

### **Systems thinking and wildland fire management**

[www.nrfirescience.org/resource/16148](http://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

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

[www.nrfirescience.org/resource/16145](http://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

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Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/15488](http://www.nrfirescience.org/resource/15488)

Characterising 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

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Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/15485](http://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

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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](http://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

### **Mapping the future: U.S. exposure to multiple landscape stressors**

[www.nrfirescience.org/resource/15285](http://www.nrfirescience.org/resource/15285)

Landscape exposure to multiple stressors can pose risks to human health, biodiversity, and ecosystem services. Attempts to study, control, or mitigate these stressors can strain public and private budgets. An interdisciplinary team of Pacific Northwest Research Station and Oregon State University scientists created maps of the...

Author(s): Marie Oliver, Becky K. Kerns, John Kim, Jeffrey D. Kline

Year Published: 2017

Type: Document

Technical Report or White Paper

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

[www.nrfirescience.org/resource/14998](http://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

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

[www.nrfirescience.org/resource/16149](http://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

### **Natural hazard modeling and uncertainty analysis (Chapter 2)**

[www.nrfirescience.org/resource/16147](http://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

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

[www.nrfirescience.org/resource/15490](http://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

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

[www.nrfirescience.org/resource/16144](http://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

### **Whither the paradigm shift? Large wildland fires and the wildfire paradox offer opportunities for a new paradigm of ecological fire management**

[www.nrfirescience.org/resource/15487](http://www.nrfirescience.org/resource/15487)

The growing frequency of large wildland fires has raised awareness of the 'wildfire paradox' and the 'firefighting trap' that are both rooted in the fire exclusion paradigm. However, a paradigm shift has been unfolding in the wildland fire community that seeks to restore fire ecology processes across broad landscapes. This...

Author(s): Timothy Ingalsbee

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Resolving future fire management conflicts using multicriteria decision making**

[www.nrfirescience.org/resource/13893](http://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

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

[www.nrfirescience.org/resource/13788](http://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

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

[www.nrfirescience.org/resource/16049](http://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

### **Wildfire risk to residential structures in the Island Park Sustainable Fire Community: Caribou-Targhee National Forest**

[www.nrfirescience.org/resource/14695](http://www.nrfirescience.org/resource/14695)

The Island Park Sustainable Fire Community (IPSFC) Project is a collaborative working group of citizens, businesses, non-profit organizations, and local, state, and federal government agencies ([www.islandparkfirecommunity.com](http://www.islandparkfirecommunity.com)) working to create fire-resilient ecosystems in and around the human communities of West Yellowstone,...

Author(s): Don Helmbrecht, Julie W. Gilbertson-Day, Joe H. Scott, LaWen Hollingsworth

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Uncertainty is information, too**

[www.nrfirescience.org/resource/16151](http://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

### **Wildfire risk as a socioecological pathology**

[www.nrfirescience.org/resource/14461](http://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 perception, sense-making and resilient performance: the sounds of wildland firefighting in action**

[www.nrfirescience.org/resource/15572](http://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

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

[www.nrfirescience.org/resource/14409](http://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

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

[www.nrfirescience.org/resource/14351](http://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

### **Evaluating the characteristics of social vulnerability to wildfire: demographics, perceptions, and parcel characteristics**

[www.nrfirescience.org/resource/14804](http://www.nrfirescience.org/resource/14804)

A large body of research focuses on identifying patterns of human populations most at risk from hazards and the factors that help explain performance of mitigations that can help reduce that risk. One common concept in such studies is social vulnerability-human populations' potential exposure to, sensitivity from and ability to...

Author(s): Travis B. Paveglio, Tony Prato, Catrin Edgeley, Derek J. Nalle

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](http://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

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

[www.nrfirescience.org/resource/14411](http://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](http://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](http://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

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Book or Chapter or Journal Article

### **Indicators of climate impacts for forests: recommendations for the US National Climate Assessment indicators system**

[www.nrfirescience.org/resource/13969](http://www.nrfirescience.org/resource/13969)

The Third National Climate Assessment (NCA) process for the United States focused in part on developing a system of indicators to communicate key aspects of the physical climate, climate impacts, vulnerabilities, and preparedness to inform decisionmakers and the public. Initially, 13 active teams were formed to recommend indicators...

Author(s): Linda S. Heath, Sarah M. Anderson, Marla R. Emery, Jeffrey A. Hicke, Jeremy S. Littell, Alan Lucier, Jeffrey G. Masek, David L. Peterson, Richard Pouyat, Kevin M. Potter, Guy Robertson, Jinelle Sperry, Andrzej Bytnerowicz, Sarah Jovan, Miranda H. Mockrin, Robert Musselman, Bethany K. Shulz, Robert J. Smith, Susan I. Stewart

Year Published: 2015

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Technical Report or White Paper

### **Emerging concepts in wildfire risk assessment and management**

[www.nrfirescience.org/resource/13948](http://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

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

[www.nrfirescience.org/resource/16154](http://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

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

[www.nrfirescience.org/resource/13447](http://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

## **Quantifying and predicting fuels and the effects of reduction treatments along successional and invasion gradients in sagebrush habitats - JFSP final report**

[www.nrfirescience.org/resource/15504](http://www.nrfirescience.org/resource/15504)

Sagebrush shrubland ecosystems in the Great Basin are prime examples of how altered successional trajectories can create dynamic fuel conditions and, thus, increase uncertainty about fire risk and behavior. Although fire is a natural disturbance in sagebrush, post-fire environments are highly susceptible to conversion to an invasive...

Author(s): Douglas J. Shinneman, David S. Pilliod, Robert S. Arkle, Nancy F. Glenn

Year Published: 2015

Type: Document

Technical Report or White Paper

## **Optimizing fuel treatments to reduce wildland fire risk**

[www.nrfirescience.org/resource/13273](http://www.nrfirescience.org/resource/13273)

Fuel treatments have been widely used as an effective fire management tool to mitigate catastrophic wildland fire risk in forested landscapes. Fire research efforts of the last two decades have significantly advanced fire behavior modeling and fuel treatment effects analysis, but integrated fuel treatment planning and optimization...

Author(s): Woodam Chung

Year Published: 2015

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Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/13271](http://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

## **Exploring how alternative mapping approaches influence fireshed assessment and human community exposure to wildfire**

[www.nrfirescience.org/resource/13949](http://www.nrfirescience.org/resource/13949)

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

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

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/13947](http://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

### **Wildfires: systemic changes required**

[www.nrfirescience.org/resource/16155](http://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 probabilistic method for wildfire suppression cost modeling**

[www.nrfirescience.org/resource/12762](http://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

### **Regional likelihood of very large wildfires over the 21st century across the western United States: motivation to study individual events like the Rim Fire, a unique opportunity with unprecedented remote sensing data**

[www.nrfirescience.org/resource/13681](http://www.nrfirescience.org/resource/13681)

Studies project that a warming climate will likely increase wildfire activity in many areas (Westerling and others 2002; Flannigan and others 2005, 2009; Littell and others 2009). These analyses are often of aggregate statistics like annual area burned, which are insufficient for analyzing changes in seasonality of fire events, the...

Author(s): E. Natasha Stavros, John T. Abatzoglou, Zachary Tane, Van R. Kane, Sander Veraverbeke, Bob McGaughey, James A. Lutz, Narasimhan K. Larkin, Donald McKenzie, E. Ashley Steel, Carlos Ramirez, David S. Schimel

Year Published: 2015

Type: Document

Conference Proceedings

### **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](http://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

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

[www.nrfirescience.org/resource/13419](http://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

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

[www.nrfirescience.org/resource/13272](http://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

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

[www.nrfirescience.org/resource/16159](http://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

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

[www.nrfirescience.org/resource/12759](http://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

### **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](http://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

### **Social, institutional, and psychological factors wildfire incident decision making**

[www.nrfirescience.org/resource/16136](http://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

### **Understanding evacuation preferences and wildfire mitigations among northwest Montana residents**

[www.nrfirescience.org/resource/12955](http://www.nrfirescience.org/resource/12955)

There is currently insufficient information in the United States about residents' planned evacuation actions during wildfire events, including any intent to remain at or near home during fire events. This is incompatible with growing evidence that select populations at risk from wildfire are considering alternatives to evacuation....

Author(s): Travis B. Paveglio, Tony Prato, Douglas Dalenberg, Tyron J. Venn

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Wildfire risk transmission in the Colorado Front Range, USA**

[www.nrfirescience.org/resource/16162](http://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

### **Understanding stochastic wildfire simulation results**

[www.nrfirescience.org/resource/12758](http://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

### **Response of highly valued resources and assets to wildfire within Grand Teton National Park and Bridger-Teton National Forest**

[www.nrfirescience.org/resource/12744](http://www.nrfirescience.org/resource/12744)

Grand Teton National Park (GTNP) and the Bridger-Teton National Forest (BTNF) cover approximately 3.7 million acres within the Greater Yellowstone Ecosystem. The majority of this land base is fairly remote, much of it either designated Wilderness or roadless, and composed of fire-adapted ecosystems. To add complexity to the fire...

Author(s): Joe H. Scott, Don Helmbrecht, Martha A. Williamson

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Hazardous fuel treatments, suppression cost impacts, and risk mitigation**

[www.nrfirescience.org/resource/16170](http://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 national approach for integrating wildfire simulation modeling into wildland urban interface risk assessments within the United States**

[www.nrfirescience.org/resource/12739](http://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

### **A wildfire risk assessment framework for land and resource management**

[www.nrfirescience.org/resource/12445](http://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

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

[www.nrfirescience.org/resource/12757](http://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

### **Best practices in risk and crisis communication: implications for natural hazards management**

[www.nrfirescience.org/resource/8359](http://www.nrfirescience.org/resource/8359)

As societies evolve, often the most appropriate response to the hazard must also evolve. However, such shifts in appropriate response to a hazard, whether at the individual or at the societal level, are rarely straightforward: Closing the gap between desired practice and current practice requires effective communication. Although...

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

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **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](http://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

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

[www.nrfirescience.org/resource/12755](http://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](http://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

## **Quantifying the potential impacts of fuel treatments on wildfire suppression costs**

[www.nrfirescience.org/resource/16138](http://www.nrfirescience.org/resource/16138)

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

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

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/12748](http://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

## **Wildfire risk and optimal investments in watershed protection**

[www.nrfirescience.org/resource/16172](http://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

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

[www.nrfirescience.org/resource/12743](http://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

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

[www.nrfirescience.org/resource/13478](http://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

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

[www.nrfirescience.org/resource/12048](http://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

### **Wildfire exposure and fuel management on western US national forests**

[www.nrfirescience.org/resource/12756](http://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

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

[www.nrfirescience.org/resource/11903](http://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  
Synthesis, Technical Report or White Paper

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

[www.nrfirescience.org/resource/12752](http://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

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

[www.nrfirescience.org/resource/12750](http://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

### **Modeling wildfire incident complexity dynamics**

[www.nrfirescience.org/resource/16137](http://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

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

[www.nrfirescience.org/resource/16174](http://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

### **Risk complexity and the wildland firefighter**

[www.nrfirescience.org/resource/16402](http://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

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

[www.nrfirescience.org/resource/16178](http://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](http://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

### **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](http://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

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

[www.nrfirescience.org/resource/16179](http://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

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

[www.nrfirescience.org/resource/12736](http://www.nrfirescience.org/resource/12736)

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

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/12734](http://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 (FPU) 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

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

[www.nrfirescience.org/resource/12729](http://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](http://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

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

[www.nrfirescience.org/resource/16180](http://www.nrfirescience.org/resource/16180)

In this paper we review progress towards the implementation of a riskmanagement 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

### **A regional experiment to evaluate effects of fire and fire surrogate treatments in the sagebrush biome - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11225](http://www.nrfirescience.org/resource/11225)

SageSTEP is a comprehensive regional experiment that provides critical information to managers faced with a sagebrush steppe ecosystem that is increasingly at risk from wildfire, invasive plants, and climate change. The experiment provides managers with information that can be used to restore ecological communities across the 100+...

Author(s): James D. Mclver, Hugh Barrett, Mark W. Brunson, Stephen C. Bunting, Jeanne C. Chambers, Carla M. D'Antonio, Paul S. Doescher, Dale Johnson, Sherm Karl, Steve Knick, Richard F. Miller, Michael L. Pellant, Frederick B. Pierson, David A. Pyke, Kimberly Rollins, Bruce A. Roundy, Eugene Schupp, Robin J. Tausch, David Turner, Michael J. Wisdom

Year Published: 2011

Type: Document

Technical Report or White Paper

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

[www.nrfirescience.org/resource/12735](http://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

### **A method for ensemble wildland fire simulation**

[www.nrfirescience.org/resource/12732](http://www.nrfirescience.org/resource/12732)

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

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Uncertainty and risk in wildland fire management: a review**

[www.nrfirescience.org/resource/12431](http://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 comparative risk assessment framework for wildland fire management: the 2010 cohesive strategy science report**

[www.nrfirescience.org/resource/12728](http://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 exposure index: developing firefighter safety performance measures**

[www.nrfirescience.org/resource/16182](http://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

### **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](http://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

### **Wildfire risk and hazard: procedures for the first approximation**

[www.nrfirescience.org/resource/12726](http://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

### **Evaluating wildland fire danger and prioritizing vegetation and fuels treatments**

[www.nrfirescience.org/resource/11465](http://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 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](http://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

### **Forests at risk: integrating risk science into fuel management strategies**

[www.nrfirescience.org/resource/11089](http://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

### **Spatial-endogenous fire risk and efficient fuel management and timber harvest**

[www.nrfirescience.org/resource/8277](http://www.nrfirescience.org/resource/8277)

This paper integrates a spatial fire-behavior model and a stochastic dynamic-optimization model to determine the optimal spatial pattern of fuel management and timber harvest. Each year's fire season causes the loss of forest values and lives in the western United States. We use a multi-plot analysis and incorporate uncertainty...

Author(s): Masashi Konoshima, Claire A. Montgomery, Heidi J. Albers, Jeffrey L. Arthur

Year Published: 2008  
Type: Document  
Book or Chapter or Journal Article

### **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](http://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

### **Forest harvest can increase subsequent forest fire severity**

[www.nrfirescience.org/resource/11054](http://www.nrfirescience.org/resource/11054)

The USDA Forest Service is progressing from a land management strategy oriented around timber extraction towards one oriented around maintaining healthy forested lands. The healthy Forest Initiative promotes the idea of broadscale forest thinning and fuel treatments as an effective means for mitigating hazardous fuel conditions and...

Author(s): Carter Stone, Andrew T. Hudak, Penelope Morgan

Year Published: 2008

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Fire probability, fuel treatment effectiveness and ecological tradeoffs in Western U.S. public forests**

[www.nrfirescience.org/resource/12724](http://www.nrfirescience.org/resource/12724)

Fuel treatment effectiveness and non-treatment risks can be estimated from the probability of fire occurrence. Using extensive fire records for western US Forest Service lands, we estimate fuel treatments have a mean probability of 2.0-7.9% of encountering moderate- or high-severity fire during an assumed 20-year period of...

Author(s): Jonathan J. Rhodes, William L. Baker

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Managing the unexpected: resilient performance in an age of uncertainty**

[www.nrfirescience.org/resource/15972](http://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](http://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

### **Modeling wildfire risk to northern spotted owl (*Strix occidentalis caurina*) habitat in Central Oregon, USA**

[www.nrfirescience.org/resource/12723](http://www.nrfirescience.org/resource/12723)

Natural disturbances including wildfire, insects and disease are a growing threat to the remaining late successional forests in the Pacific Northwest, USA. These forests are a cornerstone of the region's ecological diversity and provide essential habitat to a number of rare terrestrial and aquatic species including the endangered...

Author(s): Alan A. Ager, Mark A. Finney, Becky K. Kerns, Helen Maffei

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Collaborative planning to reduce risk**

[www.nrfirescience.org/resource/138](http://www.nrfirescience.org/resource/138)

Wildland fire knows no political boundaries, nor should efforts to address its risk. Collaboration is not a new idea; many examples of natural resource managers and community groups working together can be found in forest management planning, watershed restoration, and wildland fire suppression (Sturtevant et al. 2005). Direction...

Author(s): Victoria Sturtevant, Pamela J. Jakes

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Assessing post-fire values-at-risk with a new calculation tool**

[www.nrfirescience.org/resource/11127](http://www.nrfirescience.org/resource/11127)

Wildfire effects include loss of vegetative cover and changes to soil properties that may lead to secondary effects of increased runoff, erosion, flooding, sedimentation, and vulnerability to invasive weeds. These secondary effects may threaten human life and safety, cultural and ecological resources, land use, and existing...

Author(s): David E. Calkin, Kevin D. Hyde, Peter R. Robichaud, J. Greg Jones, Louise E. Ashmun, Dan R. Loeffler

Year Published: 2007

Type: Document

Technical Report or White Paper

### **Improving wildfire preparedness: lessons from communities across the US**

[www.nrfirescience.org/resource/7947](http://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

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

[www.nrfirescience.org/resource/12720](http://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<sup>-1</sup> or \$ yr<sup>-1</sup> ac<sup>-1</sup>). 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

### **Wildland fire hazard and risk: problems, definitions and context**

[www.nrfirescience.org/resource/12716](http://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](http://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

### **Shared mindfulness in cockpit crisis situations**

[www.nrfirescience.org/resource/15912](http://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](http://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

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

[www.nrfirescience.org/resource/12719](http://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](http://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](http://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

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

[www.nrfirescience.org/resource/16114](http://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

### **Western forest, fire risk, and climate change**

[www.nrfirescience.org/resource/11114](http://www.nrfirescience.org/resource/11114)

Climate warming may first show up in forests as increased growth, which occurs as warmer temperatures, increased carbon dioxide, and more precipitation encourage higher rates of photosynthesis. The second way that climate change may show up in forests is through changes in disturbance regimes-the long-term patterns of fire, drought...

Author(s): Valerie A. Rapp  
Year Published: 2004  
Type: Document  
Research Brief or Fact Sheet

### **Probability based models for estimation of wildfire risk**

[www.nrfirescience.org/resource/12709](http://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 km<sup>2</sup>-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

### **Surviving the age of risk: a call for ethical management**

[www.nrfirescience.org/resource/15903](http://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

### **A new accident model for engineering safer systems**

[www.nrfirescience.org/resource/15959](http://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

### **Training ecologists to think with uncertainty in mind**

[www.nrfirescience.org/resource/12642](http://www.nrfirescience.org/resource/12642)

Predictive capacity is needed to anticipate the consequences of global change. Along with the computational challenges inherent in accounting for uncertainty in models of ecological and physical processes related to global change, we face educational challenges related to developing the intellectual capital for thinking with...

Author(s): Carol A. Brewer, Louis J. Gross

Year Published: 2003

Type: Document

Book or Chapter or Journal Article, Synthesis

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

[www.nrfirescience.org/resource/10993](http://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

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

[www.nrfirescience.org/resource/15963](http://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](http://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

### **Lessons from Longford: the Esso Gas Plant explosion**

[www.nrfirescience.org/resource/15906](http://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](http://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](http://www.nrfirescience.org/resource/11045)

Management activities are analyzed at landscape scales employing both simulation and optimization. SIMPPLE, 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

### **Preventing disaster: home ignitability in the wildland-urban interface**

[www.nrfirescience.org/resource/159](http://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](http://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

### **Applying simulation and optimization to plan fuel treatments at landscape scales**

[www.nrfirescience.org/resource/11067](http://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

### **Managing major hazards: the lessons of the Moura Mine disaster**

[www.nrfirescience.org/resource/15905](http://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

### **Risk management for ecological stewardship**

[www.nrfirescience.org/resource/15896](http://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](http://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](http://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 environmental uncertainty with legitimate authority: a comparative analysis of the Mann Gulch and Storm King Mountain Fires**

[www.nrfirescience.org/resource/15893](http://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](http://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

### **Managing the risks of organizational accidents**

[www.nrfirescience.org/resource/15960](http://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

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

[www.nrfirescience.org/resource/16255](http://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

### **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](http://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

### **Sensemaking in organizations**

[www.nrfirescience.org/resource/16258](http://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

### **Beyond aviation human factors: safety in high technology systems**

[www.nrfirescience.org/resource/15883](http://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

### **Causes of disaster: sloppy management**

[www.nrfirescience.org/resource/15891](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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

### **Economic efficiency and risk character of fire management programs, northern rocky mountains**

[www.nrfirescience.org/resource/11218](http://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 polices. 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](http://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

### **The Great Basin: wildland fire management in the year 2000**

[www.nrfirescience.org/resource/11487](http://www.nrfirescience.org/resource/11487)

The future of wildland fire management depends on the course chosen by fire managers today. Our responsiveness to issues will determine how much we influence where we go. Economics in concert with a better appreciation of fire's role in ecosystem dynamics will significantly alter fire management as we know it today. Public subsidies...

Author(s): James B. Webb

Year Published: 1987

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Judgment under uncertainty: heuristics and biases**

[www.nrfirescience.org/resource/15910](http://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](http://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](http://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

### **Wildland Fire Decision Support System (WFDSS)**

[www.nrfirescience.org/resource/60](http://www.nrfirescience.org/resource/60)

This system is intended to assist fire managers and analysts in making strategic and tactical decisions for fire incidents. It is designed to replace the WFSA (Wildland Fire Situation Analysis), Wildland Fire Implementation Plan (WFIP), and Long-Term Implementation Plan (LTIP) processes with a single process that is easier to use,...

Type: Tool

Model or System

### **Integrating community wildfire protection plans and natural hazard mitigation plans**

[www.nrfirescience.org/resource/15290](http://www.nrfirescience.org/resource/15290)

Natural Hazard Mitigation Plans (NHMP) and Community Wildfire Protection Plans (CWPP) both benefit communities striving to reduce risk to natural hazards. Though one plan is focused on the wildfire hazard and other is focused on multi-natural hazards, the requirements of what needs to be in the plans have a lot of similarities. As a...

Type: Media

Webinar

## **Bridging the Divide - Video 2: Values & Risks**

[www.nrfirescience.org/resource/15942](http://www.nrfirescience.org/resource/15942)

This video series is a compilation of post-fire interviews, workshops, and research presentations, highlighting the special conditions of the fire and the unique community outcomes. Through collaboration and partnerships, these mountain communities are learning to live with fire in the landscape. During the summer of 2013 over 1000...

Type: Media

Webinar

## **Large incident risk assessments: the roles of the agency administrator and the resource specialist**

[www.nrfirescience.org/resource/13081](http://www.nrfirescience.org/resource/13081)

Stephen Gage, Asst. Dir., Operations for fire and aviation management USFS & Kevin Martin, Forest Supervisor, Umatilla National Forest discuss large incident risk assessments and the roles of the agency administrator and the resource specialist.

Type: Media

Webinar

## **The Science of Budgeting Fire Programs - Integrating Fuels and Preparedness at National and Landscape Levels**

[www.nrfirescience.org/resource/16367](http://www.nrfirescience.org/resource/16367)

Doug Rideout discusses STARfire - a spatial planning and budgeting system integrating fuels, preparedness, and risk assessment guided by ROI. Scalable from planning unit to regional to national levels.

Type: Media

Webinar

## **Risk, resilience, and the fire management system**

[www.nrfirescience.org/resource/15104](http://www.nrfirescience.org/resource/15104)

The future of wildland fire management in the US entails increasing complexity, risk, and scrutiny, and it is clear that business-as-usual is unsustainable. New paradigms recognize a need to deemphasize fire exclusion, expand application of prescribed and managed natural fire, and foster resilience and adaptation to fire....

Type: Media

Webinar

## **Using climate information for risk mitigation and objective achievement in managed fire**

[www.nrfirescience.org/resource/12874](http://www.nrfirescience.org/resource/12874)

Considerable evidence exists that climate impacts wildfires and that climate change will continue to provide challenges for fire management. For fire managers, a key step in meeting those challenges is to identify ways to utilize climate information in order to both mitigate risks associated with wildfires and achieve objectives for...

Type: Media

Webinar

## **Fire behaviour: next gen Canadian Forest Fire Danger Rating System**

[www.nrfirescience.org/resource/16078](http://www.nrfirescience.org/resource/16078)

Mike Wotton from the Canadian Fire Service discussing the next generation Canadian Forest Fire Danger Rating System at the 2013 Fire Behaviour Symposium.

Type: Media

Video

### **Climate, Megafires, and Conservation Financing**

[www.nrfirescience.org/resource/16356](http://www.nrfirescience.org/resource/16356)

Join us in a discussion on how climatic changes can influence wildland fire activity across the globe and how these critical fire weather variables have changed over the last 40 years. These changes in key weather variables have combined to both lengthen the fire season and increase the fire weather severity within the fire season....

Type: Media

Webinar

### **Rethinking performance measurement in US federal wildland fire management: putting initial attack success in its place**

[www.nrfirescience.org/resource/14868](http://www.nrfirescience.org/resource/14868)

Initial attack (IA) success has long been one of the primary performance measures used by agencies with wildland firefighting responsibility in the United States (US) and elsewhere. The US federal agencies currently state that (1) they credit an IA success when an 'unwanted' wildfire is suppressed before it...

Type: Media

Webinar

### **LANDFIRE #2: Assessing needs - Grand Teton NP & Bridger-Teton NF risk assessment findings**

[www.nrfirescience.org/resource/12804](http://www.nrfirescience.org/resource/12804)

This is the second webinar in a series of three, developed by LANDFIRE, the Northern Rockies and Southern Rockies Fire Science Networks, and the Joint Fire Science Program. The webinar series is designed to introduce LANDFIRE data and tools, examine an on-the-ground application project in the Rockies region, and look at ways to...

Type: Media

Webinar

### **Learning from the Experts: Ric Carlson - Time to Walk Away**

[www.nrfirescience.org/resource/16041](http://www.nrfirescience.org/resource/16041)

Ric Carlson describes how he develops the prescription window and uses a process of constant evaluation and updating that helps him avoid the traps always inherent with boundary selection. He talks about a scheduled burn that he and his crew decided to walk away from and the steps he took to make that decision.

Type: Media

Video

### **David Calkin - What will it take to break the cycle of the wildfire paradox?**

[www.nrfirescience.org/resource/16193](http://www.nrfirescience.org/resource/16193)

This 20 minute presentation was given by David Calkin, research forester with the US Forest Service, at 3rd SW Fire Ecology Conference & 1st Applied Fire Science Workshop in Tucson, Arizona.

Type: Media

Video

### **Have definitions and standards for fire severity, hazard, and risk improved since 1999?**

[www.nrfirescience.org/resource/14269](http://www.nrfirescience.org/resource/14269)

In 1998 the General Accounting Office presented to Congress a comprehensive assessment of the wildfire threat to western national forests. The GAO report stated 'In 1995, the [Forest Service] agency estimated that 39 million acres are now at risk of large, uncontrollable, catastrophic fires.' The national assessment and mapping...

Type: Media

Video

### **Landscape science solutions for resource managers**

[www.nrfirescience.org/resource/13217](http://www.nrfirescience.org/resource/13217)

Jerry Tagestad, Sr. Research Scientist with the Pacific Northwest National Laboratory, will discuss deriving information from geospatial data, and a recently developed fire risk model and how it might be adapted for the Great Basin. The ability to make informed decisions about landscape condition and fire risk usually isn't limited...

Type: Media

Webinar

### **Developing an Effective Mitigation Strategy**

[www.nrfirescience.org/resource/15939](http://www.nrfirescience.org/resource/15939)

The heart of any natural hazards mitigation plan is the mitigation strategy. The strategy serves as the long-term blueprint for reducing your potential losses identified in the risk assessment. The mitigation strategy describes how you will accomplish the overall purpose of the planning process. This webinar will explore how to...

Type: Media

Webinar

### **The Story Behind the Yellowstone Fires of 198: retro Report**

[www.nrfirescience.org/resource/16084](http://www.nrfirescience.org/resource/16084)

This 11 minute video covers the lessons learned from the summer of 1988 when fires burned nearly one third of Yellowstone National Park. The 1988 fire continue to shape the way we fight wildfires raging across the West today.

Type: Media

Video

### **Integrating Natural Hazard Mitigation Plans into Local Comprehensive Plans**

[www.nrfirescience.org/resource/16364](http://www.nrfirescience.org/resource/16364)

Local plans, such as the comprehensive plan, economic development plan, and transportation plan, establish policies that are intended to guide a community's day-to-day land use decisions and capital facilities expenditures. These policies have a major impact on whether people and property are exposed to natural hazards as well as...

Type: Media

Webinar

### **ArcFuels: an ArcGIS interface for fuel treatment planning and wildfire risk assessment**

[www.nrfirescience.org/resource/12853](http://www.nrfirescience.org/resource/12853)

Potential fire behavior metrics, including fire spread, intensity, likelihood, and ecological risk need to be analyzed for proposed fuel treatment alternatives. We built ArcFuels to streamline the fuel management planning process, and provide tools for quantitative wildfire risk assessment. ArcFuels integrated a number of fire...

Type: Media

Webinar

### **Wildfire risk assessment**

[www.nrfirescience.org/resource/13805](http://www.nrfirescience.org/resource/13805)

Large incident risk assessments: the roles of the agency administrator and the resource specialist.

Type: Media

Webinar

### **2014 WFSTAR: Fireline Leadership**

[www.nrfirescience.org/resource/16073](http://www.nrfirescience.org/resource/16073)

This 20 minute video covers the most essential element for success in the wildland fire service, which is good leadership. This module focuses on the framework, values, and principles that guide wildland fire leaders now and into the future. A portion of a Ted talk by general Stanley McCrystal is included in this video.

Type: Media

Video

### **Federal Fire Managers' Perceptions of the Importance, Scarcity and Substitutability of Suppression Resources**

[www.nrfirescience.org/resource/16351](http://www.nrfirescience.org/resource/16351)

A frequent prerequisite for meeting fire management objectives is the availability of key suppression resources, prepositioned for timely response. In the United States, multi-jurisdictional fire suppression demand is met by a national-scale pool of suppression resources that come from a variety of jurisdictions and provide a wide...

Type: Media

Webinar

### **Learning From Experts: Reflecting on a Burn Gone Bad - Riva Duncan**

[www.nrfirescience.org/resource/16043](http://www.nrfirescience.org/resource/16043)

Riva Duncan shares her story of being involved in an escaped prescribed fire. Riva explains how, after this event, she changed her methods of writing and implementing prescription burn plans.

Type: Media

Video

### **Temporal Dynamics of Wildfire Risk Assessments: Assessing tradeoffs and asking the hard questions**

[www.nrfirescience.org/resource/15794](http://www.nrfirescience.org/resource/15794)

Recent advances in integrating wildfire planning and strategic wildfire response can create more tangible fire outcomes that are better aligned the national cohesive strategy goals of living sustainably with wildfire. By integrating both in-situ and transboundary wildfire risk assessments with potential operations delineations, we...

Type: Media

Seminar

### **Standing Accountable - Lessons Learned From Cerro Grande**

[www.nrfirescience.org/resource/16033](http://www.nrfirescience.org/resource/16033)

Paul Gleason's insights on Type 3 IC decision making and other lessons learned from the Cerro Grande Prescribed fire escape. Presented to a S-490 Advanced Wildland Fire Behavior Calculation class in Fort Collins, Colorado on January 23, 2001.

Type: Media

Video

### **Making National Spatial Data Work on Your NW Landscape**

[www.nrfirescience.org/resource/15509](http://www.nrfirescience.org/resource/15509)

The principles of data modification are demonstrated through an example in Oregon's Rogue River Basin where LANDFIRE data were calibrated for use in a wildfire hazard analysis.

Type: Media

Webinar

### **FIREHouse: The Northwest and Alaska Fire Research Clearinghouse**

[www.nrfirescience.org/resource/144](http://www.nrfirescience.org/resource/144)

FIREHouse provides user-friendly, web-based information about fire science and technology relevant to Washington, Oregon, Idaho and Alaska. For each project posted, the goal is to provide, as applicable, online, searchable access to: (1) project and tool descriptions, contact information and links; (2) on-line publications; (3)...

Type: Website

Website

### **Risk assessment to achieve fire-adapted communities**

[www.nrfirescience.org/resource/13218](http://www.nrfirescience.org/resource/13218)

The outline for this webinar is as follows - Trends and background in risk assessment  
Wildfire risk trajectory - system model  
Structured risk assessment  
Risk sharing in the WUI  
Risk transmission from FS lands to private lands

Type: Media

Webinar