Private and tribal forest landowners and fire risk: a two-county case study in Washington state

www.nrfirescience.org/resource/16114

This study focused on the role of fire both as a perceived threat and a management tool of nonindustrial private forest and tribal forest landowners or managers in two counties in northeastern Washington State. Using qualitative social research methods and a risk perception conceptual frame, we identified distinct categories of...

Author(s): Matthew S. Carroll, Patricia J. Cohn, Keith A. Blatner

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

Probability based models for estimation of wildfire risk

www.nrfirescience.org/resource/12709

We present a probability-based model for estimating fire risk. Risk is defined using three probabilities: the probability of fire occurrence; the conditional probability of a large fire given ignition; and the unconditional probability of a large fire. The model is based on grouped data at the 1 km²-day cell level. We fit a...

Author(s): Haiganoush K. Preisler, David R. Brillinger, Robert E. Burgan, John W. Benoit

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

A new accident model for engineering safer systems

www.nrfirescience.org/resource/15959

Leveson argues that most accident models are designed for simple systems. Newer accident models are needed because of the changing landscape of organizational systems and the changing contexts in which they are developed. Fast-paced technological change, new types of digital failure and hazards, decreasing tolerance for failure, and...

Author(s): Nancy Leveson

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

The spatial context of fire: a new approach for predicting fire occurrence

www.nrfirescience.org/resource/10993

Across North America, decades of fire suppression and recent patterns of human settlement have combined to increase the risks that wildland fires pose to human life, property, and natural resource values. Various methods can be used to reduce fuel hazards and mitigate these risks, but funding and other constraints require that these...

Author(s): Carol Miller

Year Published: 2003

Type: Document

Conference Proceedings, Technical Report or White Paper

A review of prescribed burning effectiveness in fire hazard reduction

www.nrfirescience.org/resource/18713

Wildfire hazard abatement is one of the major reasons to use prescribed burning. Computer simulation, case studies, and analysis of the fire regime in the presence of active prescribed burning programs in

forest and shrubland generally indicate that this fuel management tool facilitates fire suppression efforts by reducing the...

Author(s): Paulo M. Fernandes, Herminio S. Botelho

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality

www.nrfirescience.org/resource/15963

Risk assessment is often viewed as a logical, cause-effect process that uses mathematics and gives little credence to feelings. Without discounting the need for a rational approach to categorizing risk analysis, the authors show how affect, feelings, and emotions (the perceived "goodness" and the "badness" of a risky...

Author(s): Paul Slovic, Melissa Finucane, Ellen Peters, Donald G. MacGregor

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

Inviting disaster: lessons from the edge of technology

www.nrfirescience.org/resource/15873

While technology has provided the means for achieving unprecedented control over land, air, and sea, it has also become increasingly complex. As a result of this complexity, disasters are difficult to predict, and they are even more difficult to prevent. This book exposes many common mistakes that have culminated in unnecessary...

Author(s): James R. Chiles

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

Preventing disaster: home ignitability in the wildland-urban interface

www.nrfirescience.org/resource/159

Wildland-urban interface (W-UI) fires are a significant concern for federal, state, and local land management and fire agencies. Research using modeling, experiments, and W-UI case studies indicates that home ignitability during wildland fires depends on the characteristics of the home and its immediate surroundings. These findings...

Author(s): Jack D. Cohen

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

Decisions: making the right ones. Learning from the wrong ones.

www.nrfirescience.org/resource/16230

This article critiques two predominant forms of decision making: rational-choice and the intuitive approach. The authors suggest a more productive approach to decision making is the experiential, or "recognize/react," approach. The experiential approach asserts that experience provides decision makers the ability to size up...

Author(s): Gary Klein, Karl E. Weick

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

Lessons from Longford: the Esso Gas Plant explosion

www.nrfirescience.org/resource/15906

The Esso gas plant explosion of 1998 represents a series of organizational failures that resulted in devastating consequences, including two deaths. This book examines those organizational failures through the findings of the Royal Commission. The author argues that the accident was preventable and was caused by a number of failures...

Author(s): Andrew Hopkins

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

An overview of the fire and fuels extension to the forest vegetation simulator

www.nrfirescience.org/resource/11037

The Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS) has been developed to assess the risk, behavior, and impact of fire in forest ecosystems. This extension to the widely-used stand-dynamics model FVS simulates the dynamics of snags and surface fuels as they are affected by stand management (of trees or fuels...

Author(s): Sarah J. Beukema, Elizabeth D. Reinhardt, Werner A. Kurz, Nicholas L. Crookston

Year Published: 2000

Type: Document

Conference Proceedings

Sequential use of simulation and optimization in analysis and planning

www.nrfirescience.org/resource/11045

Management activities are analyzed at landscape scales employing both simulation and optimization. SIMPPLLE, a stochastic simulation modeling system, is initially applied to assess the risks associated with a specific natural process occurring on the current landscape without management treatments, but with fire suppression. These...

Author(s): Hans R. Zuuring, Jimmie D. Chew, J. Greg Jones

Year Published: 2000

Type: Document

Conference Proceedings

Managing major hazards: the lessons of the Moura Mine disaster

www.nrfirescience.org/resource/15905

In every organization, things go wrong. For the most part, these errors are minor and often go unnoticed. However, when disaster occurs, external pressure often forces the exposure of many of the failures that occur within an organization. Thus, a disaster can offer an opportunity for in-depth analysis of the internal workings of an...

Author(s): Andrew Hopkins

Year Published: 1999

Type: Document

Book or Chapter or Journal Article

Applying simulation and optimization to plan fuel treatments at landscape scales

www.nrfirescience.org/resource/11067

Fuel treatment activities are analyzed at the landscape scale by using both simulation and optimization. Simulating vegetative patterns and processes at landscape scales (SIMPPLLE), a stochastic simulation modeling system, is initially applied to assess wildfire risks on the current landscape without management treatments but with...

Author(s): J. Greg Jones, Jimmie D. Chew, Hans R. Zuuring
Year Published: 1999
Type: Document
Conference Proceedings, Technical Report or White Paper

Risk management for ecological stewardship

www.nrfirescience.org/resource/15896

This comprehensive chapter documents, from a management perspective, the knowledge base on risk assessments and risk management. The previous chapter in the book is a companion article that provides the scientific foundation for the concepts and terminology used by Cleaves and Haynes. In this chapter, Cleaves and Haynes provide a...

Author(s): D.A. Cleaves, R. W. Haynes

Year Published: 1999

Type: Document

Book or Chapter or Journal Article

Normal accidents: living with high-risk technologies

www.nrfirescience.org/resource/15886

Many of the accidents that organizations face are a result of complex interactions between multiple events and with multiple actors. They cannot be explained as being only one group or individual's "fault". In this book, Perrow investigates the complexity of accidents as events that are inevitable because of the complex...

Author(s): Charles Perrow

Year Published: 1999

Type: Document

Book or Chapter or Journal Article

Organizational learning activities in high-hazard industries: the logics underlying self-analysis

www.nrfirescience.org/resource/15818

Carroll begins by discussing how different staff members in an organization know different things about how work is accomplished. For an organization to run properly, these staff members must engage in organizational learning, which means facilitating the development of organizational knowledge by supporting each other and...

Author(s): John S. Carroll

Year Published: 1998

Type: Document

Book or Chapter or Journal Article

Managing the risks of organizational accidents

www.nrfirescience.org/resource/15960

This book focuses on the causes, consequences, and possible means of avoiding organizational accidents. While individual accidents are more frequent and often target the individual for blame, organizational accidents are deep rooted errors in the daily function of organizations that increase the likelihood for disaster. The author...

Author(s): James Reason

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

Managing environmental uncertainty with legitimate authority: a comparative analysis of the

Mann Gulch and Storm King Mountain Fires

www.nrfirescience.org/resource/15893

Alder recognizes two decisions common to both the Mann Gulch and Storm King Mountain fires that influenced the behavior of firefighters during critical moments: 1) failing to question authority and 2) failing to obey authority. He argues that these failures are based on individual perceptions of legitimate authority. There are four...

Author(s): G. Stoney Alder

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

Man-made disasters

www.nrfirescience.org/resource/15889

To understand and avoid future calamities, decision makers must have a more accurate way of understanding past calamities. Most of what we know about calamities comes from eye witness accounts that favor relief efforts and damage reports rather than the specific events that come together initially to form a disaster. This suggests...

Author(s): Barry A. Turner, Nick F. Pidgeon

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

Learning from mistakes is easier said than done: group and organizational influences on the detection and correction of human error

www.nrfirescience.org/resource/15878

Researchers have often studied and discussed errors and accidents within an organizational setting in two ways. The first focuses on the individual, while the second looks at the system in which the individual operates. Edmondson argues for a third perspective, one that looks at both the individual and the system, and specifically...

Author(s): Amy Edmondson

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

The Challenger launch decision: risky technology, culture, and deviance at NASA

www.nrfirescience.org/resource/16255

In the wake of the explosion of the 1986 space shuttle Challenger, a conventional explanation for the tragedy emerged: the economic strain on NASA caused managers to withhold information about safety violations in order to maintain the launch schedule. In her book, Diane Vaughan contradicts this conventional explanation by providing...

Author(s): Diane Vaughan

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

Beyond aviation human factors: safety in high technology systems

www.nrfirescience.org/resource/15883

Aviation human factors investigations have typically blamed individual behavior as the primary cause of serious work accidents. However, this book argues that organizations are responsible for two aspects that contribute to work related accidents: 1) the local working conditions that restrict how workers can behave and 2) the...

Author(s): Daniel E. Maurino, James Reason, Neil Johnston, Rob B. Lee
Year Published: 1995
Type: Document
Book or Chapter or Journal Article

Sensemaking in organizations

www.nrfirescience.org/resource/16258

Sensemaking is about how people make sense of situations. When faced with problems, people construct meaning. This constructive process plays a key role in the ultimate understanding that is developed. The meaning of a situation is both created and interpreted through sensemaking. Weick lists seven distinguishing characteristics of...

Author(s): Karl E. Weick
Year Published: 1995
Type: Document
Book or Chapter or Journal Article

Causes of disaster: sloppy management

www.nrfirescience.org/resource/15891

Turner argues that while the best way to avoid disasters is primarily “for managers to establish, to strengthen, and then to assert control,” management control only addresses part of the problem, and there are limitations that affect management in disaster situations. Turner advocates examining three interrelated factors in a...

Author(s): Barry Turner
Year Published: 1994
Type: Document
Book or Chapter or Journal Article

The textual approach: risk and blame in disaster sensemaking

www.nrfirescience.org/resource/16261

This article investigates responses to a gas pipeline explosion as a means of uncovering the methods that organizations and other participants use to make sense during disaster and to change situations. Sensemaking deals with how organizations and individuals explain or “make sense of” what goes on around them. Gephart is...

Author(s): Robert P. Gephart Jr.
Year Published: 1993
Type: Document
Book or Chapter or Journal Article

Organizational communication imperatives: lessons of the space program

www.nrfirescience.org/resource/15970

Drawing upon experience working for NASA during the Apollo Missions and his studies of organizational communication, Tompkins illustrates that taking a communication perspective can help with understanding organizational problems. This book takes a narrative approach in which Tompkins discusses his visits to the Marshall Space...

Author(s): Phillip K. Tompkins
Year Published: 1993
Type: Document
Book or Chapter or Journal Article

Military misfortunes: the anatomy of failure in war

www.nrfirescience.org/resource/15876

Military misfortunes are complex and involve not only individual failures in judgment or action, but also organizational failures rooted in the values each military organization upholds. This book uses examples from several military battles to highlight the need for military operations and organizations that: 1) learn from past...

Author(s): Eliot A. Cohen, John Gooch

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

Conservatism, efficiency, and the value of life

www.nrfirescience.org/resource/15868

Many organizations are faced with unavoidable dangers that may harm employees during their regular work. However, despite organizational efforts, it is often unrealistic for employees to be responsible for avoiding all possible risk. Employees must get the job done despite the dangers they may face. In this chapter, MacLean and...

Author(s): Douglas MacLean, Claudia Mills

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

Overcoming organizational defenses: facilitating organizational learning

www.nrfirescience.org/resource/15810

Organizations often suffer because workers and managers avoid embarrassment by turning a blind eye toward mistakes. This book focuses on errors that are consciously buried in order to avoid situations that might damage individual reputations. Using examples from businesses across the United States and government errors like the...

Author(s): Chris Argyris

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

On risk communication as interorganizational control: the case of the aviation safety reporting system

www.nrfirescience.org/resource/15969

Focusing on the 1974 Trans World Airlines (TWA) Flight 514 crash, Tompkins discusses the National Transportation Safety Board's (NTSB) investigation of the crash and points to communication between the pilot and controllers and communication between airline organizations as principle contributors to the tragedy. Using this...

Author(s): Phillip K. Tompkins

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

The history and politics of disaster management in the United States

www.nrfirescience.org/resource/15870

This chapter overviews the history of hazard management in the United States, and defines what constitutes a "disaster" by federal standards. Popkin provides a history of federal and state policies and programs established and maintained in the United States since 1803. Despite historic moves to ensure federally funded hazard...

Author(s): Roy S. Popkin

Year Published: 1990
Type: Document
Book or Chapter or Journal Article

Uncertainty: a guide to dealing with uncertainty in quantitative risk and policy analysis

www.nrfirescience.org/resource/18888

The authors explain the ways in which uncertainty is an important factor in the problems of risk and policy analysis. This book outlines the source and nature of uncertainty, discusses techniques for obtaining and using expert judgment, and reviews a variety of simple and advanced methods for analyzing uncertainty. Powerful computer...

Author(s): M. Granger Morgan, Max Henrion

Year Published: 1990

Type: Document

Book or Chapter or Journal Article

Decision traps: the ten barriers to brilliant decision-making and how to overcome them

www.nrfirescience.org/resource/18893

Make Every Decision Your Best Decision Executives rate decision-making ability as the most important business skill, but few people have the training they need to make good decisions consistently. Becoming a good decision-maker is like training to be a top athlete: Just as the best coaches use training methods to help athletes...

Author(s): J. Edward Russo, Paul J. H. Schoemaker

Year Published: 1989

Type: Document

Book or Chapter or Journal Article

Economic efficiency and risk character of fire management programs, northern Rocky Mountains

www.nrfirescience.org/resource/11218

Economic efficiency and risk have long been considered during the selection of fire management programs and the design of fire management policies. The risk considerations was largely subjective, however, and efficiency has only recently been calculated for selected portions of the fire management program. The highly stochastic...

Author(s): Thomas J. Mills, Frederick W. Bratten

Year Published: 1988

Type: Document

Technical Report or White Paper

Searching for safety

www.nrfirescience.org/resource/15871

Safety and danger are usually seen as opposites that exclude one another in practice. Safety is often seen as the absence of danger, and danger is often seen as the absence of safety. This book, however, argues that the two conditions are unavoidably and unconditionally connected and that continued safety must encourage the...

Author(s): Aaron Wildavsky

Year Published: 1987

Type: Document

Book or Chapter or Journal Article

Judgment under uncertainty: heuristics and biases

www.nrfirescience.org/resource/15910

This is a classic textbook written by three well known authors (Kahneman recently won the Nobel Prize for economics) who have spent their careers working in the psychological fields of understanding how people make decisions under uncertainty. The introduction to this edited volume identifies three heuristics (in other words, rules...

Year Published: 1986

Type: Document

Book or Chapter or Journal Article

Risk and culture: an essay on the selection of technological and environmental dangers

www.nrfirescience.org/resource/15864

Perceptions of risk and danger are largely based on what society and organizations choose to value and what they choose to fear. Often, these values are shaped by larger organizational and political interests that bias perceptions of risk, danger, and responses that reinforce the values they match.

Scientific disagreement on what...

Author(s): Mary Douglas, Aaron Wildavsky

Year Published: 1982

Type: Document

Book or Chapter or Journal Article

Threat rigidity effects in organizational behavior: a multilevel analysis

www.nrfirescience.org/resource/15967

This article addresses how organizations deal with adversity and how organizations adapt within adverse conditions. The authors comment that most research emphasizes "organizational and not individual or group responses to adversity," and those studies tend to "take a functional stance". What those approaches leave out is...

Author(s): Barry Staw, Lance Sandelands, Jane Dutton

Year Published: 1981

Type: Document

Book or Chapter or Journal Article

Proceedings of the fourth fire behavior and fuels conference

www.nrfirescience.org/resource/18396

The Fourth Fire Behavior and Fuels Conference was held in Raleigh, North Carolina, USA, February 18-22, 2013. The theme for this conference was At The Crossroads: Looking Toward the Future in a Changing Environment. Joint sponsorship of the conference was by the International Association of Wildland Fire (IAWF) and the International...

Author(s): Dale D. Wade, Rebekah L. Fox

Type: Document

Conference Proceedings