

## **Economic and policy factors driving adoption of institutional woody biomass heating systems in the United States**

[www.nrfirescience.org/resource/16492](http://www.nrfirescience.org/resource/16492)

Abundant stocks of woody biomass that are associated with active forest management can be used as fuel for bioenergy in many applications. Though factors driving large-scale biomass use in industrial settings have been studied extensively, small-scale biomass combustion systems commonly used by institutions for heating have received...

Author(s): Jesse Young, Nathaniel Anderson, Helen T. Naughton, Katrina Mullan

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

## **Application of an original wildfire smoke health cost benefits transfer protocol to the western US, 2005-2015**

[www.nrfirescience.org/resource/15529](http://www.nrfirescience.org/resource/15529)

Recent growth in the frequency and severity of US wildfires has led to more wildfire smoke and increased public exposure to harmful air pollutants. Populations exposed to wildfire smoke experience a variety of negative health impacts, imposing economic costs on society. However, few estimates of smoke health costs exist and none for...

Author(s): Benjamin A. Jones, Robert P. Berrens

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Modeling fuel treatment leverage: Encounter rates, risk reduction, and suppression cost impacts**

[www.nrfirescience.org/resource/16521](http://www.nrfirescience.org/resource/16521)

The primary theme of this study is the cost-effectiveness of fuel treatments at multiple scales of investment. We focused on the nexus of fuel management and suppression response planning, designing spatial fuel treatment strategies to incorporate landscape features that provide control opportunities that are relevant to fire...

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Effects of wildfire on the value of recreation in western North America**

[www.nrfirescience.org/resource/15023](http://www.nrfirescience.org/resource/15023)

Wildfires play an integral role in forest ecosystems of western North America. In an attempt to measure the level and value of ecosystem damage caused by wildfires, papers employing nonmarket valuation techniques-stated preference, revealed preference, and combined methods-are reviewed. A systematic review of results shows a portion...

Author(s): Ranjit S. Bawa

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Fighting fire in the heat of the day: an analysis of operational and environmental conditions of use for large airtankers in United States fire suppression**

[www.nrfirescience.org/resource/14347](http://www.nrfirescience.org/resource/14347)

Large airtanker use is widespread in wildfire suppression in the United States. The current approach to

nationally dispatching the fleet of federal contract airtankers relies on filling requests for airtankers to achieve suppression objectives identified by fire managers at the incident level. In general, demand is met if resources...

Author(s): Crystal S. Stonesifer, David E. Calkin, Matthew P. Thompson, Keith Stockmann

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Wildfires in the United States: a primer**

[www.nrfirescience.org/resource/14226](http://www.nrfirescience.org/resource/14226)

This report examines recent wildfires in the United States, summarizing their frequency, trends, and costs. It documents the increase in large wildfires and shows their concentration in western states. Cost and budget issues linked to wildfires are also examined. The report recommends ways to reduce the frequency and costs of...

Author(s): Vera Brusentsev, Wayne Vroman

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Production and efficiency of large wildland fire suppression effort: a stochastic frontier analysis**

[www.nrfirescience.org/resource/13841](http://www.nrfirescience.org/resource/13841)

This study examines the production and efficiency of wildland fire suppression effort. We estimate the effectiveness of suppression resource inputs to produce controlled fire lines that contain large wildland fires using stochastic frontier analysis. Determinants of inefficiency are identified and the effects of these determinants...

Author(s): Hari Katuwal, David E. Calkin, Michael S. Hand

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Managing the market: how procurement practices impact private sector wildfire response capacity**

[www.nrfirescience.org/resource/15575](http://www.nrfirescience.org/resource/15575)

Effective wildfire management requires significant institutional organization, a skilled workforce, facilities, and equipment. Sustaining sufficient wildfire response capacity is critical to both agencies and communities that are affected by fire. Because fire suppression is seasonal work and demands vary considerably from year to...

Author(s): Heidi Huber-Stearns, Cassandra Moseley, Autumn Ellison

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Examining heterogeneity and wildfire management expenditures using spatially and temporally descriptive data**

[www.nrfirescience.org/resource/14353](http://www.nrfirescience.org/resource/14353)

Increasing costs of wildfire management have highlighted the need to better understand suppression expenditures and potential tradeoffs of land management activities that may affect fire risks. Spatially and temporally descriptive data is used to develop a model of wildfire suppression expenditures, providing new insights into the...

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

Year Published: 2016

Type: Document  
Book or Chapter or Journal Article

### **A synthesis of the economic values of wilderness**

[www.nrfirescience.org/resource/14168](http://www.nrfirescience.org/resource/14168)

Early applications of wilderness economic research demonstrated that the values of natural amenities and commodities produced from natural areas could be measured in commensurate terms. To the surprise of many, the economic values of wilderness protection often exceeded the potential commercial values that might result from resource...

Author(s): Thomas P. Holmes, Jeffrey Englin, J. M. Bowker, Evan Hjerpe, John B. Loomis, Spencer Phillips, Robert Richardson

Year Published: 2016

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Social preferences toward energy generation with woody biomass from public forests in Montana, USA**

[www.nrfirescience.org/resource/14893](http://www.nrfirescience.org/resource/14893)

In Montana, USA, there are substantial opportunities for mechanized thinning treatments on public forests to reduce the likelihood of severe and damaging wildfires and improve forest health. These treatments produce residues that can be used to generate renewable energy and displace fossil fuels. The choice modeling method is...

Author(s): Tyron J. Venn, Nathaniel Anderson, Robert M. Campbell

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Reduce wildfire risks or we'll continue to pay more for fire disasters**

[www.nrfirescience.org/resource/13048](http://www.nrfirescience.org/resource/13048)

This is a position paper on the true costs of wildfire, collectively published by the Association for Fire Ecology, the International Association of Wildland Fire, and The Nature Conservancy. The goal was to raise awareness of the often unreported total costs of wildfire, and to present a united perspective regarding the...

Author(s): Association for Fire Ecology, International Association of Wildland Fire, The Nature Conservancy

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Wildfires burn science capacity**

[www.nrfirescience.org/resource/13500](http://www.nrfirescience.org/resource/13500)

With just over 3 months remaining, it looks like 2015 could be a record-breaking year for wildfires in the United States. So far this year, more than 8.5 million acres have burned and severe fires often happen in October. For the first time, the U.S. Forest Service will spend over 50% of its budget on fire management. Ironically,...

Author(s): Christopher Topik

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **The rising cost of wildfire operations: effects on the Forest Service's non-fire work**

[www.nrfirescience.org/resource/13425](http://www.nrfirescience.org/resource/13425)

Over 100 years ago, President Theodore Roosevelt established the U.S. Forest Service to manage America's 193-million acre national forests and grasslands for the benefit of all Americans. Today, that mission is being consumed by the ever-increasing costs of fighting fires. This report documents the growth over the past 20 years of...

Author(s): United States Department of Agriculture

Year Published: 2015

Type: Document

Technical Report or White Paper

### **The cost of climate change: ecosystem services and wildland fires**

[www.nrfirescience.org/resource/13074](http://www.nrfirescience.org/resource/13074)

Little research has focused on the economic impact associated with climate-change induced wildland fire on natural ecosystems and the goods and services they provide. We examine changes in wildland fire patterns based on the U.S. Forest Service's MC1 dynamic global vegetation model from 2013 to 2115 under two pre-defined scenarios:...

Author(s): Christine Lee, Claire Schlemme, Jessica Murray, Robert Unsworth

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/13950](http://www.nrfirescience.org/resource/13950)

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

Author(s): Matthew P. Thompson, Nathaniel Anderson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article, Synthesis

### **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

### **American Fire History, 1960-2013**

[www.nrfirescience.org/resource/15567](http://www.nrfirescience.org/resource/15567)

With support from the U.S. Forest Service, Department of the Interior, and Joint Fire Science Program, I have written a fire history of America from 1960 to 2013. The project will result in two books. Between Two Fires: A Fire History of Contemporary America relates the basic narrative. To the Last Smoke assembles anthologies of...

Author(s): Stephen Pyne, Heidi Neeley  
Year Published: 2015  
Type: Document  
Technical Report or White Paper

### **Operational wildfire suppression modelling: a review evaluating development, state of the art and future directions**

[www.nrfirescience.org/resource/13463](http://www.nrfirescience.org/resource/13463)

Wildfires are an inherent part of the landscape in many parts of the world; however, they often impose substantial economic burdens on human populations where they occur, both in terms of impacts and of management costs. As wildfires burn towards human assets, a universal response has been to deploy fire suppression resources (crews...

Author(s): Thomas J. Duff, Kevin G. Tolhurst  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **The economic benefit of localised, short-term, wildfire-potential information**

[www.nrfirescience.org/resource/13384](http://www.nrfirescience.org/resource/13384)

Wildfire-potential information products are designed to support decisions for prefire staging of movable wildfire suppression resources across geographic locations. We quantify the economic value of these information products by defining their value as the difference between two cases of expected fire-suppression expenditures: one...

Author(s): Kimberly Rollins, Laine Christman  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Rebuilding and new housing development after wildfire**

[www.nrfirescience.org/resource/13201](http://www.nrfirescience.org/resource/13201)

The number of wildland-urban interface communities affected by wildfire is increasing, and both wildfire suppression and losses are costly. However, little is known about post-wildfire response by homeowners and communities after buildings are lost. Our goal was to characterise rebuilding and new development after wildfires across...

Author(s): Patricia M. Alexandre, Miranda H. Mockrin, Susan I. Stewart, Roger B. Hammer, Volker C. Radeloff  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Playing with fire: how climate change and development patterns are contributing to the soaring costs of western wildfires**

[www.nrfirescience.org/resource/12974](http://www.nrfirescience.org/resource/12974)

Strong scientific evidence shows that climate change is producing hotter, drier conditions that contribute to larger fires and longer fire seasons in the American West today. The annual number of large wildfires on federally managed lands in the 11 western states has increased by more than 75 percent: from approximately 140 during...

Author(s): Rachel Cleetus, Kranti Mulik  
Year Published: 2014  
Type: Document  
Technical Report or White Paper

### **Are wildfire management resources in the United States efficiently allocated to protect resources at risk? A case study from Montana**

[www.nrfirescience.org/resource/12909](http://www.nrfirescience.org/resource/12909)

Federal wildfire management agencies in the United States are under substantial pressure to reduce and economically justify their expenditures. To support economically efficient management of wildfires, managers need better estimates of the resource benefits and avoided damage costs associated with alternative wildfire management...

Author(s): Derek T. O'Donnell, Tyron J. Venn, David E. Calkin

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Large airtanker use and outcomes in suppressing wildland fires in the United States**

[www.nrfirescience.org/resource/13952](http://www.nrfirescience.org/resource/13952)

Wildfire activity in the United States incurs substantial costs and losses, and presents challenges to federal, state, tribal and local agencies that have responsibility for wildfire management. Beyond the potential socioeconomic and ecological losses, and the monetary costs to taxpayers due to suppression, wildfire management is a...

Author(s): David E. Calkin, Crystal S. Stonesifer, Matthew P. Thompson, Charles W. McHugh

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Job growth and loss across sectors and time in the western US: the impact of large wildfires**

[www.nrfirescience.org/resource/12023](http://www.nrfirescience.org/resource/12023)

The link between economic growth and natural hazards has long been studied to better understand the effects of natural hazards on local, regional, and country level growth patterns. However, relatively little generalizable research has focused on wildfires, one of the most common forest disturbances in the western United States (US...

Author(s): Max W. Nielsen-Pincus, Cassandra Moseley, Krista M. Gebert

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Challenges and opportunities for large landscape-scale management in a shifting climate: the importance of nested adaptation responses across geospatial and temporal scales**

[www.nrfirescience.org/resource/12994](http://www.nrfirescience.org/resource/12994)

The Yellowstone to Yukon Conservation Initiative (Y2Y) was established over 20 years ago as an experiment in large landscape conservation. Initially, Y2Y emerged as a response to large scale habitat fragmentation by advancing ecological connectivity. It also laid the foundation for large scale multi-stakeholder conservation...

Author(s): Gary M. Tabor, Anne Carlson, R. Travis Belote

Year Published: 2014

Type: Document

Technical Report or White Paper

### **Economics of wildfire management: the development and application of suppression expenditure models**

[www.nrfirescience.org/resource/16161](http://www.nrfirescience.org/resource/16161)

In the United States, increased wildland fire activity over the last 15 years has resulted in increased pressure to balance the cost, benefits, and risks of wildfire management. Amid increased public scrutiny and a highly variable wildland fire environment, a substantial body of research has developed to study factors affecting the...

Author(s): Michael S. Hand, Krista M. Gebert, Jingjing Liang, David E. Calkin, Matthew P. Thompson, Mo Zhou

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **A comprehensive guide to fuel management practices for dry mixed conifer forests in the northwestern United States: inventory and model-based economic analysis of mechanical fuel treatments**

[www.nrfirescience.org/resource/12921](http://www.nrfirescience.org/resource/12921)

Implementing fuel treatments in every place where it could be beneficial to do so is impractical and not cost effective under any plausible specification of objectives. Only some of the many possible kinds of treatments will be effective in any particular stand and there are some stands that seem to defy effective treatment. In many...

Author(s): Theresa B. Jain, Michael A. Battaglia, Han-Sup Han, Russell T. Graham, Christopher R. Keyes, Jeremy S. Fried, Jonathan Sandquist

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

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

[www.nrfirescience.org/resource/16171](http://www.nrfirescience.org/resource/16171)

This article is a condensed and slightly edited version of a previously published article appearing in the Journal of Forestry (Thompson et al. 2013). Readers wishing for more detail on study motivation, relevant literature, data sources, modeling methods, and the full presentation of results are encouraged to refer to the article...

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

### **The economics of fuel management: wildfire, invasive plants, and the dynamics of sagebrush rangelands in the western United States**

[www.nrfirescience.org/resource/12134](http://www.nrfirescience.org/resource/12134)

In this article we develop a simulation model to evaluate the economic efficiency of fuel treatments and apply it to two sagebrush ecosystems in the Great Basin of the western United States: the Wyoming sagebrush steppe and mountain big sagebrush ecosystems. These ecosystems face the two most prominent concerns in sagebrush...

Author(s): Michael H. Taylor, Kimberly Rollins, Mimako Kobayashi, Robin J. Tausch

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **A risk-based approach to wildland fire budgetary planning**

[www.nrfirescience.org/resource/16163](http://www.nrfirescience.org/resource/16163)

The financial impact of wildfire management within the USDA Forest Service challenges the ability of

the agency to meet societal demands and maintain forest health. The extent of this financial crisis has been attributed to historical and continuing fire management practices, changing climatic conditions, and increasing human...

Author(s): Matthew P. Thompson, David E. Calkin, Mark A. Finney, Krista M. Gebert, Michael S. Hand

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

### **Perspectives on disconnects between scientific information and management decisions on post-fire recovery in western US**

[www.nrfirescience.org/resource/12035](http://www.nrfirescience.org/resource/12035)

Environmental regulations frequently mandate the use of 'best available' science, but ensuring that it is used in decisions around the use and protection of natural resources is often challenging. In the Western US, this relationship between science and management is at the forefront of post-fire land management decisions. Recent...

Author(s): Xiaoli Chen, Nathan Emery, Elizabeth S. Garcia, Erin J. Hanan, Heather E. Hodges, Tyronne Martin, Matthew A. Meyers, Lindsey E. Peavey, Hui Peng, Jaime Sainz Santamaria, Kellie A. Uyeda, Sarah E. Anderson, Christina Tague

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Wildland fire management: are actively managed forests more resilient than passively managed forests?**

[www.nrfirescience.org/resource/12434](http://www.nrfirescience.org/resource/12434)

Large areas of federal lands in the western states are currently at high risk of severe wildfire and have many insect and disease problems, indicating a significant decline in forest health and resilience.

Although research studies have not been done that would measure whether actively managed forests are more resilient to wildfires...

Author(s): Jay O'Laughlin

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Criteria and methodology for evaluating aerial wildfire suppression**

[www.nrfirescience.org/resource/12414](http://www.nrfirescience.org/resource/12414)

Aircraft are often used to drop suppressants and retardants to assist wildfire containment. Drop effectiveness has rarely been measured due to the difficulties in collecting data from wildfires and running field experiments and the absence of definitions and measures. This paper presents a set of



criteria and methodologies for...

Author(s): Matt P. Plucinski, Elsa Pastor

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Wildfire smoke and health impacts: a closer look at fire attributes and their marginal effects**

[www.nrfirescience.org/resource/12143](http://www.nrfirescience.org/resource/12143)

Existing studies on the economic impact of wildfire smoke have focused on single fire events or entire seasons without considering the marginal effect of daily fire progression on downwind communities. In addition, neither approach allows for an examination of the impact of even the most basic fire attributes, such as distance and...

Author(s): K. Moeltner, Man-Kuen Kim, E. Zhu, W. Yang

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/16170](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

### **Effects of wildfire on national park visitation and the regional economy: a natural experiment in the Northern Rockies**

[www.nrfirescience.org/resource/12040](http://www.nrfirescience.org/resource/12040)

Federal wildland fire management policy in the United States directs the use of value-based methods to guide priorities. However, the economic literature on the effect of wildland fire on nonmarket uses, such as recreation, is limited. This paper introduces a new approach to measuring the effect of wildfire on recreational use by...

Author(s): John W. Duffield, Chris J. Neher, David A. Patterson, Aaron M. Deskins

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **The effects of large wildfires on employment and wage growth and volatility in the western United States**

[www.nrfirescience.org/resource/12037](http://www.nrfirescience.org/resource/12037)

We examined the effect of large wildfires on economic growth and volatility in the western United States. We matched wildfire data with quarterly employment and earnings growth data to assess the specific effect of wildfire on employment and wage growth in western US counties. Wildfires generally tended to exhibit positive effects...

Author(s): Max W. Nielsen-Pincus, Cassandra Moseley, Krista M. Gebert

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **The rising cost of wildfire protection**

[www.nrfirescience.org/resource/12409](http://www.nrfirescience.org/resource/12409)

Headwaters Economics produced this report to better understand and address why wildfires are becoming more severe and expensive. The report also describes how the protection of homes in the Wildland-Urban Interface has added to these costs and concludes with a brief discussion of solutions that may help control escalating costs....

Author(s): Ross Gorte

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Airtankers and wildfire management in the US Forest Service: examining data availability and exploring usage and cost trends**

[www.nrfirescience.org/resource/16173](http://www.nrfirescience.org/resource/16173)

Evaluating the effectiveness and efficiency of fixed- and rotary-wing aircraft is a crucial component of strategic wildfire management and planning. In this manuscript, we focus on the economics of fire and aviation management within the US Forest Service. Substantial uncertainties challenge comprehensive analysis of airtanker use,...

Author(s): Matthew P. Thompson, David E. Calkin, Jason M. Herynk, Charles W. McHugh, Karen C. Short

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

### **Research perspectives on the public and fire management: a synthesis of current social science on eight essential questions**

[www.nrfirescience.org/resource/12601](http://www.nrfirescience.org/resource/12601)

As part of a Joint Fire Science Program project, a team of social scientists reviewed existing fire social science literature to develop a targeted synthesis of scientific knowledge on the following questions: 1. What is the public's understanding of fire's role in the ecosystem? 2. Who are trusted sources of information about fire...

Author(s): Sarah M. McCaffrey, Christine Olsen

Year Published: 2012

Type: Document

Synthesis

### **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

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

[www.nrfirescience.org/resource/11449](http://www.nrfirescience.org/resource/11449)

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

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

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

## **A synthesis of current knowledge on forests and carbon storage in the United States**

[www.nrfirescience.org/resource/12598](http://www.nrfirescience.org/resource/12598)

Using forests to mitigate climate change has gained much interest in science and policy discussions. We examine the evidence for carbon benefits, environmental and monetary costs, risks and trade-offs for a variety of activities in three general strategies: (1) land use change to increase forest area (afforestation) and avoid...

Author(s): Duncan C. McKinley, Michael G. Ryan, Richard A. Birdsey, Christian P. Giardina, Mark E. Harmon, Linda S. Heath, Richard A. Houghton, Robert B. Jackson, James F. Morrison, Brian C.

Murray, Diane E. Pataki, Kenneth E. Skog

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

## **Recent trends in post-wildfire seeding in western US forests: costs and seed mixes**

[www.nrfirescience.org/resource/8284](http://www.nrfirescience.org/resource/8284)

Broadcast seeding is one of the most commonly used post-fire rehabilitation treatments to establish ground cover for erosion control and mitigation of non-native plant species invasions. Little quantitative information is available on overall trends of post-fire seeding expenditures and seed mixes used over time in forested...

Author(s): Donna Peppin, Peter Z. Fule, Carolyn Hull Sieg, Jan L. Beyers, Molly E. Hunter, Peter R. Robichaud

Year Published: 2011

Type: Document

Book or Chapter or Journal Article, Synthesis

## **Economic and social impacts of wildfires and invasive plants in American deserts: lessons from**

## **the Great Basin**

[www.nrfirescience.org/resource/11463](http://www.nrfirescience.org/resource/11463)

Research on the impacts of wildfire and invasive plants in rangelands has focused on biophysical rather than human dimensions of these environmental processes. We offer a synthetic perspective on economic and social aspects of wildfire and invasive plants in American deserts, focusing on the Great Basin because greater research...

Author(s): Mark W. Brunson, John A. Tanaka

Year Published: 2011

Type: Document

Book or Chapter or Journal Article, Synthesis

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

[www.nrfirescience.org/resource/11468](http://www.nrfirescience.org/resource/11468)

The spread of invasive annual grasses and resulting escalation of wildfire frequency and severity pose a significant and growing threat to the economic and ecological viability of the rangelands in the Great Basin. While private ranchers have the option to limit the severity of wildfires through fuels removal treatments, few...

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

Year Published: 2010

Type: Document

Conference Proceedings

## **A synthesis of the science on forests and carbon for U.S. forests**

[www.nrfirescience.org/resource/12589](http://www.nrfirescience.org/resource/12589)

Forests play an important role in the U.S. and global carbon cycle, and carbon sequestered by U.S. forest growth and harvested wood products currently offsets 12-19% of U.S. fossil fuel emissions. The cycle of forest growth, death, and regeneration and the use of wood removed from the forest complicate efforts to understand and...

Author(s): Michael G. Ryan, Mark E. Harmon, Richard A. Birdsey, Christian P. Giardina, Linda S. Heath, Richard A. Houghton, Robert B. Jackson, Duncan C. McKinley, James F. Morrison, Brian C. Murray, Diane E. Pataki, Kenneth E. Skog

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

## **Economic analysis of geospatial technologies for wildfire suppression**

[www.nrfirescience.org/resource/8398](http://www.nrfirescience.org/resource/8398)

Geospatial technologies used to fight large fires are becoming increasingly available, yet no rigorous study exists of their effects on suppression costs or fire losses, nor do we know whether these technologies allow more efficient combination of firefighting assets used to suppress fires. The high cost of these technologies merits...

Author(s): Hayley Hessel, Gregory S. Amacher, Aaron M. Deskins

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

## **Forest road erosion control using multiobjective optimization**

[www.nrfirescience.org/resource/16187](http://www.nrfirescience.org/resource/16187)

Forest roads are associated with accelerated erosion and can be a major source of sediment delivery to streams, which can degrade aquatic habitat. Controlling road-related erosion therefore remains an

important issue for forest stewardship. Managers are faced with the task to develop efficient road management strategies to achieve...

Author(s): Matthew P. Thompson, Jeff Sessions, Kevin Boston, Arne Skaugset, David Tomberlin

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Evaluation of forest management systems under risk of wildfire**

[www.nrfirescience.org/resource/8336](http://www.nrfirescience.org/resource/8336)

We evaluate the economic efficiency of even- and uneven-aged management systems under risk of wildfire. The management problems are formulated for a mixed-conifer stand and approximations of the optimal solutions are obtained using simulation optimization. The Northern Idaho variant of the Forest Vegetation Simulator and its Fire...

Author(s): Kari Hyytiainen, Robert G. Haight

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **The economic cost of adverse health effects from wildfire: a review**

[www.nrfirescience.org/resource/14534](http://www.nrfirescience.org/resource/14534)

The economic costs of adverse health effects associated with exposure to wildfire smoke should be given serious consideration in determining the optimal wildfire management policy. Unfortunately, the literature in this research area is thin. In an effort to better understand the nature of these economic costs, we review and...

Author(s): Ikuho Kochi, Geoffrey H. Donovan, Patricia A. Champ, John B. Loomis

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Challenges of socio-economically evaluating wildfire management on non-industrial private and public forestland in the western United States**

[www.nrfirescience.org/resource/8334](http://www.nrfirescience.org/resource/8334)

Non-industrial private forests (NIPFs) and public forests in the United States generate many non-market benefits for landholders and society generally. These values can be both enhanced and diminished by wildfire management. This paper considers the challenges of supporting economically efficient allocation of wildfire suppression...

Author(s): Tyron J. Venn, David E. Calkin

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **National Fire Plan fuels treatments target the wildland-urban interface in the western United States**

[www.nrfirescience.org/resource/8351](http://www.nrfirescience.org/resource/8351)

The article 'Implementation of National Fire Plan treatments in the wildland-urban interface in the western United States' (1) is misleading because it is based on wildland-urban interface (WUI) designations not used by federal agencies or their state and local partners. Moreover, by omitting any examination of the allotment of...

Author(s): Allan Fitzsimmons

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/11063](http://www.nrfirescience.org/resource/11063)

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

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

Year Published: 2009

Type: Document

Conference Proceedings

### **Willingness-to-pay function for two fuel treatments to reduce wildfire acreage burned: a scope test and comparison of white and hispanic households**

[www.nrfirescience.org/resource/11065](http://www.nrfirescience.org/resource/11065)

We estimate a marginal benefit function for using prescribed burning and mechanical fuel reduction programs to reduce acres burned by wildfire in three states. Since each state had different acre reductions, a statistically significant coefficient on the reduction in acres burned is also a split sample scope test frequently used as...

Author(s): John B. Loomis, Le Trong Hung, Armando Gonzalez-Caban

Year Published: 2009

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Climate and forest wildfire in the western US**

[www.nrfirescience.org/resource/8183](http://www.nrfirescience.org/resource/8183)

This chapter has three goals. First, to define what climate, as opposed to weather, is, and to explain what this implies for climate versus weather forecasts. Second, to describe the scientific community's current understanding of the relationships between climate variability and forest wildfire in the western United States. And...

Author(s): Anthony L. Westerling

Year Published: 2008

Type: Document

Book or Chapter or Journal Article, Synthesis

### **A synthesis of biomass utilization for bioenergy production in the western United States**

[www.nrfirescience.org/resource/8179](http://www.nrfirescience.org/resource/8179)

This study examines the use of woody residues, primarily from forest harvesting or wood products manufacturing operations as a feedstock for direct-combustion bioenergy systems for electrical or thermal power applications. Opportunities for utilizing biomass for energy at several scales, with an emphasis on larger scale electrical...

Author(s): David L. Nicholls, Robert A. Monserud, Dennis P. Dykstra

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Wood product and market trends influencing residue utilization**

[www.nrfirescience.org/resource/8176](http://www.nrfirescience.org/resource/8176)

ANNOTATION: The potential markets for forest residues can be classified into four primary categories. This paper deals with each of these categories separately, and attempts to indicate some of the major influences which are expected to change the trend of forest residue utilization for each of the potential uses. Of the four major...

Author(s): Rhodes Yepsen

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Synthesis of knowledge from woody biomass removal case studies**

[www.nrfirescience.org/resource/12631](http://www.nrfirescience.org/resource/12631)

Woody biomass-usually logging slash, tops and limbs, or trees that cannot be sold as timber-is the lowest valued material removed from the forest and presents economic and logistical challenges. This report brings together 45 case studies of how biomass is removed from forests and used across the country to demonstrate the wide...

Author(s): Alexander M. Evans

Year Published: 2008

Type: Document

Synthesis, Technical Report or White Paper

### **Estimating harvest costs for fuel treatments in the west**

[www.nrfirescience.org/resource/8172](http://www.nrfirescience.org/resource/8172)

ANNOTATION: The costs for harvesting timber for forest fire fuel reduction purposes were estimated for 12 states in the West. These simulation inputs were used to estimate average costs for 12,039 Forest inventory and Analysis plots in the West, and then that FRCS output was used develop regression equations that estimated costs as...

Author(s): Rodrigo Arriagada, Fred W. Cubbage, Karen L. Abt, Robert J. Huggett

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Potential for future development on fire-prone lands**

[www.nrfirescience.org/resource/12009](http://www.nrfirescience.org/resource/12009)

Most studies of wildland fire and residential development have focused on the cost of firefighting and solutions such as fuel reduction and fire-safe home building. Although some studies quantify the number of homes being built near forests, little research has indicated the potential magnitude of the problem in the future. This...

Author(s): Patricia Gude, Ray Rasker, Jeff van den Noort

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Paying our way: thinking strategically to offset the cost of reducing fire hazard in western forests**

[www.nrfirescience.org/resource/11087](http://www.nrfirescience.org/resource/11087)

The fire hazard in many western forests is unacceptably high, posing risks to human health and property, wildlife habitat, and air and water quality. Cost is an inhibiting factor for reducing hazardous fuel, given the amount of acreage needing treatment. Thinning overly dense forests is one way to reduce fuel loads. Much of the...

Author(s): Rhonda L. Mazza

Year Published: 2008

Type: Document  
Research Brief or Fact Sheet

### **Contingent valuation of fuel hazard reduction treatments**

[www.nrfirescience.org/resource/11988](http://www.nrfirescience.org/resource/11988)

This chapter presents a stated preference technique for estimating the public benefits of reducing wildfires to residents of California, Florida, and Montana from two alternative fuel reduction programs: prescribed burning, and mechanical fuels reduction. The two fuel reduction programs under study are quite relevant to people...

Author(s): John B. Loomis, Armando Gonzalez-Caban

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Market impacts of a multiyear mechanical fuel treatment program in the U.S.**

[www.nrfirescience.org/resource/8125](http://www.nrfirescience.org/resource/8125)

We describe a two-stage model of global log and chip markets that evaluates the spatial and temporal economic effects of government-subsidized fire-related mechanical fuel treatment programs in the U.S. West and South. The first stage is a goal program that allocates subsidies according to fire risk and location priorities, given a...

Author(s): Jeffrey P. Prestemon, Karen L. Abt, Robert J. Huggett

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **A report on conceptual advances in roll on/off technology in forestry**

[www.nrfirescience.org/resource/8173](http://www.nrfirescience.org/resource/8173)

ANNOTATION: This study looks into increasingly severe fire seasons over the last two decades that have led policymakers to recognize the need for thinning overgrown stands of trees. Thinning presents a financial challenge and the problem is that hazardous fuel reduction projects-especially projects in the Wildland/Urban Interface-...

Author(s): Dave Atkins, Robert B. Rummer, Beth Dodson, Craig E. Thomas, Andy Horcher, Ed Messerlie, Craig Rawlings, David Haston

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **The fire-climate connection**

[www.nrfirescience.org/resource/11985](http://www.nrfirescience.org/resource/11985)

JFSP-funded research is exploring and quantifying relationships among the large-scale drivers of climate and the occurrence and extent of wildfire in the various regions of the western United States.

Author(s): Gail Wells

Year Published: 2007

Type: Document

Research Brief or Fact Sheet

### **Two-aged silvicultural treatments in lodgepole pine stands can be economically viable**

[www.nrfirescience.org/resource/11103](http://www.nrfirescience.org/resource/11103)

Economically viable silvicultural options are critical for management activities that provide wood products, reduce forest fuels, improve forest health, and enhance wildlife habitat. The Tenderfoot



Research Project was developed in the late 1990s to evaluate and quantify ecological and biological effects of two-aged silvicultural...

Author(s): Ward W. McCaughey, Steven J. Martin, Dean A. Blomquist

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

### **Modeling fuel treatment costs on Forest Service lands in the western United States**

[www.nrfirescience.org/resource/7915](http://www.nrfirescience.org/resource/7915)

This report intends to increase the accuracy of cost data available for planning and prioritizing fuel management in national forests. A survey of fire management officers was used to develop regression models that may be used to estimate the cost of hazardous fuel reduction treatments. The model was based on the USDA Forest Service...

Author(s): David E. Calkin, Krista M. Gebert

Year Published: 2006

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Paying for hazardous fuel treatments with revenue from removed biomass**

[www.nrfirescience.org/resource/11079](http://www.nrfirescience.org/resource/11079)

We use Fuel Treatment Evaluator (FTE) 3.0 to estimate how many acres might be treated near three western communities (Pagosa Springs, Colorado; Hamilton, Montana; Colville, Washington) for which the value of biomass removed covers the treatment cost.

Author(s): U.S. Department of Agriculture, Forest Service

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

### **Mastication: a fuel reduction and site preparation alternative**

[www.nrfirescience.org/resource/10959](http://www.nrfirescience.org/resource/10959)

During the fall of 2005, a study was conducted at Priest River Experimental Forest (PREF) in northern Idaho to investigate the economics of mastication used to treat activity and standing live fuels. In this study, a rotary head masticator was used to crush and chop activity fuels within harvest units on 37.07 acres. Production...

Author(s): Jeff Halbrook, Han-Sup Han, Russell T. Graham, Theresa B. Jain, Robert Denner

Year Published: 2006

Type: Document

Conference Proceedings

### **Fuel Treatment Evaluator 3.0**

[www.nrfirescience.org/resource/11078](http://www.nrfirescience.org/resource/11078)

The Fuel Treatment Evaluator (FTE) 3.0 is a web-based tool that simulates uneven-aged and even-aged silvicultural treatments on timberland in 12 western states. This tool simulates treatments to reduce forest fire hazard to specific target levels and identifies the volume of biomass removed, harvesting costs, and estimated biomass...

Author(s): U.S. Department of Agriculture, Forest Service

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

### **Intermountain region wood utilization and wood energy application program**

[www.nrfirescience.org/resource/8180](http://www.nrfirescience.org/resource/8180)

ANNOTATION: In 1978 the U.S. Forest Service initiated a National Wood Utilization and Wood Energy Application Program to focus attention on application of existing and developing technology. In this paper, the mission and goals of this program are discussed. Additionally, problems such as access, economic feasibility, and long-term...

Author(s): Dan R. Loeffler, David E. Calkin, Robin P. Silverstein

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Financial analysis of fuel treatments on national forests in the Western United States**

[www.nrfirescience.org/resource/12020](http://www.nrfirescience.org/resource/12020)

The purpose of this note is to provide a starting point for discussion of fire hazard reduction treatments that meet the full range of management objectives, including budget priorities. Thoughtful design requires an understanding not only of the physical and biological outcomes, but also the costs and potential revenues of applying...

Author(s): Roger D. Fight, R. James Barbour

Year Published: 2006

Type: Document

Research Brief or Fact Sheet

### **Wildfire, timber salvage, and the economics of expediency**

[www.nrfirescience.org/resource/8124](http://www.nrfirescience.org/resource/8124)

Administrative planning rules and legal challenges can have significant economic impacts on timber salvage programs on public lands. This paper examines the costs of the delay in salvage caused by planning rules and the costs associated with the volume reductions forced by legal challenges in one case study. The fires on the...

Author(s): Jeffrey P. Prestemon, David N. Wear, Fred J. Stewart, Thomas P. Holmes

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Economics research unit explores biomass utilization opportunities on the Bitterroot National Forest**

[www.nrfirescience.org/resource/11100](http://www.nrfirescience.org/resource/11100)

Almost a million tons of biomass left over after thinning designed to reduce hazardous fuels and increase tree vigor, thus decreasing susceptibility to insects and disease, could provide significant small business opportunities in the Bitterroot Valley. Researchers with the Forest Service Economics Research Work Unit and the...

Author(s): David E. Calkin

Year Published: 2005

Type: Document

Research Brief or Fact Sheet

### **Comparing resource values at risk from wildfires with Forest Service fire suppression expenditures: examples from 2003 western Montana wildfire season**

[www.nrfirescience.org/resource/11099](http://www.nrfirescience.org/resource/11099)

Determining the economic effectiveness of wildfire suppression activities is complicated by difficulties in identifying the area that would have burned and the associated resource value changes had suppression resources not been employed. We developed a case study using break-even analysis for

two large wildfires from the 2003 fire...

Author(s): David E. Calkin, Kevin D. Hyde, Krista M. Gebert, J. Greg Jones

Year Published: 2005

Type: Document

Research Brief or Fact Sheet

### **Testing transferability of willingness to pay for forest fire prevention among three states of California, Florida, and Montana**

[www.nrfirescience.org/resource/7960](http://www.nrfirescience.org/resource/7960)

The equivalency of willingness to pay between the states of California, Florida and Montana is tested. Residents in California, Florida and Montana have an average willingness to pay of \$417, \$305, and \$382 for prescribed burning program, and \$403, \$230, and \$208 for mechanical fire fuel reduction program, respectively. Due to wide...

Author(s): John B. Loomis, Le Trong Hung, Armando Gonzalez-Caban

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

### **Break-even point: suppression-cost analyses in Montana weigh resource values as determined by tax records and available GIS data**

[www.nrfirescience.org/resource/8154](http://www.nrfirescience.org/resource/8154)

Over the past decade, an increase in larger wildland fires has converged with rapid growth in the wildland-urban interface. Suppression resources, including firefighters, equipment and money, are pressed to their limits. Attacking every fire with equal priority is not an option, as some play an essential role in keeping forests...

Author(s): David E. Calkin, Kevin D. Hyde

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

### **Fuels planning: science synthesis and integration; economic uses fact sheet 8: prescribed fire costs**

[www.nrfirescience.org/resource/14941](http://www.nrfirescience.org/resource/14941)

Although the use of prescribed fire as a management tool is widespread, there is great variability and uncertainty in the treatment costs. Given specific site variables and management objectives, how much will it cost to use prescribed fire? This paper describes the FASTRACS database, a tool that has been developed to aid managers...

Author(s): Geoffrey H. Donovan

Year Published: 2004

Type: Document

Research Brief or Fact Sheet

### **Thinning and prescribed fire and projected trends in wood product potential, financial return, and fire hazard in Montana**

[www.nrfirescience.org/resource/11177](http://www.nrfirescience.org/resource/11177)

This work was undertaken under a joint fire science project 'Assessing the need, costs, and potential benefits of prescribed fire and mechanical treatments to reduce fire hazard.' This paper compares the future mix of timber products under two treatment scenarios for the state of Montana. We developed and demonstrated an analytical...

Author(s): R. James Barbour, Roger D. Fight, Glenn A. Christensen, Guy L. Pinjuv, Rao V. Nagubadi

Year Published: 2004

Type: Document  
Technical Report or White Paper

### **The effects of fire on hiking demand: a travel cost study of Colorado and Montana**

[www.nrfirescience.org/resource/10968](http://www.nrfirescience.org/resource/10968)

Surveys were conducted on 33 sites within National Forests in Colorado and Montana to test how forest fires affected recreation demand in the two states. Data were collected on the actual number of visits and on the intended number of visits if the area had been subject to a recent high intensity crown fire, a recent prescribed fire...

Author(s): Hayley Hessel, John B. Loomis, Armando Gonzalez-Caban

Year Published: 2003

Type: Document

Conference Proceedings

### **The economic availability of forest residue in the northern Rocky Mountains: a preliminary analysis**

[www.nrfirescience.org/resource/8182](http://www.nrfirescience.org/resource/8182)

ANNOTATION: The goal of this project is to estimate the cost of harvesting and transporting forest residues to processing centers in the northern Rocky Mountains. Regionwide estimates are to be made based on the detailed analyses of the volumes and types of forest residues available to selected individual manufacturing centers. The...

Author(s): Charles E. Keegan, Michael J. Niccolucci, Carl E. Fiedler, J. Greg Jones, Roy W. Regel

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **The dynamic path of recreational values following a forest fire: a comparative analysis of states in the Intermountain West**

[www.nrfirescience.org/resource/7924](http://www.nrfirescience.org/resource/7924)

This analysis examines the dynamic path of recreational values following a forest fire in three different states in the intermountain western United States. The travel cost demand analysis found that annual recreation values after a fire follow a highly nonlinear intertemporal path. The path is S-shaped, providing a range of...

Author(s): Jeffrey Englin, John B. Loomis, Armando Gonzalez-Caban

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **A strategic assessment of biofuels development in the western states**

[www.nrfirescience.org/resource/8177](http://www.nrfirescience.org/resource/8177)

ANNOTATION: This paper focuses on describing the methods used to estimate forest biomass supply curves and describing selected overall results of the analysis, including information on all forest and agricultural supply sources and maps indicating the estimated location of biofuels plants using cellulosic feedstocks that would...

Author(s): Bruce R. Hartsough, Xiaoshan Zhang, Roger D. Fight

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **Protecting people and sustaining resources in fire-adapted ecosystems: a cohesive strategy**

[www.nrfirescience.org/resource/11223](http://www.nrfirescience.org/resource/11223)

This strategy is based on the premise that sustainable resources are predicated on healthy, resilient ecosystems. In fire-adapted ecosystems, some measure of fire use-at appropriate intensity, frequency, and time of year-should be included in management strategies intended to protect and sustain watersheds, species, and other...

Author(s): Lyle Laverty, Gerald W. Williams

Year Published: 2000

Type: Document

Technical Report or White Paper

### **Evaluating the effectiveness of postfire rehabilitation treatments**

[www.nrfirescience.org/resource/11194](http://www.nrfirescience.org/resource/11194)

Spending on postfire emergency watershed rehabilitation has increased during the past decade. A west-wide evaluation of USDA Forest Service burned area emergency rehabilitation (BAER) treatment effectiveness was undertaken as a joint project by USDA Forest Service Research and National Forest System staffs. This evaluation covers...

Author(s): Peter R. Robichaud, Jan L. Beyers, Daniel G. Neary

Year Published: 2000

Type: Document

Technical Report or White Paper

### **Testing transferability of forest recreation demand in three intermountain states with application to forest fire effects**

[www.nrfirescience.org/resource/11052](http://www.nrfirescience.org/resource/11052)

Surveys of visitors to National Forests in Colorado, Idaho, and Wyoming were conducted to determine whether non-motorized recreation visitation responded to different fire ages and fire intensities. Actual and intended behavior data was combined using a negative binomial count data travel cost model. The intended behavior trip...

Author(s): John B. Loomis, Jeffrey Englin, Jared McDonald, Armando Gonzalez-Caban

Year Published: 2000

Type: Document

Conference Proceedings

### **Appropriate management responses to wildland fire: options and costs**

[www.nrfirescience.org/resource/11068](http://www.nrfirescience.org/resource/11068)

The Federal Wildland Fire Management Policy and Program Review, chartered and completed in 1995, represents the latest stage in the evolution of wildland fire management. The concept of appropriate management response is central to this policy. Through this approach, management responses are developed to reflect resource management...

Author(s): G. Thomas Zimmerman

Year Published: 1999

Type: Document

Conference Proceedings, Technical Report or White Paper

### **The budgetary, ecological, and managerial impacts of pinyon-juniper and cheatgrass fires**

[www.nrfirescience.org/resource/12108](http://www.nrfirescience.org/resource/12108)

The 1996 fire season illustrated the potential impacts of wildland fires on the Bureau of Land Management (BLM) administered lands through numerous western states. During the 1996 fire season, over six million acres burned in the United States through unplanned ignitions (wildfires). Over two million acres burned on BLM administered...

Author(s): Thomas C. Roberts

Year Published: 1999  
Type: Document  
Conference Proceedings

**Effects of fire on the economic value of forest recreation in the Intermountain West: preliminary results**

[www.nrfirescience.org/resource/11051](http://www.nrfirescience.org/resource/11051)

Visitors to National Forests in Colorado, Idaho, and Wyoming were asked how their visitation rates would change with the presence of a high-intensity crown fire, prescribed fire, and a 20-year-old high-intensity fire at the area they were visiting. By using pairwise t-tests, visitors to forests in Colorado showed a statistically...

Author(s): John B. Loomis, Jeffrey Englin, Armando Gonzalez-Caban

Year Published: 1999

Type: Document

Conference Proceedings, Technical Report or White Paper

**Western national forests: a cohesive strategy is needed to address catastrophic wildfire threats**

[www.nrfirescience.org/resource/11224](http://www.nrfirescience.org/resource/11224)

National forests of the dry, interior portion of the western United States that are managed by the Department of Agriculture's Forest Service have undergone significant changes over the last century and a half, becoming much denser, with fewer large trees and many more small, tightly spaced trees and underbrush. These changes have...

Author(s): United States General Accounting Office

Year Published: 1999

Type: Document

Technical Report or White Paper

**Managerial and institutional factors affect prescribed burning costs**

[www.nrfirescience.org/resource/7931](http://www.nrfirescience.org/resource/7931)

Prescribed burning costs are extremely variable, even if conditions are similar. This variability complicates planning and evaluation of prescribed burning programs and budgets, resulting in imprecise projections of their economic benefits. Evaluating the worth of prescribed burning efforts in objective terms is difficult, but the...

Author(s): Armando Gonzalez-Caban

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

**The ecological implications of fire in Greater Yellowstone, proceedings of the second biennial conference on the Greater Yellowstone Ecosystem**

[www.nrfirescience.org/resource/11989](http://www.nrfirescience.org/resource/11989)

Proceedings of the second biennial conference on the Greater Yellowstone Ecosystem.

Author(s): Jason Greenlee

Year Published: 1996

Type: Document

Conference Proceedings

**Harvest cost collection approaches and associated equations for restoration treatments on national forests**

[www.nrfirescience.org/resource/8181](http://www.nrfirescience.org/resource/8181)

ANNOTATION: This article provides several harvest cost estimation methods for forest managers. Methods discussed include elements of stump-to-truck timber harvest cost estimation methods in ecosystem restoration prescriptions. Particular attention is focused on cost estimation models for tractor and skyline systems in Montana with...

Author(s): Charles E. Keegan, Carl E. Fiedler, Fred J. Stewart

Year Published: 1995

Type: Document

Book or Chapter or Journal Article

### **A technical comparison model: class A foam compared to water as an example**

[www.nrfirescience.org/resource/12153](http://www.nrfirescience.org/resource/12153)

Water has been used to fight fire for centuries. The Bureau of Land Management (BLM) relies on a fleet of over 400 water engines as its primary fire suppression technology in Great Basin fuels. Class A foam is a relatively new approach to fire suppression. The foam concentrates were introduced in the early 1980's (Schlobohm and...

Author(s): Paul M. Schlobohm

Year Published: 1994

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Some economic impacts of the 1988 fires in the Yellowstone area**

[www.nrfirescience.org/resource/11934](http://www.nrfirescience.org/resource/11934)

Four types of economic impacts associated with the 1988 fires in and around Yellowstone National Park were studied. The park was headed for a record attendance year in 1988. Based on projections in this study, summer visitation would have increased from about 2.1 million visits in 1987 to 2.3 million in 1988 and 2.5 million in 1989...

Author(s): Paul E. Polzin, Michael S. Yuan, Ervin G. Schuster

Year Published: 1993

Type: Document

Research Brief or Fact Sheet

### **Effects of the Gates Park Fire on recreation choices**

[www.nrfirescience.org/resource/11094](http://www.nrfirescience.org/resource/11094)

The 1988 Gates Park Fire, along the North Fork of the Sun River in the Bob Marshall Wilderness, provided an opportunity to explore fire effects on wilderness visitor choices. Recreation visitors along the North and South Fork drainages were interviewed to assess the effects of 1988 fires on their 1989 visits. The Gates Park fire had...

Author(s): Timothy G. Love, Alan E. Watson

Year Published: 1992

Type: Document

Research Brief or Fact Sheet

### **Protecting people and homes from wildfire in the interior West: proceedings of the symposium and workshop**

[www.nrfirescience.org/resource/11968](http://www.nrfirescience.org/resource/11968)

Includes 25 invited papers and panel discussions, 6 workshop reports, and 15 poster papers that focus on the escalating problem of wildfire in wildland residential areas throughout the western United States and Canada.

Author(s): William C. Fischer, Stephen F. Arno

Year Published: 1988

Type: Document

### **Using prescribed fire to reduce the risk of large wildfires: a break-even analysis**

[www.nrfirescience.org/resource/11397](http://www.nrfirescience.org/resource/11397)

Nearly all wildfires are extinguished when they are still small. The 3-5% that get out of control cause 95% of all wildfire-related costs and damages (Dodge 1972, Wilson 1985). There are two ways to deal with these problem fires. One practice is to limit fire by suppressing fires as soon as possible after they are detected....

Author(s): James M. Saveland

Year Published: 1987

Type: Document

Conference Proceedings

### **Estimating cost of large-fire suppression for three Forest Service Regions**

[www.nrfirescience.org/resource/11110](http://www.nrfirescience.org/resource/11110)

The annual costs attributable to large fire suppression in three Forest Service Regions (1970-1981) were estimated as a function of fire perimeters using linear regression. Costs calculated on a per chain of perimeter basis were highest for the Pacific Northwest Region, next highest for the Northern Region, and lowest for the...

Author(s): Eric L. Smith, Armando Gonzalez-Caban

Year Published: 1987

Type: Document

Research Brief or Fact Sheet

### **Watershed modeling for fire management planning in the Northern Rocky Mountains**

[www.nrfirescience.org/resource/11220](http://www.nrfirescience.org/resource/11220)

Water yield and sediment production almost always increase after wildfire has destroyed vegetative cover. The value of water generally is not as much appreciated in the water-rich northern Rocky Mountains as it is elsewhere. Increased water yield becomes economically beneficial, however, when its potential for consumptive and...

Author(s): Donald F. Potts, David L. Peterson, Hans R. Zuuring

Year Published: 1985

Type: Document

Technical Report or White Paper

### **Changes in recreation values after fire in the Northern Rocky Mountains**

[www.nrfirescience.org/resource/11111](http://www.nrfirescience.org/resource/11111)

Changes in recreation values after wildfire in the northern Rocky Mountains were determined by estimating the difference in the present net value of recreation activity with and without fire. To estimate the value of recreation activity at burned and unburned sites, a contingent market valuation approach was used. Hypothetical...

Author(s): Patrick J. Flowers, Henry J. Vaux, Philip D. Gardner, Thomas J. Mills

Year Published: 1985

Type: Document

Research Brief or Fact Sheet

### **Fire Review of the 1985 Log Tom Fire Complex (Butte Fire)**

[www.nrfirescience.org/resource/15987](http://www.nrfirescience.org/resource/15987)

This report reviews the Log Tom Fire Complex. The review team identified 11 issues and provided alternatives for them to reduce suppression costs, improve suppression efficiency, and minimize



resource impacts on future large fires in the Salmon River area.  
Author(s): Jerry Monesmith, Dick Flannelly, Bert Strom, Jim Lawrence  
Year Published: 1985  
Type: Document  
Management or Planning Document

### **Timber net value and physical output changes following wildfire in the northern rocky mountains: estimates for specific fire situations**

[www.nrfirescience.org/resource/11219](http://www.nrfirescience.org/resource/11219)

In the last decade, the fire management program of the Forest Service, U.S. Department of Agriculture, has come under closer scrutiny because of ever-rising program costs. The Forest Service has responded by conducting several studies analyzing the economic efficiency of its fire management program. Some components of the analytical...

Author(s): Patrick J. Flowers, Patricia B. Shinkle, Daria A. Cain, Thomas J. Mills  
Year Published: 1985  
Type: Document  
Technical Report or White Paper

### **Costs of fire suppression forces based on cost-aggregation approach**

[www.nrfirescience.org/resource/11230](http://www.nrfirescience.org/resource/11230)

A cost-aggregation approach has been developed for determining the cost of Fire Management Inputs (FMIs)-the direct fireline production units (personnel and equipment) used in initial attack and large-fire suppression activities. All components contributing to an FMI are identified, computed, and summed to estimate hourly costs....

Author(s): Armando Gonzalez-Caban, Charles W. McKetta, Thomas J. Mills  
Year Published: 1984  
Type: Document  
Technical Report or White Paper

### **Wildland fires: predicting the behavior of wildland fires-among nature's most potent forces-can save lives, money, and natural resources**

[www.nrfirescience.org/resource/8315](http://www.nrfirescience.org/resource/8315)

During a period of three days in mid-February 1983, bushfires swept over 400,000 ha in southern Australia, killing 74 people, destroying more than 2,000 homes, and burning out 7 towns. This tragic repetition of the fires of January 1939, in which 71 people perished, was foretold by Noble (1977), whose monograph on the 1939 fires...

Author(s): Frank A. Albin  
Year Published: 1984  
Type: Document  
Book or Chapter or Journal Article

### **Estimating postfire changes in production and value of northern rocky mountain-intermountain rangelands**

[www.nrfirescience.org/resource/11222](http://www.nrfirescience.org/resource/11222)

A simulation model was developed to estimate postfire changes in the production and value of grazing lands in the Northern Rocky Mountain-Intermountain region. Ecological information and management decisions were used to simulate expected changes in production and value after wildfire in six major rangeland types: permanent forested...

Author(s): David L. Peterson, Patrick J. Flowers  
Year Published: 1984  
Type: Document

### **Fuel management opportunities on the Lolo National Forest: an economic analysis**

[www.nrfirescience.org/resource/11925](http://www.nrfirescience.org/resource/11925)

Examines economic feasibility of managing nonslash fuels in mature timber to reduce the costs and damages of wildfire. A 1.2-million-acre (496,000 hectare) study area is stratified by timber value, fire occurrence rate, and fuel hazard. Maximum potential fuel management benefits-based on the elimination of expected class E+ fires-...

Author(s): Donald Brent Wood

Year Published: 1979

Type: Document

Research Brief or Fact Sheet

### **Lodgepole pine logging residues: management alternatives**

[www.nrfirescience.org/resource/12125](http://www.nrfirescience.org/resource/12125)

The dollar and nondollar effects of alternative levels of residue utilization in mature lodgepole pine are compared. Net dollar returns were greater in conventional logging (removal of green sawlogs to a 6-inch top, with slash piled and burned) than in near-complete harvesting (sawlog removal followed by field chipping of remaining...

Author(s): Robert E. Benson

Year Published: 1974

Type: Document

Technical Report or White Paper

### **A century of wildland fire research: contributions to long-term approaches for wildland fire management**

[www.nrfirescience.org/resource/15915](http://www.nrfirescience.org/resource/15915)

The costs of wildland fire in the United States are enormous, not only in terms of the financial impacts of fire suppression and post-fire rehabilitation of property and ecosystems, but also in terms of loss of lives, impacts on physical health of nearby communities, effects on local and regional economies from losses of revenue,...

Type: Media

Webinar

### **The effectiveness of suppression resources in large fire management**

[www.nrfirescience.org/resource/12826](http://www.nrfirescience.org/resource/12826)

Wildfire management currently represents over 50 percent of the US Forest Service's total budget. Suppression of large fires represents the single largest category of fire management and typically exceeds \$1 billion annually. In both 2012 and 2013 large fire suppression exceeded the Agency's budget allocations by over \$400...

Type: Media

Webinar

### **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

### **A Climate Change Assessment of Vegetation, Fire, and Ecosystem Services for Tribal lands in the PNW**

[www.nrfirescience.org/resource/16349](http://www.nrfirescience.org/resource/16349)

Researchers from the USFS PNW Research Station and Case Research synthesized model projections of changes in vegetation and fire across tribal lands in the PNW. They will demonstrate how these changes will impact economically and culturally important ecosystem services and how this information can be used for adaptation planning.

Type: Media

Webinar

### **Drivers of wildfire suppression spending**

[www.nrfirescience.org/resource/13225](http://www.nrfirescience.org/resource/13225)

Over the past century, wildland fire management has been core to the mission of federal land management agencies. In recent decades, however, federal spending on wildfire suppression has increased dramatically; suppression spending that on average accounted for less than 20 percent of the USFS's discretionary funds prior to 2000 had...

Type: Media

Webinar

### **Can fuel treatments save money on suppression costs in the future?**

[www.nrfirescience.org/resource/14871](http://www.nrfirescience.org/resource/14871)

How fire suppression forces respond to an ignition may be determined by a number of factors (including proximity to values at risk and potential to improve habitat), which in essence amount to fire management personnel evaluating the fire's potential to have a net positive or negative effect. When using...

Type: Media

Webinar

### **Economics of ecological restoration and hazardous fuel reduction treatments**

[www.nrfirescience.org/resource/14290](http://www.nrfirescience.org/resource/14290)

What are the economic values of landscape-level ecological restoration and hazardous fuel treatments? The Ecological Restoration Institute at Northern Arizona University (ERI) assembled a team of wildland fire economists to conduct a rapid evidence-based assessment, as well as to design a timely and efficient way to answer the...

Type: Media

Webinar

### **The economic impact of large wildfires**

[www.nrfirescience.org/resource/12846](http://www.nrfirescience.org/resource/12846)

This webinar discusses findings from a recent study from the Ecosystem Workforce Program at the University of Oregon that examined how large fires affect local economies and jobs. Cassandra Moseley discusses how suppression spending can help mediate negative impacts of wildfires, and explore factors that influence whether local...

Type: Media

Webinar

### **Effects of fuel treatments and previous fires on subsequent fire management costs**

[www.nrfirescience.org/resource/15732](http://www.nrfirescience.org/resource/15732)

This webinar highlights results from a study on the effects of fuel treatments and previously burned areas on subsequent fire management costs. Presenter Kevin Barnett and his colleagues, Helen Naughton, Sean Parks, and Carol Miller, built models explaining variation in daily fire management costs that captured the influences of...

Type: Media

Webinar

### **The influence of incident management teams on suppression resource use**

[www.nrfirescience.org/resource/13767](http://www.nrfirescience.org/resource/13767)

Wildfire incidents present complex management problems, even for experienced and highly trained management organizations. This paper explores how managers of highly complex incidents - those requiring Type I or Type II incident management teams (IMTs) - adjust suppression resource orders in response to changing...

Type: Media

Seminar

### **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. Scaleable from planning unit to regional to national levels.

Type: Media

Webinar

### **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