

## **Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape**

[www.nrfirescience.org/resource/17571](http://www.nrfirescience.org/resource/17571)

Many studies have examined how fuels, topography, climate, and fire weather influence fire severity. Less is known about how different forest management practices influence fire severity in multi-owner landscapes, despite costly and controversial suppression of wildfires that do not acknowledge ownership boundaries. In 2013, the...

Author(s): Harold S. Zald, Christopher J. Dunn

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

## **Managing Wildfire for Whitebark Pine Ecosystem Restoration in western North America**

[www.nrfirescience.org/resource/18304](http://www.nrfirescience.org/resource/18304)

Wildfire in declining whitebark pine forests can be a tool for ecosystem restoration or an ecologically harmful event. This document presents a set of possible wildfire management practices for facilitating the restoration of whitebark pine across its range in Western North America. These management actions are designed to enhance...

Author(s): Robert E. Keane

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

## **Proceedings of the IUFRO joint conference: Genetics of five-needle pines, rusts of forest trees, and Strobosphere**

[www.nrfirescience.org/resource/17556](http://www.nrfirescience.org/resource/17556)

Proceedings from the 2014 IUFRO Joint Conference: Genetics of five-needle pines, rusts of forest trees, and Strobosphere in Fort Collins, Colorado. The published proceedings include 91 papers pertaining to research conducted on the genetics and pathology of five-needle pines and rusts of forest trees. Topic areas are: ecology and...

Year Published: 2018

Type: Document

Technical Report or White Paper

## **Advancing Fire Science with Large Forest Plots and a Long-Term Multidisciplinary Approach**

[www.nrfirescience.org/resource/17105](http://www.nrfirescience.org/resource/17105)

Large, spatially explicit forest plots have the potential to address currently understudied aspects of fire ecology and management, including the validation of physics-based fire behavior models and next-generation fire effects models. Pre-fire forest structures, fire-mediated mortality, and post-fire forest development can be...

Author(s): James A. Lutz, Andrew J. Larson, Mark E. Swanson

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

## **Rethinking the wildland fire management system**

[www.nrfirescience.org/resource/17822](http://www.nrfirescience.org/resource/17822)

In the western United States and elsewhere, the need to change society's relationship with wildfire is well-recognized. Suppressing fewer fires in fire-prone systems is promoted to escape existing feedback loops that lead to ever worsening conditions and increasing risks to responders and communities. Our primary focus is how to...

Author(s): Matthew P. Thompson, Donald G. MacGregor, Christopher J. Dunn, David E. Calkin, John Phipps  
Year Published: 2018  
Type: Document  
Book or Chapter or Journal Article

### **Decision Support Approaches in Adaptive Forest Management**

[www.nrfirescience.org/resource/17655](http://www.nrfirescience.org/resource/17655)

Climate and social changes place strong demands on forest managers. Forest managers need powerful approaches and tools, which could help them to be able to react to the rapidly changing conditions. However, the complexity of quantifying forest ecosystems services as well as the complexity of current decision theories, technologies...

Author(s): Jan Kaspar, Pete Bettinger, Harald Vacik, Robert Marusak, Jordi Garcia-Gonzalo  
Year Published: 2018  
Type: Document  
Book or Chapter or Journal Article

### **A model-based framework to evaluate alternative wildfire suppression strategies**

[www.nrfirescience.org/resource/16478](http://www.nrfirescience.org/resource/16478)

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

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

### **Can Air Quality Management Drive Sustainable Fuels Management at the Temperate Wildland–Urban Interface?**

[www.nrfirescience.org/resource/18137](http://www.nrfirescience.org/resource/18137)

Sustainable fire management has eluded all industrial societies. Given the growing number and magnitude of wildfire events, prescribed fire is being increasingly promoted as the key to reducing wildfire risk. However, smoke from prescribed fires can adversely affect public health. We propose that the application of air quality...

Author(s): David M. J. S. Bowman, Lori D. Daniels, Fay H. Johnston, Grant J. Williamson, William Matt Jolly, Sheryl Magzamen, Ana G. Rappold, Michael Brauer, Sarah B. Henderson  
Year Published: 2018  
Type: Document  
Book or Chapter or Journal Article

### **A conservation paradox in the Great Basin-altering sagebrush landscapes with fuel breaks to reduce habitat loss from wildfire**

[www.nrfirescience.org/resource/17420](http://www.nrfirescience.org/resource/17420)

Interactions between fire and nonnative, annual plant species (that is, 'the grass/fire cycle') represent one of the greatest threats to sagebrush (*Artemisia* spp.) ecosystems and associated wildlife, including the greater sage-grouse (*Centrocercus urophasianus*). In 2015, U.S. Department of the Interior called for a 'science-based...

Author(s): Douglas J. Shinneman, Cameron L. Aldridge, Peter S. Coates, Matthew J. Germino, David S. Pilliod, Nicole M. Vaillant  
Year Published: 2018

Type: Document  
Technical Report or White Paper

### **Use and benefits of NASA's RECOVER for post-fire decision support**

[www.nrfirescience.org/resource/18018](http://www.nrfirescience.org/resource/18018)

Today's extended fire seasons and large fire footprints have prompted state and federal land-management agencies to devote increasingly large portions of their budgets to wildfire management. As fire costs continue to rise, timely and comprehensive fire information becomes increasingly critical to response and rehabilitation...

Author(s): William Toombs, Keith T. Weber, Tesa Stegner, John L. Schnase, Eric Lindquist, Frances Lippitt

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Wildfire fuel management: network-based models and optimization of prescribed burning**

[www.nrfirescience.org/resource/17866](http://www.nrfirescience.org/resource/17866)

Wildfires are a common phenomenon on most continents. They have occurred for an estimated 60 million years and are part of a regular climatic cycle. Nevertheless, wildfires represent a real and continuing problem that can have a major impact on people, wildlife and the environment. The intensity and severity of wildfires can be...

Author(s): Dmytro Matsypura, Oleg A. Prokopyev, Aizat Zahar

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Collaborative restoration effects on forest structure in ponderosa pine-dominated forests of Colorado**

[www.nrfirescience.org/resource/17786](http://www.nrfirescience.org/resource/17786)

In response to large, severe wildfires in historically fire-adapted forests in the western US, policy initiatives, such as the USDA Forest Service's Collaborative Forest Landscape Restoration Program (CFLRP), seek to increase the pace and scale of ecological restoration. One required component of this program is collaborative...

Author(s): Jeffery B. Cannon, Kevin J. Barrett, Benjamin Gannon, Rob Addington, Michael A. Battaglia, Paula J. Fornwalt, Gregory H. Aplet, Anthony S. Cheng, Jeffrey L. Underhill, Jennifer S. Briggs, Peter M. Brown

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Spatiotemporal patterns of unburned areas within fire perimeters in the northwestern United States from 1984 to 2014**

[www.nrfirescience.org/resource/16632](http://www.nrfirescience.org/resource/16632)

A warming climate, fire exclusion, and land cover changes are altering the conditions that produced historical fire regimes and facilitating increased recent wildfire activity in the northwestern United States. Understanding the impacts of changing fire regimes on forest recruitment and succession, species distributions, carbon...

Author(s): Arjan J. H. Meddens, Crystal A. Kolden, James A. Lutz, John T. Abatzoglou

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **The Challenge of Diffusion in Forest Plans: A Methodological Proposal and Case Study**

[www.nrfirescience.org/resource/17627](http://www.nrfirescience.org/resource/17627)

Society's participation in decisions regarding land planning and management is essential for reaching viable and long-lasting solutions. The success of forest plans depends on the involvement of different stakeholders. In turn, stakeholder involvement depends on the representativity achieved in public participation in the...

Author(s): Xabier Bruña-García, Manuel F. Marey-Pérez

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

### **Targeted woodland removal to recover at-risk grouse and their sagebrush-steppe and prairie ecosystems**

[www.nrfirescience.org/resource/14924](http://www.nrfirescience.org/resource/14924)

In this paper, we summarize key findings from a special issue of the journal Rangeland Ecology & Management examining socioecological aspects of woodland expansion and management actions to address this threat in sagebrush and prairie ecosystems. We highlight species and ecosystem outcomes that may result from recent...

Author(s): Richard F. Miller, David E. Naugle, Jeremy D. Maestas, Christian A. Hagen, Galon Hall

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Where you stand depends on where you sit: Qualitative inquiry into notions of fire adaptation**

[www.nrfirescience.org/resource/16190](http://www.nrfirescience.org/resource/16190)

Wildfire and the threat it poses to society represents an example of the complex, dynamic relationship between social and ecological systems. Increasingly, wildfire adaptation is posited as a pathway to shift the approach to fire from a suppression paradigm that seeks to control fire to a paradigm that focuses on "living with"...

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

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

[www.nrfirescience.org/resource/15542](http://www.nrfirescience.org/resource/15542)

This proceedings of a workshop summarizes presentations and discussions on ways in which science can help wildland fire planning and management be more strategic, reduce costs, and ultimately increase resilience to wildland fire, both on the land and in communities affected by fire. Its organization follows the structure of the...

Year Published: 2017

Type: Document

Conference Proceedings

### **Spatiotemporal dynamics of simulated wildfire, forest management, and forest succession in central Oregon, USA**

[www.nrfirescience.org/resource/15134](http://www.nrfirescience.org/resource/15134)

We use the simulation model Envision to analyze long-term wildfire dynamics and the effects of

different fuel management scenarios in central Oregon, USA. We simulated a 50-year future where fuel management activities were increased by doubling and tripling the current area treated while retaining existing treatment strategies in...

Author(s): Ana M. G. Barros, Alan A. Ager, Michelle A. Day, Haiganoush K. Preisler, Thomas A. Spies, Eric M. White, Robert J. Pabst, Keith A. Olsen, Emily K. Platt, John D. Bailey, John P. Bolte

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **All lands approaches to fire management in the Pacific West: a typology**

[www.nrfirescience.org/resource/15125](http://www.nrfirescience.org/resource/15125)

Since 2009, the US Department of Agriculture Forest Service has promoted an “all lands approach” to forest restoration, particularly relevant in the context of managing wildfire. To characterize its implementation, we undertook an inventory of what we refer to as fire-focused all lands management (ALM) projects, defined as...

Author(s): Susan Charnley, Erin C. Kelly, Kendra L. Wendel

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **A simulation and optimisation procedure to model daily suppression resource transfers during a fire season in Colorado**

[www.nrfirescience.org/resource/15495](http://www.nrfirescience.org/resource/15495)

Sharing fire engines and crews between fire suppression dispatch zones may help improve the utilisation of fire suppression resources. Using the Resource Ordering and Status System, the Predictive Services' Fire Potential Outlooks and the Rocky Mountain Region Preparedness Levels from 2010 to 2013, we tested a simulation and...

Author(s): Yu Wei, Erin J. Belval, Matthew P. Thompson, David E. Calkin, Crystal S. Stonesifer

Year Published: 2017

Type: Document

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

Type: Document

Book or Chapter or Journal Article

### **Wildland fire risk reduction: a Government Accountability Office report**

[www.nrfirescience.org/resource/15283](http://www.nrfirescience.org/resource/15283)

This report examines federal officials' and stakeholders' views on (1) factors that affect federal-nonfederal collaboration aimed at reducing wildland fire risk to communities and (2) actions that could improve their ability to reduce risk to communities.

Author(s): U.S. Government Accountability Office

Year Published: 2017

Type: Document  
Technical Report or White Paper

### **Restoration of the iconic Pando aspen clone: emerging evidence of recovery**

[www.nrfirescience.org/resource/14933](http://www.nrfirescience.org/resource/14933)

Quaking aspen (*Populus tremuloides* Michx.) is being stressed across the America West from a variety of sources including drought, herbivory, fire suppression, development, and past management practices. Rich assemblages of plants and animals that utilize aspen forests, as well as economic values of tourism, grazing, hunting,...

Author(s): Paul C. Rogers, Jody A. Gale

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **Adaptive silviculture for climate change: a national experiment in manager-scientist partnerships to apply an adaptation framework**

[www.nrfirescience.org/resource/15232](http://www.nrfirescience.org/resource/15232)

Forest managers in the United States must respond to the need for climate-adaptive strategies in the face of observed and projected climatic changes. However, there is a lack of on-the-ground forest adaptation research to indicate what adaptation measures or tactics might be effective in preparing forest ecosystems to deal with...

Author(s): Linda Nagel, Brian J. Palik, Michael A. Battaglia, Anthony W. D'Amato, James M. Guldin, Christopher W. Swanston, Maria K. Janowiak, Matthew P. Powers, Linda A. Joyce, Constance I. Millar, David L. Peterson, Lisa Ganio, Chad Kirschbaum, Molly R. Roske

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

### **A range-wide restoration strategy for whitebark pine (*Pinus albicaulis*)**

[www.nrfirescience.org/resource/12690](http://www.nrfirescience.org/resource/12690)

Whitebark pine (*Pinus albicaulis*), an important component of western high-elevation forests, has been declining in both the United States and Canada since the early Twentieth Century from the combined effects of mountain pine beetle (*Dendroctonus ponderosae*) outbreaks, fire exclusion policies, and the spread of the exotic disease...

Author(s): Robert E. Keane, Diana F. Tomback, C. A. Aubry, A. D. Bower, Elizabeth M. Campbell, Cathy L. Cripps, M. B. Jenkins, M. F. Mahalovich, Mary Manning, Shawn T. McKinney, Michael P. Murray, Dana L. Perkins, C. A. Ryan, Anna W. Schoettle, Cyndi M. Smith

Year Published: 2017

Type: Document

Technical Report or White Paper

### **Diversity in forest management to reduce wildfire losses**

[www.nrfirescience.org/resource/15210](http://www.nrfirescience.org/resource/15210)

This study investigates how federal, state, and private corporate forest owners in a fire-prone landscape of southcentral Oregon manage their forests to reduce wildfire hazard and loss to high-severity wildfire. We evaluate the implications of our findings for concepts of social-ecological resilience. Using interview data, we...

Author(s): Susan Charnley, Thomas A. Spies, Ana M. G. Barros, Eric M. White, Keith A. Olsen

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Using an agent-based model to examine forest management outcomes in a fire-prone landscape in Oregon, USA**

[www.nrfirescience.org/resource/15133](http://www.nrfirescience.org/resource/15133)

Fire-prone landscapes present many challenges for both managers and policy makers in developing adaptive behaviors and institutions. We used a coupled human and natural systems framework and an agent-based landscape model to examine how alternative management scenarios affect fire and ecosystem services metrics in a fire-prone...

Author(s): Thomas A. Spies, Eric M. White, Alan A. Ager, Jeffrey D. Kline, John P. Bolte, Emily K. Platt, Keith A. Olsen, Robert J. Pabst, Ana M. G. Barros, John D. Bailey, Susan Charnley, Jennifer Koch, Michelle M. Steen-Adams, Peter H. Singleton, James Sulzman, Cynthia Schwartz, Blair Csuti

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Studying interregional wildland fire engine assignments for large fire suppression**

[www.nrfirescience.org/resource/15497](http://www.nrfirescience.org/resource/15497)

One crucial component of large fire response in the United States (US) is the sharing of wildland firefighting resources between regions: resources from regions experiencing low fire activity supplement resources in regions experiencing high fire activity. An important step towards improving the efficiency of resource sharing and...

Author(s): Erin J. Belval, Yu Wei, David E. Calkin, Crystal S. Stonesifer, Matthew P. Thompson, John R. Tipton

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **Adapt to more wildfire in western North American forests as climate changes**

[www.nrfirescience.org/resource/15327](http://www.nrfirescience.org/resource/15327)

Wildfires across western North America have increased in number and size over the past three decades, and this trend will continue in response to further warming. As a consequence, the wildland–urban interface is projected to experience substantially higher risk of climate-driven fires in the coming decades. Although many plants,...

Author(s): Tania L. Schoennagel, Jennifer Balch, Hannah Brenkert-Smith, Philip E. Dennison, Brian J. Harvey, Meg A. Krawchuk, Nathan Mietkiewicz, Penelope Morgan, Max A. Moritz, Ray Rasker, Monica G. Turner, Cathy L. Whitlock

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

## **The influence of incident management teams on the deployment of wildfire suppression resources**

[www.nrfirescience.org/resource/15494](http://www.nrfirescience.org/resource/15494)

Despite large commitments of personnel and equipment to wildfire suppression, relatively little is known about the factors that affect how many resources are ordered and assigned to wildfire incidents and the variation in resources across incident management teams (IMTs). Using detailed data on suppression resource assignments for...

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

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

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

Type: Document

Book or Chapter or Journal Article

## **Landowner guide to sage-grouse conservation in Wyoming**

[www.nrfirescience.org/resource/15280](http://www.nrfirescience.org/resource/15280)

Sagebrush ecosystems are complex and so are the efforts to conserve sage-grouse. Those who own or manage sage-grouse habitat play a critical role in conserving this species in Wyoming, and this guide is intended to provide a concise source of science-based information about the greater sage-grouse and the habitat required for its...

Author(s): Leanne L. Correll, Rebecca M. Burton, John Derek Scasta, Jeffrey L. Beck

Year Published: 2017

Type: Document

Management or Planning Document

## **Pando's lessons: restoration of a giant aspen clone**

[www.nrfirescience.org/resource/16378](http://www.nrfirescience.org/resource/16378)

A 106 acre (43 ha) aspen clone lives in the Fishlake National Forest in south-central Utah. Clones are comprised of multiple aspen stems, called ramets, which are genetically identical. This particular colony of ramets was named "Pando" (Latin for "I spread") by researchers believing it to be the largest living organism on...

Year Published: 2017

Type: Document

Research Brief or Fact Sheet

## **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

## **Cascading effects of fire retardant on plant-microbe interactions, community composition, and invasion**

[www.nrfirescience.org/resource/14485](http://www.nrfirescience.org/resource/14485)

Climate change, historical fire suppression, and a rise in human movements in urban-forest boundaries have resulted in an increased use of long-term fire retardant (LTFR). While LTFR is an effective fire-

fighting tool, it contains high concentrations of nitrogen and phosphorus, and little is known about how this nutrient pulse...

Author(s): Abigail Marshall, Lauren Waller, Ylva Lekberg

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Engaging communities and climate change futures with Multi-Scale, Iterative Scenario Building (MISB) in the western United States**

[www.nrfirescience.org/resource/14428](http://www.nrfirescience.org/resource/14428)

Current projections of future climate change foretell potentially transformative ecological changes that threaten communities globally. Using two case studies from the United States Intermountain West, this article highlights the ways in which a better articulation between theory and methods in research design can generate proactive...

Author(s): Daniel Murphy, Carina Wyborn, Laurie Yung, Daniel R. Williams, Cory Cleveland, Lisa A. Eby, Solomon Z. Dobrowski, Erin Towler

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Insights from wildfire science: a resource for fire policy discussions**

[www.nrfirescience.org/resource/13863](http://www.nrfirescience.org/resource/13863)

Record blazes swept across parts of the US in 2015, burning more than 10 million acres. The four biggest fire seasons since 1960 have all occurred in the last 10 years, leading to fears of a 'new normal' for wildfire. Fire fighters and forest managers are overwhelmed, and it is clear that the policy and management approaches of...

Author(s): Tania L. Schoennagel, Penelope Morgan, Jennifer Balch, Philip E. Dennison, Brian J. Harvey, Richard L. Hutto, Meg A. Krawchuk, Max A. Moritz, Ray Rasker, Cathy L. Whitlock

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Complex challenges of maintaining whitebark pine in Greater Yellowstone under climate change: A call for innovative research, management, and policy approaches**

[www.nrfirescience.org/resource/14364](http://www.nrfirescience.org/resource/14364)

Climate suitability is projected to decline for many subalpine species, raising questions about managing species under a deteriorating climate. Whitebark pine (WBP) (*Pinus albicaulis*) in the Greater Yellowstone Ecosystem (GYE) crystallizes the challenges that natural resource managers of many high mountain ecosystems will likely face...

Author(s): Andrew J. Hansen, Kathryn Ireland, Kristin Legg, Robert E. Keane, Edward Barge, Martha Jenkins, Michiel Pillet

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **From ideas to action: a guide to funding and authorities for collaborative forestry**

[www.nrfirescience.org/resource/14761](http://www.nrfirescience.org/resource/14761)

For 15 years, the Rural Voices for Conservation Coalition (RVCC) has successfully advocated for the expansion and improvement of federal policies that support stewardship and restoration on public and private lands. An All Lands approach to collaborative stewardship recognizes the social, ecological, and...

Author(s): Rebecca Shively, Karen Hardigg, Rachel Plawecki  
Year Published: 2016  
Type: Document  
Technical Report or White Paper

### **Wildland fire: nature's fuel treatment (spotlight)**

[www.nrfirescience.org/resource/16056](http://www.nrfirescience.org/resource/16056)

RMRS Scientists have evaluated more than 40 years of satellite imagery to determine what happens when a fire burns into a previously burned area. Results from this research are helping land managers to assess whether a previous wildland fire will act as a fuel treatment based on the length of time since the previous fire occurred,...

Author(s): Sean A. Parks, Carol Miller  
Year Published: 2016  
Type: Document  
Research Brief or Fact Sheet

### **Is 'resilience' maladaptive? Towards an accurate lexicon for climate change adaptation**

[www.nrfirescience.org/resource/16876](http://www.nrfirescience.org/resource/16876)

Climate change adaptation is a rapidly evolving field in conservation biology and includes a range of strategies from resisting to actively directing change on the landscape. The term 'climate change resilience,' frequently used to characterize adaptation strategies, deserves closer scrutiny because it is ambiguous, often...

Author(s): Nicholas A. Fisichelli, Gregor W. Schuurman, Cat Hawkins Hoffman  
Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Using resilience and resistance concepts to manage threats to sagebrush ecosystems, Gunnison sage-grouse, and Greater sage-grouse in their eastern range: a strategic multi-scale approach**

[www.nrfirescience.org/resource/14967](http://www.nrfirescience.org/resource/14967)

This report provides a strategic approach developed by a Western Association of Fish and Wildlife Agencies interagency working group for conservation of sagebrush ecosystems, Greater sage-grouse, and Gunnison sage-grouse. It uses information on (1) factors that influence sagebrush ecosystem resilience to disturbance and resistance...

Author(s): Jeanne C. Chambers, Jeffrey L. Beck, Steven B. Campbell, John Carlson, Thomas J. Christiansen, Karen J. Clause, Jonathan B. Dinkins, Douglas W. Havlina, Kevin E. Doherty, Kathleen A. Griffin, Douglas W. Havlina, Kenneth F. Henke, Jacob D. Hennig, Laurie L. Kurth, Jeremy D. Maestas, Mary Manning, Kenneth E. Mayer, Brian A. Meador, Clinton McCarthy, Marco A. Perea, David A. Pyke  
Year Published: 2016  
Type: Document  
Technical Report or White Paper

### **Should scientists be required to use a model-based solution to adjust for possible distance-based detectability bias?**

[www.nrfirescience.org/resource/14590](http://www.nrfirescience.org/resource/14590)

The most popular method used to gain an understanding of population trends or of differences in bird abundance among land condition categories is to use information derived from point counts. Unfortunately, various factors can affect one's ability to detect birds, and those factors need to be controlled or accounted for so that any...

Author(s): Richard L. Hutto

Year Published: 2016  
Type: Document  
Book or Chapter or Journal Article

### **Smoke management photographic guide: a visual aid for communicating impacts**

[www.nrfirescience.org/resource/14538](http://www.nrfirescience.org/resource/14538)

Communicating emissions impacts to the public can sometimes be difficult because quantitatively conveying smoke concentrations is complicated. Regulators and land managers often refer to particulate-matter concentrations in micrograms per cubic meter, but this may not be intuitive or meaningful to everyone. The primary purpose of...

Author(s): Joshua C. Hyde, Jarod Blades, Troy E. Hall, Roger D. Ottmar, Alistair M. S. Smith

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Administrative and judicial review of NEPA decisions: risk factors and risk minimizing strategies for the Forest Service**

[www.nrfirescience.org/resource/14463](http://www.nrfirescience.org/resource/14463)

Changes in land use and management practices throughout the past century—in addition to drought and other stressors exacerbated by climate change—have degraded the nation's forests and led to overgrowth and accumulation of hazardous fuels (GAO 2015). Because of these fuels, some forests now see high-severity fires that...

Author(s): Audrey Bixler, R. Patrick Bixler, Autumn Ellison, Cassandra Moseley

Year Published: 2016

Type: Document

Synthesis

### **Long-term post-disturbance forest recovery in the Greater Yellowstone Ecosystem analyzed using landsat time series stack**

[www.nrfirescience.org/resource/14826](http://www.nrfirescience.org/resource/14826)

Forest recovery from past disturbance is an integral process of ecosystem carbon cycles, and remote sensing provides an effective tool for tracking forest disturbance and recovery over large areas. Although the disturbance products (tracking the conversion from forest to non-forest type) derived using the Landsat Time Series Stack...

Author(s): Feng R. Zhao, Ran Meng, Chengquan Huang, Maosheng Zhao, Feng A. Zhao, Peng Gong, Zhiliang Zhu, Le Yu

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Conserving whitebark pine in ski areas - Demonstrations at Whitefish Mountain Resort**

[www.nrfirescience.org/resource/14705](http://www.nrfirescience.org/resource/14705)

As part of the Whitebark Pine Ecosystem Foundation's Annual Science and Management Workshop - Successes and Challenges in Managing the Jewel in the Crown of the Continent, participants saw first hand some of the challenges facing whitebark pine restoration, and they witnessed certification of the first Whitebark Pine Friendly Ski...

Author(s): Corey L. Gucker

Year Published: 2016

Type: Document

Research Brief or Fact Sheet

### **Local capacity for integrated forest and wildfire management**

[www.nrfirescience.org/resource/14655](http://www.nrfirescience.org/resource/14655)

The purpose of this document is to examine how some organizations have developed local, cross-trained workforces to address wildfire risks alongside intensifying wildfire management needs. We conducted case studies of four organizations in the western United States that have found ways to successfully...

Author(s): Heidi Huber-Stearns, Cassandra Moseley, Nick Goulette

Year Published: 2016

Type: Document

Technical Report or White Paper

### **Facilitating knowledge transfer between researchers and wildfire practitioners about trust: an international case study**

[www.nrfirescience.org/resource/14605](http://www.nrfirescience.org/resource/14605)

The importance of knowledge transfer between researchers, policy makers and practitioners is widely recognized. However, barriers to knowledge transfer can make it difficult for practitioners to apply the results of scientific research. This paper describes a project that addressed barriers to knowledge transfer by involving...

Author(s): Tara K. McGee, Allan Curtis, Bonita McFarlane, Bruce A. Shindler, Amy Christianson, Christine Olsen, Sarah M. McCaffrey

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Opportunities to utilize traditional phenological knowledge to support adaptive management of social-ecological systems vulnerable to changes in climate and fire regimes**

[www.nrfirescience.org/resource/13956](http://www.nrfirescience.org/resource/13956)

The field of adaptive management has been embraced by researchers and managers in the United States as an approach to improve natural resource stewardship in the face of uncertainty and complex environmental problems. Integrating multiple knowledge sources and feedback mechanisms is an important step in this approach. Our objective...

Author(s): Christopher A. Armatas, Tyron J. Venn, Brooke Baldauf McBride, Alan E. Watson, Stephen J. Carver

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

### **Conservation and management of whitebark pine ecosystems**

[www.nrfirescience.org/resource/14563](http://www.nrfirescience.org/resource/14563)

This reference presents general guidelines for planning, implementing, and evaluating whitebark pine conservation and management activities on lands administered by the Bureau of Land Management.

Author(s): Dana L. Perkins, Robert E. Means, Alexia C. Cochrane

Year Published: 2016

Type: Document

Synthesis, Technical Report or White Paper

### **Managing ungulate browsing for sustainable aspen**

[www.nrfirescience.org/resource/16376](http://www.nrfirescience.org/resource/16376)

In montane forests of the Intermountain West composition and function are often defined by what happens with quaking aspen. Aspen is a pioneer species that regenerates quickly following disturbance

and then establishes ecological conditions under which the rest of the biological community develops.

Quaking aspen forests have high...

Author(s): Samuel B. St. Clair, Paul C. Rogers, Michael R. Kuhns

Year Published: 2015

Type: Document

Research Brief or Fact Sheet

### **Forest structure and species traits mediate projected recruitment declines in western US tree species**

[www.nrfirescience.org/resource/15644](http://www.nrfirescience.org/resource/15644)

ABSTRACT Aim: Determine if differences in the climatic niche between conspecific adult and juvenile trees of the western United States vary by species traits and to assess if forest canopies moderate the sensitivity of juvenile trees to climatic variation. Location: The western United States. Methods: Using data from the USDA...

Author(s): Solomon Z. Dobrowski, Alan Swanson, John T. Abatzoglou, Zachary A. Holden, Hugh Safford, Michael K. Schwartz, Daniel G. Gavin

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Simulated big sagebrush regeneration supports predicted changes at the trailing and leading edges of distribution shifts**

[www.nrfirescience.org/resource/15432](http://www.nrfirescience.org/resource/15432)

Many semi-arid plant communities in western North America are dominated by big sagebrush. These ecosystems are being reduced in extent and quality due to economic development, invasive species, and climate change. These pervasive modifications have generated concern about the long-term viability of sagebrush habitat and sagebrush-...

Author(s): Daniel Schlaepfer, Kyle A. Taylor, Victoria E. Pennington, Kellen N. Nelson, Trace E. Martyn, Caitlin M. Rottler, William Lauenroth, John Bradford

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Tracking progress - The monitoring process used in collaborative forest landscape restoration projects in the Pacific Northwest**

[www.nrfirescience.org/resource/13348](http://www.nrfirescience.org/resource/13348)

Several trends have emerged in recent years that affect the management of the National Forest System, particularly in the western U.S. One is the recognition of landscapes departed from a natural range of variation, especially with implications for wildfire management. Another trend is the economic...

Author(s): Thomas DeMeo, Amy Markus, Bernard Bormann, Jodi Leingang

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Representing climate, disturbance, and vegetation interactions in landscape models**

[www.nrfirescience.org/resource/13639](http://www.nrfirescience.org/resource/13639)

The prospect of rapidly changing climates over the next century calls for methods to predict their effects on myriad, interactive ecosystem processes. Spatially explicit models that simulate ecosystem dynamics at fine (plant, stand) to coarse (regional, global) scales are indispensable tools for meeting this challenge under a...

Author(s): Robert E. Keane, Donald McKenzie, Donald A. Falk, Erica A. H. Smithwick, Carol Miller, Lara-

Karena B. Kellogg  
Year Published: 2015  
Type: Document  
Book or Chapter or Journal Article

### **Keeping it wild 2: an updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System**

[www.nrfirescience.org/resource/13591](http://www.nrfirescience.org/resource/13591)

Keeping It Wild 2 is an interagency strategy to monitor trends in selected attributes of wilderness character based on lessons learned from 15 years of developing and implementing wilderness character monitoring across the National Wilderness Preservation System. This document updates and replaces Keeping It Wild: An Interagency...

Author(s): Peter Landres, Chris Barns, Steve Boutcher, Tim Devine, Peter Dratch, Adrienne Lindholm, Linda Merigliano, Nancy Roeper, Emily Simpson

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Temperate forest health in an era of emerging megadisturbance**

[www.nrfirescience.org/resource/13501](http://www.nrfirescience.org/resource/13501)

Although disturbances such as fire and native insects can contribute to natural dynamics of forest health, exceptional droughts, directly and in combination with other disturbance factors, are pushing some temperate forests beyond thresholds of sustainability. Interactions from increasing temperatures, drought, native insects and...

Author(s): Constance I. Millar, Nathan L. Stephenson

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

### **Strategic operations planning-it's not just for wilderness! How the strategic operations planner can help**

[www.nrfirescience.org/resource/14609](http://www.nrfirescience.org/resource/14609)

The Strategic Operational Planner (SOPL) wildland fire management position was created in the United States in 2009 to reflect updated terminology. SOPL merges the former Fire Use Manager positions (FUM1 and FUM2) and is now an established position within the Incident Command System.

Traditionally, the FUM positions and the SOPL...

Author(s): Charles W. McHugh, Stu Hoyt, Brett Fay

Year Published: 2015

Type: Document

Technical Report or White Paper

### **Effects of post-fire salvage logging and a skid trail treatment on ground cover, soils, and sediment production in the interior western United States**

[www.nrfirescience.org/resource/12829](http://www.nrfirescience.org/resource/12829)

Post-fire salvage logging adds another set of environmental effects to recently burned areas, and previous studies have reported varying impacts on vegetation, soil disturbance, and sediment production with limited data on the underlying processes. Our objectives were to determine how: (1) ground-based post-fire logging affects...

Author(s): Joseph W. Wagenbrenner, Lee H. MacDonald, Robert N. Coats, Peter R. Robichaud, Robert E. Brown

Year Published: 2015

Type: Document  
Book or Chapter or Journal Article

### **Effect of fire prevention programs on accidental and incendiary wildfires on tribal lands in the United States**

[www.nrfirescience.org/resource/13177](http://www.nrfirescience.org/resource/13177)

Humans cause more than 55% of wildfires on lands managed by the USDA Forest Service and US Department of the Interior, contributing to both suppression expenditures and damages. One means to reduce the expenditures and damages associated with these wildfires is through fire prevention activities, which can include burn permits,...

Author(s): Karen L. Abt, David T. Butry, Jeffrey P. Prestemon, Samuel Scranton

Year Published: 2015

Type: Document  
Book or Chapter or Journal Article

### **The role of fire in aspen ecology and restoration**

[www.nrfirescience.org/resource/16377](http://www.nrfirescience.org/resource/16377)

Quaking aspen is generally considered to be a fire-adapted species because it regenerates prolifically after fire, and it can be replaced by more shade-tolerant tree species in the absence of fire. As early-successional aspen stands transition to greater conifer-dominance, they become increasingly fire prone, until fire returns, and...

Author(s): Douglas J. Shinneman, Kevin Krasnow, Susan K. McIlroy

Year Published: 2015

Type: Document  
Research Brief or Fact Sheet

### **Determination of the smoke-plume heights and their dynamics with ground-based scanning LIDAR**

[www.nrfirescience.org/resource/13611](http://www.nrfirescience.org/resource/13611)

Lidar-data processing techniques are analyzed, which allow determining smoke-plume heights and their dynamics and can be helpful for the improvement of smoke dispersion and air quality models. The data processing algorithms considered in the paper are based on the analysis of two alternative characteristics related to the smoke...

Author(s): Vladimir A. Kovalev, Alexander P. Petkov, Cyle E. Wold, Shawn P. Urbanski, Wei Min Hao

Year Published: 2015

Type: Document  
Book or Chapter or Journal Article

### **A systematic review of the physical health impacts from non-occupational exposure to wildfire smoke**

[www.nrfirescience.org/resource/13262](http://www.nrfirescience.org/resource/13262)

Climate change is likely to increase the threat of wild fires, and little is known about how wild fires affect health in exposed communities. A better understanding of the impacts of the resulting air pollution has important public health implications for the present day and the future. Method: We performed a systematic search to...

Author(s): Jia C. Liu, Gavin Pereira, Sarah A. Uhl, Mercedes Bravo, Michelle L. Bell

Year Published: 2015

Type: Document  
Synthesis

## **Are high-severity fires burning at much higher rates recently than historically in dry-forest landscapes of the western USA?**

[www.nrfirescience.org/resource/13487](http://www.nrfirescience.org/resource/13487)

Dry forests at low elevations in temperate-zone mountains are commonly hypothesized to be at risk of exceptional rates of severe fire from climatic change and land-use effects. Their setting is fire-prone, they have been altered by land-uses, and fire severity may be increasing. However, where fires were excluded, increased fire...

Author(s): William L. Baker

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **Principles of effective USA federal fire management plans**

[www.nrfirescience.org/resource/13454](http://www.nrfirescience.org/resource/13454)

Federal fire management plans are essential implementation guides for the management of wildland fire on federal lands. Recent changes in federal fire policy implementation guidance and fire science information suggest the need for substantial changes in federal fire management plans of the United States. Federal land management...

Author(s): Marc D. Meyer, Susan L. Roberts, Robin Wills, Matthew L. Brooks, Eric M. Winford

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

## **Adapting to climate change**

[www.nrfirescience.org/resource/13430](http://www.nrfirescience.org/resource/13430)

Federal agencies have led the development of adaptation principles and tools in forest ecosystems over the past decade. Successful adaptation efforts generally require organizations to: (1) develop science-management partnerships, (2) provide education on climate change science, (3) provide a toolkit of methods and processes for...

Author(s): Constance I. Millar, Christopher W. Swanson, David L. Peterson

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

## **Prescribed fire effects on resource selection by cattle in mesic sagebrush steppe. part 1: spring grazing**

[www.nrfirescience.org/resource/12148](http://www.nrfirescience.org/resource/12148)

Prescribed fire is commonly applied world-wide as a tool for enhancing habitats and altering resource-selection patterns of grazing animals. A scientific basis for this practice has been established in some ecosystems but its efficacy has not been rigorously evaluated on mesic sagebrush steppe. Beginning in 2003, resource-selection...

Author(s): Patrick E. Clark, Jaechoul Lee, Kyungduk Ko, Ryan M. Nielson, Douglas E. Johnson, David C. Ganskopp, Joe Chigbrow, Frederick B. Pierson, Stuart P. Hardegree

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

## **Restoration fuels treatments in old-growth- Visiting research plots in western larch and ponderosa pine forests**

[www.nrfirescience.org/resource/12674](http://www.nrfirescience.org/resource/12674)

Mick Harrington and Steve Arno, retired research foresters with the USFS Rocky Mountain Research

Station, took participants of the May 2014 Large Wildland Fires Conference through a 300-year-old stand of ponderosa pine (*Pinus ponderosa*) and western larch (*Larix occidentalis*). While there, they discussed their research, which...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

### **Applying resilience thinking - Seven principles for building resilience in social-ecological systems**

[www.nrfirescience.org/resource/13407](http://www.nrfirescience.org/resource/13407)

This publication is a popular summary of the book "Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems", published by Cambridge University Press (2014). This book, in turn, expands on the comprehensive review "Towards principles for enhancing the resilience of..."

Author(s): Stockholm University

Year Published: 2014

Type: Document

Technical Report or White Paper

### **Semiarid rangeland is resilient to summer fire and postfire grazing utilization**

[www.nrfirescience.org/resource/12050](http://www.nrfirescience.org/resource/12050)

Most wildfires occur during summer in the northern hemisphere, the area burned annually is increasing, and fire effects during this season are least understood. Understanding plant response to grazing following summer fire is required to reduce ecological and financial risks associated with wildfire. Forty 0.75-ha plots were...

Author(s): Lance T. Vermeire, Jessica L. Crowder, David B. Wester

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and greater sage-grouse: a strategic multi-scale approach**

[www.nrfirescience.org/resource/12989](http://www.nrfirescience.org/resource/12989)

This Report provides a strategic approach for conservation of sagebrush ecosystems and Greater Sage- Grouse (sage-grouse) that focuses specifically on habitat threats caused by invasive annual grasses and altered fire regimes. It uses information on factors that influence (1) sagebrush ecosystem resilience to disturbance and...

Author(s): Jeanne C. Chambers, David A. Pyke, Jeremy D. Maestas, Michael L. Pellant, Chad S. Boyd, Steven B. Campbell, Shawn Espinosa, Douglas W. Havlina, Kenneth E. Mayer, Amarina Wuenschel

Year Published: 2014

Type: Document

Management or Planning Document

### **Linking environmental research and practice: lessons from the integration of climate science and water management in the western United States**

[www.nrfirescience.org/resource/12626](http://www.nrfirescience.org/resource/12626)

Efforts to better connect scientific research with people and organizations involved in environmental decision making are receiving increased interest and attention. Some of the challenges we currently face, however—including complex questions associated with climate change—are unlike most of the

environmental issues encountered...

Author(s): Daniel B. Ferguson, Jennifer Rice, Connie Woodhouse

Year Published: 2014

Type: Document

Synthesis, Technical Report or White Paper

### **Six basic smoke management practices for prescribed burning**

[www.nrfirescience.org/resource/12384](http://www.nrfirescience.org/resource/12384)

Smoke management has become one of the leading challenges facing prescribed fire practitioners in the Southeast and the continued use of prescribed fire in the region may depend on effective smoke and emission mitigation practices. While not a comprehensive list of smoke management strategies, the 2011 USFS-NRCS guide to Basic Smoke...

Author(s): David R. Godwin, Alan J. Long, Peter Lahm

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

### **Dry forest resilience varies under simulated climate-management scenarios in a central Oregon, USA landscape**

[www.nrfirescience.org/resource/14233](http://www.nrfirescience.org/resource/14233)

Determining appropriate actions to create or maintain landscapes resilient to climate change is challenging because of uncertainty associated with potential effects of climate change and their interactions with land management. We used a set of climate-informed state-and-transition models to explore the effects of management and...

Author(s): Joshua S. Halofsky, Jessica E. Halofsky, Theresa Burcsu, Miles A. Hemstrom

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Learning to coexist with wildfire**

[www.nrfirescience.org/resource/15326](http://www.nrfirescience.org/resource/15326)

The impacts of escalating wildfire in many regions — the lives and homes lost, the expense of suppression and the damage to ecosystem services — necessitate a more sustainable coexistence with wildfire. Climate change and continued development on fire-prone landscapes will only compound current problems. Emerging strategies for...

Author(s): Max A. Moritz, E. Batllori, Ross A. Bradstock, A. Malcolm Gill, J. Handmer, Paul F. Hessburg, J. Leonard, Sarah M. McCaffrey, Dennis C. Odion, Tania L. Schoennagel, Alexandra D. Syphard

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

### **The Bitterroot Valley fires of 2000 - Revisiting experiences and fire effects 13 years later**

[www.nrfirescience.org/resource/12673](http://www.nrfirescience.org/resource/12673)

During the Fires of 2000 field trip, held as part of the May 2014 Large Wildland Fires Conference, researchers, managers, residents, and stakeholders shared their experiences around the unprecedented number and size of fires that burned in the Bitterroot Valley in the summer of 2000.

Topics discussed included fire history, fire...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

### **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

### **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

### **Fuels treatments in ponderosa pine - Visits to the Boise National Forest and Boise Basin Exp. Forest**

[www.nrfirescience.org/resource/12928](http://www.nrfirescience.org/resource/12928)

Terrie Jain, Research Forester with the USFS Rocky Mountain Research Station, together with foresters, and fire and wildlife managers from the Boise National Forest led a tour of fuels treatments in dry conifer forests around Idaho City, Idaho. Site visits provided a visual of high forest fuel conditions with potential to support...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document

Research Brief or Fact Sheet

### **Northern Rocky Mountain Experimental Forests: settings for science, management, and education alliances**

[www.nrfirescience.org/resource/12911](http://www.nrfirescience.org/resource/12911)

Society's view of forests and what they produce changed considerably during the latter part of the 20th century. Prior to the 1970s, society believed that forests in the western United States provided a seemingly infinite supply of natural resources and economic prosperity. The public trusted experts to make forest management...

Author(s): Theresa B. Jain, Michael A. Battaglia, Russell T. Graham

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Management for mountain pine beetle outbreak suppression: does relevant science support current policy?**

[www.nrfirescience.org/resource/13571](http://www.nrfirescience.org/resource/13571)

While the use of timber harvests is generally accepted as an effective approach to controlling bark beetles during outbreaks, in reality there has been a dearth of monitoring to assess outcomes, and failures are often not reported. Additionally, few studies have focused on how these treatments affect forest structure and function...

Author(s): Diana L. Six, Eric Biber, Elisabeth Long

Year Published: 2014

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Perverse incentives: the case of wildfire smoke regulation**

[www.nrfirescience.org/resource/14235](http://www.nrfirescience.org/resource/14235)

Wildfire is on the rise. The United States is witnessing a spectacular increase in acres lost to catastrophic wildfires, a phenomenon fed by the generally hotter and dryer conditions associated with climate change. In addition to losses in lives, property, and natural resources, wildfires contribute thousands of tons of air...

Author(s): Kirsten H. Engel

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **Resistance and resilience: a conceptual framework for silviculture**

[www.nrfirescience.org/resource/16862](http://www.nrfirescience.org/resource/16862)

Increasingly, forest management goals include building or maintaining resistance and/or resilience to disturbances in the face of climate change. Although a multitude of descriptive definitions for resistance and resilience exist, to evaluate whether specific management activities (silviculture) are effective, prescriptive...

Author(s): R. Justin DeRose, James N. Long

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

### **The many elements of traditional fire knowledge: synthesis, classification, and aids to cross-cultural problem solving in fire-dependent systems around the world**

[www.nrfirescience.org/resource/12537](http://www.nrfirescience.org/resource/12537)

I examined the hypothesis that traditional social-ecological fire systems around the world include common elements of traditional fire knowledge (TFK). I defined TFK as fire-related knowledge, beliefs, and practices that have been developed and applied on specific landscapes for specific purposes by long time inhabitants. In all, 69...

Author(s): Mary R. Huffman  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **Diversity and dynamism of fire science user needs**

[www.nrfirescience.org/resource/12636](http://www.nrfirescience.org/resource/12636)

The Joint Fire Science Program has initiated regional consortia to deliver science to managers and other natural resource stakeholders. Given the diversity and complexity of forest management and policy, there is a need to understand and reframe fire science user audiences. In this article, we assess fire science use in the US...

Author(s): Emily Jane Davis, Cassandra Moseley, Christine Olsen, Jesse Abrams, Janean Creighton  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article, Synthesis

### **The science of decision making: applications for sustainable forest and grassland management in the national forest system**

[www.nrfirescience.org/resource/16143](http://www.nrfirescience.org/resource/16143)

Sustainable management of national forests and grasslands within the National Forest System (NFS) often requires managers to make tough decisions under considerable uncertainty, complexity, and potential conflict. Resource decisionmakers must weigh a variety of risks, stressors, and challenges to sustainable management, including...

Author(s): Matthew P. Thompson, Bruce G. Marcot, Frank R. Thompson, Steven G. McNulty, Larry A. Fisher, Michael C. Runge, David Cleaves, Monica S. Tomosy  
Year Published: 2013  
Type: Document  
Technical Report or White Paper

### **A technical guide for monitoring wildlife habitat**

[www.nrfirescience.org/resource/12383](http://www.nrfirescience.org/resource/12383)

Information about status and trend of wildlife habitat is important for the U.S. Department of Agriculture, Forest Service to accomplish its mission and meet its legal requirements. As the steward of 193 million acres (ac) of Federal land, the Forest Service needs to evaluate the status of wildlife habitat and how it compares with...

Author(s): Mary M. Rowland, Christina D. Vojta  
Year Published: 2013  
Type: Document  
Technical Report or White Paper

### **Comparing the effect of salvage logging on birds in the Mediterranean Basin and the Rocky Mountains: common patterns, different conservation implications**

[www.nrfirescience.org/resource/12016](http://www.nrfirescience.org/resource/12016)

Postfire salvage logging is currently a controversial issue because of the impact that the removal of snags has on ecosystem structure and function. Although it is a common practice worldwide, the absence of comparisons across regions hinders the development of broad generalizations. Here we compare bird response to postfire salvage...

Author(s): Josep Rost, Richard L. Hutto, Lluís Brotons, Pere Pons  
Year Published: 2013  
Type: Document  
Book or Chapter or Journal Article

### **Highlights of satellite-based forest change recognition and tracking using the ForWarn System**

[www.nrfirescience.org/resource/12395](http://www.nrfirescience.org/resource/12395)

Satellite-based remote sensing can assist forest managers with their need to recognize disturbances and track recovery. Despite the long standing availability of raw imagery, the systematic delivery of spatially continuous, ready-to-use, processed products has evaded us until recently. The web-based ForWarn system moves us a step...

Author(s): Steven P. Norman, William W. Hargrove, Joseph P. Spruce, William M. Christie, Sean W. Schroeder

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Gas-particle partitioning of primary organic aerosol emissions: 3. Biomass burning**

[www.nrfirescience.org/resource/13476](http://www.nrfirescience.org/resource/13476)

Atmospheric organic aerosol concentrations depend in part on the gas-particle partitioning of primary organic aerosol (POA) emissions. Consequently, heating and dilution were used to investigate the volatility of biomass-burning smoke particles from combustion of common North American trees/shrubs/grasses during the third Fire Lab...

Author(s): Andrew A. May, Ezra Levin, Christopher J. Hennigan, Ilona Riipinen, Taehyoung Lee, Jeffrey L. Collett, Jose L. Jimenez, Sonia M. Kreidenweis, Allen L. Robinson

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Making monitoring count: project design for active adaptive management**

[www.nrfirescience.org/resource/12768](http://www.nrfirescience.org/resource/12768)

Ongoing environmental change requires that managers develop strategies capable of achieving multiple objectives in an uncertain future. Active adaptive management (AAM) offers a robust approach to reducing uncertainty while also considering diverse stakeholder perspectives. Important features of AAM include recognition of learning...

Author(s): Andrew J. Larson, R. Travis Belote, Matthew A. Williamson, Gregory H. Aplet

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Consequences of spatial heterogeneity for ecosystem services in changing forest landscapes: priorities for future research**

[www.nrfirescience.org/resource/13431](http://www.nrfirescience.org/resource/13431)

Changes in key drivers (e.g., climate, disturbance regimes and land use) may affect the sustainability of forest landscapes and set the stage for increased tension among competing ecosystem services. We addressed two questions about a suite of supporting, regulating and provisioning ecosystem services in each of two well-studied...

Author(s): Monica G. Turner, Daniel C. Donato, William H. Romme

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **Effectiveness of post-fire Burned Area Emergency Response (BAER) road treatments: results from three wildfires**

[www.nrfirescience.org/resource/12142](http://www.nrfirescience.org/resource/12142)

Wildland fires often cause extreme changes in the landscape that drastically influence surface runoff and soil erosion, which can impact forest resources, aquatic habitats, water supplies, public safety, and forest access infrastructure such as forest roads. Little information is available on the effectiveness of various post-fire...

Author(s): Randy B. Foltz, Peter R. Robichaud

Year Published: 2013

Type: Document

Technical Report or White Paper

### **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

### **Summary of science, activities, programs, and policies that influence the rangewide conservation of greater sage-grouse (*Centrocercus urophasianus*)**

[www.nrfirescience.org/resource/15420](http://www.nrfirescience.org/resource/15420)

Because of their broad range, variations in population traits and characteristics across this range, and the variability in habitat conditions and threats within this range, conservation of sage-grouse is a unique challenge compared to isolated or range-restricted species, primarily due to the scale of the effort. This complexity is...

Author(s): D.J. Manier, D.J.A. Wood, Z.H. Bowen, R.M. Donovan, M.J. Holloran, L.M. Juliusson, K.S. Mayne, S.J. Oyler-McCance, F.R. Quamen, D.J. Saher, A.J. Titolo

Year Published: 2013

Type: Document

Technical Report or White Paper

### **Rethinking the study of landscape management practices among hunter-gatherers in North America**

[www.nrfirescience.org/resource/16979](http://www.nrfirescience.org/resource/16979)

There has been little movement to systematically incorporate the study of indigenous landscape management practices the method and theory of hunter-gatherer research in North American archaeology, despite a growing interest in this The purposes of this article are twofold. One is to address why, until quite recently, archaeologists...

Author(s): Kent G. Lightfoot, Rob Q. Cuthrell, Chuck J. Striplen, Mark G. Hylkema

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **The national cohesive wildland fire management strategy: phase III western regional action plan**

[www.nrfirescience.org/resource/11971](http://www.nrfirescience.org/resource/11971)

The Western Regional Action Plan is part of the culmination of a three-year effort put into motion by the Federal Land Assistance, Management and Enhancement Act of 2009 (FLAME Act). Representatives of federal, state, local, and tribal governments, scientists, interested governmental and nongovernmental organizations, businesses and...

Author(s): Wildland Fire Executive Council

Year Published: 2013

Type: Document

Management or Planning Document

### **Sustainability in forest management and a new role for resilience thinking**

[www.nrfirescience.org/resource/16879](http://www.nrfirescience.org/resource/16879)

Forest management faces a substantial challenge with ever-more-pervasive anthropogenic impacts and growing demands on forests coupled with the increasing certainty of global change. If the capacity of forests to provide valued ecological goods and services in the future is to be maintained, new tools and approaches will be needed....

Author(s): Lucy Rist, Jon Moen

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

### **FUEGO - Fire Urgency Estimator in Geosynchronous Orbit - A proposed early-warning fire detection system**

[www.nrfirescience.org/resource/12388](http://www.nrfirescience.org/resource/12388)

Current and planned wildfire detection systems are impressive but lack both sensitivity and rapid response times. A small telescope with modern detectors and significant computing capacity in geosynchronous orbit can detect small (12 m<sup>2</sup>) fires on the surface of the earth, cover most of the western United States (under conditions of...

Author(s): Carlton R. Pennypacker, Marek K. Jakubowski, Maggi Kelly, Michael Lampton, Christopher Schmidt, Scott L. Stephens, Robert Tripp

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

### **Utility of remotely sensed imagery for assessing the impact of salvage logging after forest fires**

[www.nrfirescience.org/resource/8352](http://www.nrfirescience.org/resource/8352)

Remotely sensed imagery provides a useful tool for land managers to assess the extent and severity of post-wildfire salvage logging disturbance. This investigation uses high resolution QuickBird and National Agricultural Imagery Program (NAIP) imagery to map soil exposure after ground-based salvage operations. Three wildfires with...

Author(s): Sarah A. Lewis, Peter R. Robichaud, Andrew T. Hudak, Brian Austin, Robert J. Liebermann

Year Published: 2012  
Type: Document  
Book or Chapter or Journal Article

**Tree spatial patterns in fire-frequent forests of western North America, including mechanisms of pattern formation and implications for designing fuel reduction and restoration treatments**

[www.nrfirescience.org/resource/8316](http://www.nrfirescience.org/resource/8316)

Restoring characteristic fire regimes and forest structures are central objectives of many restoration and fuel reduction projects. Within-stand spatial pattern is a fundamental attribute of forest structure and influences many ecological processes and ecosystem functions. In this review we synthesize the available spatial reference...

Author(s): Andrew J. Larson, Derek J. Churchill

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

**Roads impact the distribution of noxious weeds more than restoration treatments in a lodgepole pine forest in Montana, U.S.A.**

[www.nrfirescience.org/resource/8346](http://www.nrfirescience.org/resource/8346)

A century of fire suppression has created unnaturally dense stands in many western North American forests, and silviculture treatments are being increasingly used to reduce fuels to mitigate wildfire hazards and manage insect infestations. Thinning prescriptions have the potential to restore forests to a more historically...

Author(s): Jennifer L. Birdsall, Ward W. McCaughey, Justin B. Runyon

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

**Do thinning and/or burning treatments in western USA ponderosa or Jeffrey pine-dominated forests help restore natural fire behavior?**

[www.nrfirescience.org/resource/8318](http://www.nrfirescience.org/resource/8318)

We carried out a systematic review and meta-analysis of the effects of forest thinning and burning treatments on restoring fire behavior attributes in western USA pine forests. Ponderosa pine (*Pinus ponderosa*) and Jeffrey pine (*Pinus jeffreyi*), with co-occurring species, are adapted to a disturbance regime of frequent surface fires...

Author(s): Peter Z. Fule, Joseph E. Crouse, John Paul Roccaforte, Elizabeth L. Kalies

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

**Adaptation: planning for climate change and its effects on federal lands**

[www.nrfirescience.org/resource/12449](http://www.nrfirescience.org/resource/12449)

National forest managers are charged with tackling the effects of climate change on the natural resources under their care. The Forest Service National Roadmap for Responding to Climate Change and the Climate Change Performance Scorecard require managers to make significant progress in addressing climate change by 2015. To help land...

Author(s): Marie Oliver

Year Published: 2012

Type: Document

Research Brief or Fact Sheet

## **Understanding the effects of fire management practices on forest health: implications for weeds and vegetation structure**

[www.nrfirescience.org/resource/11986](http://www.nrfirescience.org/resource/11986)

Current fire policy to restore ecosystem function and resiliency and reduce buildup of hazardous fuels implies a larger future role for fire (both natural and human ignitions) (USDA Forest Service and U.S. Department of the Interior 2000). Yet some fire management (such as building fire line, spike camps, or helispots) potentially...

Author(s): Anne E. Black, Peter Landres

Year Published: 2012

Type: Document

Technical Report or White Paper

## **Climate change, forests, fire, water, and fish: building resilient landscapes, streams, and managers**

[www.nrfirescience.org/resource/11270](http://www.nrfirescience.org/resource/11270)

Fire will play an important role in shaping forest and stream ecosystems as the climate changes. Historic observations show increased dryness accompanying more widespread fire and forest die-off. These events punctuate gradual changes to ecosystems and sometimes generate stepwise changes in ecosystems. Climate vulnerability...

Author(s): Charles H. Luce, Penelope Morgan, Kathleen A. Dwire, Daniel J. Isaak, Zachary A. Holden, Bruce E. Rieman

Year Published: 2012

Type: Document

Technical Report or White Paper

## **Chapter 9: Implications of fire management on cultural resources**

[www.nrfirescience.org/resource/12571](http://www.nrfirescience.org/resource/12571)

Previous chapters in this synthesis have identified the important fuel, weather, and fire relationships associated with damage to cultural resources (CR). They have also identified the types of effects commonly encountered in various fire situations and provided some guidance on how to recognize damages and minimize their occurrence...

Author(s): Rebecca Timmons, Leonard F. DeBano, Kevin C. Ryan

Year Published: 2012

Type: Document

Synthesis, Technical Report or White Paper

## **Cheating cheatgrass: new research to combat a wily invasive weed**

[www.nrfirescience.org/resource/12130](http://www.nrfirescience.org/resource/12130)

Cheatgrass and its cousin, red brome, are exotic annual grasses that have invaded and altered ecosystem dynamics in more than 41 million acres of desert shrublands between the Rockies and the Cascade-Sierra chain. A fungus naturally associated with these Bromus species has been found lethal to the plants' soil-banked dormant seeds....

Author(s): Gail Wells

Year Published: 2012

Type: Document

Research Brief or Fact Sheet

## **Can we manage for resilience? The integration of resilience thinking into natural resource management in the United States**

[www.nrfirescience.org/resource/12693](http://www.nrfirescience.org/resource/12693)

The concept of resilience is now frequently invoked by natural resource agencies in the US. This reflects growing trends within ecology, conservation biology, and other disciplines acknowledging that social–ecological systems require management approaches recognizing their complexity. In this paper, we examine the concept of...

Author(s): Melinda Harm Benson, Ahjond S. Garmestani

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **The future of high-elevation, five-needle white pines in western North America: Proceedings of the High Five Symposium. 28-30 June 2010; Missoula, MT**

[www.nrfirescience.org/resource/11894](http://www.nrfirescience.org/resource/11894)

High elevation five-needle pines are rapidly declining throughout North America. The six species, whitebark (*Pinus albicaulis* Engelm.), limber (*P. flexilis* James), southwestern white (*P. strobiformis* Engelm.), foxtail (*P. balfouriana* Grev....

Author(s): Robert E. Keane, Diana F. Tomback, Michael P. Murray, Cyndi M. Smith

Year Published: 2011

Type: Document

Conference Proceedings

### **Working with American Indian tribes on wildland fires: protecting cultural heritage sites in northwestern California**

[www.nrfirescience.org/resource/16098](http://www.nrfirescience.org/resource/16098)

The Federal Land Policy and Management Act (1976: Public Law 94-579) requires coordination with approved tribal management plans for the purposes of development and revisions of such plans and is inclusive of programs or projects. Federal Government consultation, such as government-to-government protocol agreements with federally...

Author(s): Frank K. Lake

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Getting results: measuring post-wildfire erosion control treatment effectiveness**

[www.nrfirescience.org/resource/11031](http://www.nrfirescience.org/resource/11031)

In the past decade, wildfires around the world have continued to increase in size, severity, and cost. The number of people living in wildland areas has also increased, putting public safety, homes, roads, public infrastructure, water quality, and valued natural resources at risk from wildfire and secondary fire effects. Major...

Author(s): Peter R. Robichaud, Robert E. Brown, Peter M. Wohlgemuth, Joseph W. Wagenbrenner

Year Published: 2011

Type: Document

Conference Proceedings

### **Using native annual plant species to suppress weedy invasive species in post-fire habitats - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11467](http://www.nrfirescience.org/resource/11467)

Increasing fire frequencies and uncharacteristic severe fires have created a need for improved restoration methods across rangelands in western North America. Traditional restoration seed mixtures of perennial mid- to late-seral plant species may not be suitable for intensely burned sites that have been returned to an early-seral...

Author(s): Mark W. Paschke, Paul J. Meiman, William H. Romme, Cynthia S. Brown

Year Published: 2011  
Type: Document  
Technical Report or White Paper

### **Disturbance ecology of high-elevation five-needle pine ecosystems in western North America**

[www.nrfirescience.org/resource/11896](http://www.nrfirescience.org/resource/11896)

This paper synthesizes existing information about the disturbance ecology of high-elevation five-needle pine ecosystems, describing disturbances regimes, how they are changing or are expected to change, and the implications for ecosystem persistence. As it provides the context for ecosystem conservation/restoration programs, we...

Author(s): Elizabeth M. Campbell, Robert E. Keane, Evan R. Larson, Michael P. Murray, Anna W. Schoettle, Carmen Wong

Year Published: 2011

Type: Document

Conference Proceedings, Synthesis

### **Beyond fire behavior and fuels: learning from the past to help guide us in the future**

[www.nrfirescience.org/resource/18397](http://www.nrfirescience.org/resource/18397)

The third IAWF Fire Behavior and Fuels Conference was held in Spokane, Washington, October 25-29, 2010, and commemorated the 100th anniversary of the 1910 fires in the Northern Rocky Mountains. The theme of the conference was appropriately titled 'Beyond Fire Behavior and Fuels: Learning from the Past to Help Guide Us in the...

Year Published: 2011

Type: Document

Conference Proceedings

### **Responding to climate change in national forests: a guidebook for developing adaptation options**

[www.nrfirescience.org/resource/13428](http://www.nrfirescience.org/resource/13428)

This guidebook contains science-based principles, processes, and tools necessary to assist with developing adaptation options for national forest lands. The adaptation process is based on partnerships between local resource managers and scientists who work collaboratively to understand potential climate change effects, identify...

Author(s): David L. Peterson, Constance I. Millar, Linda A. Joyce, Michael J. Furniss, Jessica E. Halofsky, Ronald P. Neilson, Toni Lyn Morelli

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

### **Effects of post-fire salvage logging on cavity-nesting birds and small mammals in southeastern Montana**

[www.nrfirescience.org/resource/12052](http://www.nrfirescience.org/resource/12052)

We investigated how post-fire salvage logging of Ponderosa Pine (*Pinus ponderosa*) affected populations of cavity-nesting birds and small mammals in southeastern Montana in 2004 and 2005. We examined two salvage and two control plots with three point-count stations and one small mammal trap site randomly distributed across each plot...

Author(s): William J. Kronland, Marco Restani

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Strategies, tools, and challenges for sustaining and restoring high elevation five-needle white pine forests in western North America**

[www.nrfirescience.org/resource/11899](http://www.nrfirescience.org/resource/11899)

Many ecologically important, five-needle white pine forests that historically dominated the high elevation landscapes of western North America are now being heavily impacted by mountain pine beetle (*Dendroctonus* spp.) outbreaks, the exotic disease white pine blister rust (WPBR), and altered high elevation fire regimes. Management...

Author(s): Robert E. Keane, Anna W. Schoettle

Year Published: 2011

Type: Document

Conference Proceedings

### **Comprehensive fuels treatment practices guide for mixed conifer forests: California, central and southern Rockies, and the Southwest**

[www.nrfirescience.org/resource/12630](http://www.nrfirescience.org/resource/12630)

The goal of this guide is to provide a resource for managers of mixed conifer forests of the Southwestern plateaus and uplands, the Central and Southern Rocky Mountains, the Sierra Nevada, and the Transverse and Peninsular Ranges in Southern California. Mixed conifer forests have different species, structures, and spatial patterns...

Author(s): Alexander M. Evans, Rick G. Everett, Scott L. Stephens, James A. Youtz

Year Published: 2011

Type: Document

Synthesis, Technical Report or White Paper

### **What Is Limiting More Flexible Fire Management—Public or Agency Pressure?**

[www.nrfirescience.org/resource/17812](http://www.nrfirescience.org/resource/17812)

Conventional wisdom within American federal fire management agencies suggests that external influence such as community or political pressure for aggressive suppression are key factors circumscribing the ability to execute less aggressive fire management strategies. Thus, a better understanding of external constraints on fire...

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

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

### **Restoration of whitebark pine forests in the northern Rocky Mountains, USA**

[www.nrfirescience.org/resource/11900](http://www.nrfirescience.org/resource/11900)

Whitebark pine (*Pinus albicaulis*) has been declining across much of its range in North America because of the combined effects of mountain pine beetle epidemics, fire exclusion policies, and widespread exotic blister rust infections. Whitebark pine seed is dispersed by a bird, the Clark's nutcracker, which caches seed in open,...

Author(s): Robert E. Keane

Year Published: 2011

Type: Document

Conference Proceedings

### **Restoring whitebark pine forests of the northern Rocky Mountains, USA**

[www.nrfirescience.org/resource/8394](http://www.nrfirescience.org/resource/8394)

Whitebark pine (*Pinus albicaulis*) has been declining across much of its range in North America because of the combined effects of mountain pine beetle (*Dendroctonus ponderosae*) epidemics, fire

exclusion policies, and widespread exotic blister rust infections. Whitebark pine seed is dispersed by a bird, the Clark's nutcracker (...)

Author(s): Robert E. Keane, Russell A. Parsons

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Continued evaluation of post-fire recovery and treatment effectiveness for validation of the ERMiT erosion model (combined proposals P07-2-2-10 and P07-2-3-06) - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11227](http://www.nrfirescience.org/resource/11227)

The use and cost of post-fire emergency stabilization treatments continues to grow. To help maximize the impact of these treatments, many assessment teams use the Erosion Risk Management Tool (ERMiT) erosion model to predict postfire erosion and mitigation effects. However, despite several completed JFSP projects, the long-term...

Author(s): Peter R. Robichaud, William J. Elliot, Joseph W. Wagenbrenner, Sarah A. Lewis, Louise E. Ashmun, Peter M. Wohlgemuth, Robert E. Brown

Year Published: 2010

Type: Document

Technical Report or White Paper

### **Management guide to ecosystem restoration treatments: whitebark pine forests of the Northern Rocky Mountains, U.S.A.**

[www.nrfirescience.org/resource/11143](http://www.nrfirescience.org/resource/11143)

Whitebark pine is declining across much of its range in North America because of the combined effects of mountain pine beetle epidemics, fire exclusion policies, and widespread exotic blister rust infections. This management guide summarizes the extensive data collected at whitebark pine treatment sites for three periods: (1) pre-...

Author(s): Robert E. Keane, Russell A. Parsons

Year Published: 2010

Type: Document

Technical Report or White Paper

### **Mitigating old tree mortality in long-unburned, fire-dependent forests: a synthesis**

[www.nrfirescience.org/resource/12618](http://www.nrfirescience.org/resource/12618)

This report synthesizes the literature and current state of knowledge pertaining to reintroducing fire in stands where it has been excluded for long periods and the impact of these introductory fires on overstory tree injury and mortality. Only forested ecosystems in the United States that are adapted to survive frequent fire are...

Author(s): Sharon M. Hood

Year Published: 2010

Type: Document

Synthesis, Technical Report or White Paper

### **Post-fire treatment effectiveness for hillslope stabilization**

[www.nrfirescience.org/resource/12594](http://www.nrfirescience.org/resource/12594)

This synthesis of post-fire treatment effectiveness reviews the past decade of research, monitoring, and product development related to post-fire hillslope emergency stabilization treatments, including erosion barriers, mulching, chemical soil treatments, and combinations of these treatments. In the past ten years, erosion barrier...

Author(s): Peter R. Robichaud, Louise E. Ashmun, Bruce D. Sims

Year Published: 2010  
Type: Document  
Synthesis, Technical Report or White Paper

### **Current health issues and management strategies for white pines in the western United States and Canada**

[www.nrfirescience.org/resource/8233](http://www.nrfirescience.org/resource/8233)

The introduced pathogen *Cronartium ribicola*, cause of white pine blister rust, has spread across much of western North America and established known infestations within all but one species of white pine endemic to western Canada and the United States. Blister rust damage to severely diseased trees reduces reproduction and survival...

Author(s): John W. Schwandt, I. Blakley Lockman, John T. Kliejunas, J. A. Muir

Year Published: 2010

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Integrating fuel treatment into ecosystem management: a proposed project planning process**

[www.nrfirescience.org/resource/8206](http://www.nrfirescience.org/resource/8206)

Concern over increased wildland fire threats on public lands throughout the western United States makes fuel reduction activities the primary driver of many management projects. This single-issue focus recalls a management planning process practiced frequently in recent decades - a least-harm approach where the primary objective is...

Author(s): Keith Stockmann, Kevin D. Hyde, J. Greg Jones, Dan R. Loeffler, Robin P. Silverstein

Year Published: 2010

Type: Document

Book or Chapter or Journal Article, Management or Planning Document

### **Delaying sheep grazing after wildfire in sagebrush steppe may not affect vegetation recovery**

[www.nrfirescience.org/resource/11439](http://www.nrfirescience.org/resource/11439)

Although many land managers prohibit grazing for 2 years after a fire, little research has been conducted to determine the interaction of grazing with vegetation recovery after fire. In a study conducted in sagebrush steppe rangelands after a 2000 wildfire at the United States Sheep Experiment Station in Idaho, the influence of...

Author(s): Lovina Roselle, Steven S. Seefeldt, Karen Launchbaugh

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Restoration treatment effects on stand structure, tree growth, and fire hazard in a ponderosa pine/Douglas-fir forest in Montana**

[www.nrfirescience.org/resource/8159](http://www.nrfirescience.org/resource/8159)

Crown fires that burned thousands of ha of ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.) forests in recent years attest to the hazardous conditions extant on the western landscape. Managers have responded with broad-scale implementation of fuel reduction treatments; however, because threats to pine forests extend beyond fire, so...

Author(s): Carl E. Fiedler, Kerry L. Metlen, Erich K. Dodson

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **Silvicultural management of white pines in western North America**

[www.nrfirescience.org/resource/8235](http://www.nrfirescience.org/resource/8235)

Since the introduction prior to 1915 of white pine blister rust (*Cronartium ribicola*) into the forests of western North America, many populations of native white pine species have seriously declined. Because western white pine (*Pinus monticola*) and sugar pine (*P. lambertiana*) are highly valued timber species, their silviculture...

Author(s): Stefan Zeglen, John Pronos, H. Merler

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **The Sagebrush Steppe Treatment Evaluation Project (SageSTEP): a test of state-and-transition theory**

[www.nrfirescience.org/resource/11226](http://www.nrfirescience.org/resource/11226)

The Sagebrush Steppe Treatment Evaluation Project (SageSTEP) is a comprehensive, integrated, long-term study that evaluates the ecological effects of fire and fire surrogate treatments designed to reduce fuel and to restore sagebrush (*Artemisia* spp.) communities of the Great Basin and surrounding areas. SageSTEP has several features...

SageSTEP has several features...

Author(s): James D. Mclver, Mark W. Brunson, Stephen C. Bunting, Jeanne C. Chambers, Nora Devoe, Paul S. Doescher, James B. Grace, Dale Johnson, 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

Year Published: 2010

Type: Document

Technical Report or White Paper

### **Disturbance and landscape dynamics in a changing world**

[www.nrfirescience.org/resource/13432](http://www.nrfirescience.org/resource/13432)

Disturbance regimes are changing rapidly, and the consequences of such changes for ecosystems and linked social-ecological systems will be profound. This paper synthesizes current understanding of disturbance with an emphasis on fundamental contributions to contemporary landscape and ecosystem ecology, then identifies future...

Author(s): Monica G. Turner

Year Published: 2010

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Interactive effects of historical logging and fire exclusion on ponderosa pine forest structure in the northern Rockies**

[www.nrfirescience.org/resource/8210](http://www.nrfirescience.org/resource/8210)

Increased forest density resulting from decades of fire exclusion is often perceived as the leading cause of historically aberrant, severe, contemporary wildfires and insect outbreaks documented in some fire-prone forests of the western United States. Based on this notion, current U.S. forest policy directs managers to reduce stand...

Author(s): Cameron Naficy, Anna Sala, Eric G. Keeling, Jon Graham, Thomas H. DeLuca

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

### **The '88 Fires: Yellowstone and Beyond IAWF Conference Proceedings**

[www.nrfirescience.org/resource/18464](http://www.nrfirescience.org/resource/18464)

Description not available

Author(s): Ronald E. Masters, Krista E. M. Galley, Don G. Despain

Year Published: 2009

Type: Document

Conference Proceedings

### **Technical guide for monitoring selected conditions related to wilderness character**

[www.nrfirescience.org/resource/12437](http://www.nrfirescience.org/resource/12437)

The purpose of monitoring wilderness character is to improve wilderness stewardship by providing managers a tool to assess how selected actions and conditions related to wilderness character are changing over time. Wilderness character monitoring provides information to help answer two key questions about wilderness character and...

Author(s): Peter Landres, Steve Boutcher, Liese Dean, Troy E. Hall, Tamara Blett, Terry Carlson, Ann Mebane, Carol Hardy, Susan Rinehart, Linda Merigliano, David N. Cole, Andy Leach, Pam Wright, Deb Bumpus

Year Published: 2009

Type: Document

Technical Report or White Paper

### **A multi-disciplinary approach to fire management strategy, suppression costs, community interaction and organizational performance**

[www.nrfirescience.org/resource/17806](http://www.nrfirescience.org/resource/17806)

Over the past several fire seasons, there has been increasing emphasis on strategies to achieve fire management objectives using less than full perimeter control, such as more prescribed burning and focused point and area protection. While the strategies and tactics themselves are not new, wider use by Federal agencies, particularly...

Author(s): Anne E. Black, Krista M. Gebert, Sarah M. McCaffrey, Toddi A. Steelman, Janie Canton-Thompson

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **Managing for multiple resources under climate change: National Forests**

[www.nrfirescience.org/resource/13435](http://www.nrfirescience.org/resource/13435)

This study explores potential adaptation approaches in planning and management that the United States Forest Service might adopt to help achieve its goals and objectives in the face of climate change. Availability of information, vulnerability of ecological and socio-economic systems, and uncertainties associated with climate change...

Author(s): Linda A. Joyce, Geoffrey M. Blate, Steven G. McNulty, Constance I. Millar, Susanne Moser, Ronald P. Neilson, David L. Peterson

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **A MODIS direct broadcast algorithm for mapping wildfire burned area in the western United States**

[www.nrfirescience.org/resource/8191](http://www.nrfirescience.org/resource/8191)

Improved wildland fire emission inventory methods are needed to support air quality forecasting and guide the development of air shed management strategies. Air quality forecasting requires dynamic fire emission estimates that are generated in a timely manner to support real-time operations. In the regulatory and planning realm,...

Author(s): Shawn P. Urbanski, J. Meghan Salmon, Bryce L. Nordgren, Wei Min Hao  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Nest-site selection by cavity-nesting birds in relation to postfire salvage logging**

[www.nrfirescience.org/resource/8383](http://www.nrfirescience.org/resource/8383)

Large wildfire events in coniferous forests of the western United States are often followed by postfire timber harvest. The long-term impacts of postfire timber harvest on fire-associated cavity-nesting bird species are not well documented. We studied nest-site selection by cavity-nesting birds over a 10-year period (1994-2003),...

Author(s): Victoria A. Saab, Robin E. Russell, Jonathan G. Dudley  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Invasive pathogen threatens bird-pine mutualism: implications for sustaining a high-elevation ecosystem**

[www.nrfirescience.org/resource/8190](http://www.nrfirescience.org/resource/8190)

Human-caused disruptions to seed-dispersal mutualisms increase the extinction risk for both plant and animal species. Large-seeded plants can be particularly vulnerable due to highly specialized dispersal systems and no compensatory regeneration mechanisms. Whitebark pine (*Pinus albicaulis*), a keystone subalpine species, obligately...

Author(s): Shawn T. McKinney, Carl E. Fiedler, Diana F. Tomback  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Developing computer-based participatory approaches to mapping landscape values for landscape and resource management**

[www.nrfirescience.org/resource/16127](http://www.nrfirescience.org/resource/16127)

The last 50 years or so have seen a steady increase in the rate of destructive wildfires across the world, partly as a result of climate change and partly as a result of encroachment of human settlement on fire-based ecosystems (Russell et al. 2004; Westerling et al. 2006). Years of active fire suppression in such areas has...

Author(s): Stephen J. Carver, Alan E. Watson, Tim Waters, Roian Matt, Kari Gunderson, Brett Davis  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Variable impacts of imazapic rate on downy brome (*Bromus tectorum*) and seeded species in two rangeland communities**

[www.nrfirescience.org/resource/8332](http://www.nrfirescience.org/resource/8332)

The herbicide imazapic is registered for use on rangelands and provides effective short-term control of certain invasive annual grasses. However, details about optimal application rates for downy brome and susceptibility of simultaneously seeded species are lacking. Thus, we investigated downy brome and seeded species responses to...

Author(s): Christo Morris, Thomas A. Monaco, Craig W. Rigby  
Year Published: 2009  
Type: Document  
Book or Chapter or Journal Article

### **Tree squirrel habitat selection and predispersal seed predation in a declining subalpine conifer**

[www.nrfirescience.org/resource/8395](http://www.nrfirescience.org/resource/8395)

Differential responses by species to modern perturbations in forest ecosystems may have undesirable impacts on plant-animal interactions. If such disruptions cause declines in a plant species without corresponding declines in a primary seed predator, the effects on the plant could be exacerbated. We examined one such interaction...

Author(s): Shawn T. McKinney, Carl E. Fiedler

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

### **A synthesis of postfire road treatments for BAER teams: methods, treatment effectiveness, and decisionmaking tools for rehabilitation**

[www.nrfirescience.org/resource/12622](http://www.nrfirescience.org/resource/12622)

We synthesized post-fire road treatment information to assist BAER specialists in making road rehabilitation decisions. We developed a questionnaire; conducted 30 interviews of BAER team engineers and hydrologists; acquired and analyzed gray literature and other relevant publications; and reviewed road rehabilitation procedures and...

Author(s): Randy B. Foltz, Peter R. Robichaud, Hakjun Rhee

Year Published: 2009

Type: Document

Synthesis, Technical Report or White Paper

### **Synthesis of knowledge on the effects of fire and fire surrogates on wildlife in U.S. dry forests**

[www.nrfirescience.org/resource/12617](http://www.nrfirescience.org/resource/12617)

Dry forests throughout the United States are fire-dependent ecosystems, and much attention has been given to restoring their ecological function. As such, land managers often are tasked with reintroducing fire via prescribed fire, wildland fire use, and fire-surrogate treatments such as thinning and mastication. During planning,...

Author(s): Patricia L. Kennedy, Joseph B. Fontaine

Year Published: 2009

Type: Document

Synthesis, Technical Report or White Paper

### **Emergency post-fire rehabilitation treatment effects on burned area ecology and long-term restoration**

[www.nrfirescience.org/resource/12591](http://www.nrfirescience.org/resource/12591)

The predicted continuation of strong drying and warming trends in the southwestern United States underlies the associated prediction of increased frequency, area, and severity of wildfires in the coming years. As a result, the management of wildfires and fire effects on public lands will continue to be a major land management...

Author(s): Peter R. Robichaud, Sarah A. Lewis, Robert E. Brown, Louise E. Ashmun

Year Published: 2009

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Measuring effectiveness of three postfire hillslope erosion barrier treatments, western Montana, USA**

[www.nrfirescience.org/resource/8389](http://www.nrfirescience.org/resource/8389)

After the Valley Complex Fire burned 86 000 ha in western Montana in 2000, two studies were conducted to determine the effectiveness of contour-felled log, straw wattle, and hand-dug contour trench erosion barriers in mitigating postfire runoff and erosion. Sixteen plots were located across a steep, severely burned slope, with a...

Author(s): Peter R. Robichaud, Frederick B. Pierson, Robert E. Brown, Joseph W. Wagenbrenner

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Living artifacts: the ancient ponderosa pines of the West**

[www.nrfirescience.org/resource/8160](http://www.nrfirescience.org/resource/8160)

Until late in the nineteenth century, magnificent ponderosa pine forests blanketed much of the inland West. They covered perhaps 30 million acres, an area the size of New York state, spreading across the mountains of New Mexico, Arizona, and California and flourishing throughout the eastern Cascades, the intermountain Pacific...

Author(s): Stephen F. Arno, Lars Ostlund, Robert E. Keane

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions**

[www.nrfirescience.org/resource/16887](http://www.nrfirescience.org/resource/16887)

Biome-scale disturbances by eruptive herbivores provide valuable insights into species interactions, ecosystem function, and impacts of global change. We present a conceptual framework using one system as a model, emphasizing interactions across levels of biological hierarchy and spatiotemporal scales. Bark beetles are major natural...

Author(s): Kenneth F. Raffa, Brian H. Aukema, Barbara J. Bentz, Allan L. Carroll, Jeffrey A. Hicke, Monica G. Turner, William H. Romme

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Evaluating the effectiveness of contour-felled log erosion barriers as a post-fire runoff and erosion mitigation treatment in the western United States**

[www.nrfirescience.org/resource/8167](http://www.nrfirescience.org/resource/8167)

Between 1998 and 2002, six sites were established immediately after large wildfires in the western United States to determine the effectiveness of contour-felled log erosion barriers in mitigating post-wildfire runoff and erosion. In each pair of matched, burned, and small watersheds (1-13 ha), one was treated with contour-felled...

Author(s): Peter R. Robichaud, Joseph W. Wagenbrenner, Robert E. Brown, Peter M. Wohlgenuth, Jan L. Beyers

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

### **Wildland fire in ecosystems: fire and nonnative invasive plants**

[www.nrfirescience.org/resource/12531](http://www.nrfirescience.org/resource/12531)

This state-of-knowledge review of information on relationships between wildland fire and nonnative invasive plants can assist fire managers and other land managers concerned with prevention, detection, and eradication or control of nonnative invasive plants. The 16 chapters in this volume

synthesize ecological and botanical...  
Year Published: 2008  
Type: Document  
Synthesis, Technical Report or White Paper

### **Wildfire smoke: a guide for public health officials**

[www.nrfirescience.org/resource/12451](http://www.nrfirescience.org/resource/12451)

Smoke rolls into town, blanketing the city, turning on streetlights, creating an eerie and choking fog. Switchboards light up as people look for answers. Citizens want to know what they should do to protect themselves. School officials want to know if outdoor events should be cancelled. The news media want to know how dangerous the...

Author(s): Michael Lipsett, Barbara Materna, Susan Lyon Stone, Shannon Therriault, Robert Blaisdell, Jeff Cook

Year Published: 2008

Type: Document

Technical Report or White Paper

### **Landscape-level changes**

[www.nrfirescience.org/resource/11480](http://www.nrfirescience.org/resource/11480)

Since European settlement, Utah's vegetative landscapes have changed. Like other arid states, these wildland systems were depleted and altered. Certain steps were taken through private, community, and finally public efforts, such as establishment of Forest Reserves (National Forests), to stop the slide. Conservation and management...

Author(s): Joel A. Frandsen

Year Published: 2008

Type: Document

Conference Proceedings

### **Managing forest structure and fire hazard - A tool for planners**

[www.nrfirescience.org/resource/8404](http://www.nrfirescience.org/resource/8404)

Fire planners and other resource managers need to examine a range of potential fuel and vegetation treatments to select options that will lead to desired outcomes for fire hazard and natural resource conditions. A new approach to this issue integrates concepts and tools from silviculture and fuel science to quantify outcomes for a...

Author(s): Morris C. Johnson, David L. Peterson, Crystal L. Raymond

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Treatment of data influenced by exceptional events; final rule**

[www.nrfirescience.org/resource/12454](http://www.nrfirescience.org/resource/12454)

This action finalizes a rule to govern the review and handling of air quality monitoring data influenced by exceptional events. Exceptional events are events for which the normal planning and regulatory process established by the Clean Air Act (CAA) is not appropriate. In this rulemaking action, EPA is finalizing the proposal to:...

Author(s): U.S. Environmental Protection Agency

Year Published: 2007

Type: Document

Management or Planning Document, Technical Report or White Paper

## **Fire, fuels and restoration of ponderosa pine-Douglas fir forests in the Rocky Mountains, USA**

[www.nrfirescience.org/resource/8223](http://www.nrfirescience.org/resource/8223)

Forest restoration in ponderosa pine and mixed ponderosa pine-Douglas fir forests in the US Rocky Mountains has been highly influenced by a historical model of frequent, low-severity surface fires developed for the ponderosa pine forests of the Southwestern USA. A restoration model, based on this low-severity fire model, focuses on...

Author(s): William L. Baker, Thomas T. Veblen, Rosemary L. Sherriff

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

## **Nest densities of cavity-nesting birds in relation to postfire salvage logging and time since wildfire**

[www.nrfirescience.org/resource/8145](http://www.nrfirescience.org/resource/8145)

We monitored the nest densities and nest survival of seven cavity-nesting bird species, including four open-space foragers (American Kestrel [*Falco sparverius*], Lewis's Woodpecker [*Melanerpes lewis*], Western Bluebird [*Sialia mexicana*], and Mountain Bluebird [*S. currucoides*]) and three wood-foragers (Hairy Woodpecker [*Picoides*...

Author(s): Victoria A. Saab, Robin E. Russell, Jonathan G. Dudley

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

## **Photographic handbook for comparing burned and unburned sites within a dry forested and grassland mosaic: a tool for communication, calibration, and monitoring post-fire effects**

[www.nrfirescience.org/resource/11237](http://www.nrfirescience.org/resource/11237)

This photograph handbook describes characteristics and burn severity of a dry forested and grassland mosaic that burned within the last decade. We show photographs of different burned and unburned sites to help compare fire occurrence in similar stands. The handbook provides local land managers with a quick, inexpensive, and...

Author(s): Theresa B. Jain, Molly Juillerat, Jonathan Sandquist, Mike Ford, Brad Sauer, Robert J. Mitchell, Scott McAvoy, Justin Hanley, Jon David

Year Published: 2007

Type: Document

Technical Report or White Paper

## **The influence of white pine blister rust on seed dispersal in whitebark pine**

[www.nrfirescience.org/resource/8391](http://www.nrfirescience.org/resource/8391)

We tested the hypotheses that white pine blister rust (*Cronartium ribicola* J.C. Fisch.) damage in whitebark pine (*Pinus albicaulis* Engelm.) stands leads to reduced (1) seed cone density, (2) predispersal seed survival, and (3) likelihood of Clark's Nutcracker (*Nucifraga columbiana* (Wilson, 1811)) seed dispersal. We gathered data...

Author(s): Shawn T. McKinney, Diana F. Tomback

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

## **Guide to fuel treatments in dry forests of the Western United States: assessing forest structure and fire hazard**

[www.nrfirescience.org/resource/11166](http://www.nrfirescience.org/resource/11166)

Guide to Fuel Treatments analyzes a range of fuel treatments for representative dry forest stands in the

Western United States with overstories dominated by ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and pinyon pine (*Pinus edulis*). Six silvicultural options (no thinning; thinning from below to 50 trees...

Author(s): Morris C. Johnson, David L. Peterson, Crystal L. Raymond

Year Published: 2007

Type: Document

Technical Report or White Paper

### **Science information for informing forest fuel management in dry forests of the western United States**

[www.nrfirescience.org/resource/7929](http://www.nrfirescience.org/resource/7929)

Land managers need timely and straightforward access to the best scientific information available for informing decisions on how to treat forest fuels in the dry forests of the western United States.

However, although there is a tremendous amount of information available for informing fuels management decisions, often, it is in a...

Author(s): Sarah M. McCaffrey, Russell T. Graham

Year Published: 2007

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Floods, fire, and ice: disturbance ecology of riparian cottonwoods**

[www.nrfirescience.org/resource/8237](http://www.nrfirescience.org/resource/8237)

Cottonwoods are poplar trees that are well adapted to dynamic riparian, or streamside, zones throughout the Northern Hemisphere. Here we assess the influences of three prominent physical disturbances, floods, fire, and ice, on cottonwood population ecology. We emphasize cottonwoods along rivers from the 'Crown of the Continent', the...

Author(s): Stewart B. Rood, Lori A. Goater, John M. Mahoney, Cheryl M. Pearce, Derald G. Smith

Year Published: 2007

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Simulation of the consequences of different fire regimes to support wildland fire use decisions**

[www.nrfirescience.org/resource/11429](http://www.nrfirescience.org/resource/11429)

The strategy known as wildland fire use, in which lightning-ignited fires are allowed to burn, is rapidly gaining momentum in the fire management community. Managers need to know the consequences of an increase in area burned that might result from an increase in wildland fire use. One concern of land managers as they consider...

Author(s): Carol Miller

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

### **Development of initial Wildland Fire Use documentation for Charles M. Russell National Wildlife Refuge**

[www.nrfirescience.org/resource/11077](http://www.nrfirescience.org/resource/11077)

The Charles M. Russell National Wildlife Refuge manages ecosystems that depend on fire for their maintenance. Fire is abundant in and adjacent to the refuge where lightning and human ignitions can rapidly spread in grass and shrub fuels. Farm and ranch land which would be adversely impacted by fire, pose a significant logistical...

Author(s): Bill Clark, Doug Stephen, Pat Stephen, Laurie L. Kurth, Ken Kerr

Year Published: 2006

Type: Document  
Management or Planning Document

### **Short- and longer-term effects of fire and herbivory on sagebrush communities in south-central Montana**

[www.nrfirescience.org/resource/15440](http://www.nrfirescience.org/resource/15440)

To better understand the role of herbivory and fire as potential disturbance processes in sagebrush communities, we examined responses of a grazing ungulate, elk (*Cervus elaphus*), following prescribed burning of sagebrush (*Artemisia tridentata* ssp. *vaseyana*) in south-central Montana (USA.) with concurrent monitoring of changes in...

Author(s): Fred Van Dyke, Jeffrey A. Darragh

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **The roles of natural and human disturbances in forest soil erosion**

[www.nrfirescience.org/resource/8170](http://www.nrfirescience.org/resource/8170)

Forests provide numerous benefits for society, including fibre, wildlife and recreation. Forest managers are challenged to balance ecosystem health with maintaining public forest lands for multiple uses. During the first half of the last century, public forest management emphasized the harvesting of forest resources. In recent years...

Author(s): William J. Elliot

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **The complexity of managing fire-dependent ecosystems in wilderness: relict ponderosa pine in the Bob Marshall Wilderness**

[www.nrfirescience.org/resource/7953](http://www.nrfirescience.org/resource/7953)

Isolated wilderness ecosystems with a history of frequent, low-severity fires have been altered due to many decades of fire exclusion and, as a result, are difficult to restore for philosophical and logistical reasons. In this paper, we describe the successional conditions of ponderosa pine (*Pinus ponderosa*) communities along the...

Author(s): Robert E. Keane, Stephen F. Arno, Laura J. Dickinson

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Postfire logging in riparian ecosystems**

[www.nrfirescience.org/resource/8126](http://www.nrfirescience.org/resource/8126)

We reviewed the behavior of wildfire in riparian zones, primarily in the western United States, and the potential ecological consequences of postfire logging. Fire behavior in riparian zones is complex, but many aquatic and riparian organisms exhibit a suite of adaptations that allow relatively rapid recovery after fire. Unless...

Author(s): Gordon H. Reeves, Peter A. Bisson, Bruce E. Rieman, Lee E. Benda

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Ecological science relevant to management policies for fire-prone forests of the western United**

### **States, Society for Conservation Biology scientific panel of fire in western U.S. forests**

[www.nrfirescience.org/resource/11190](http://www.nrfirescience.org/resource/11190)

Fire is a primary natural disturbance in most forests of western North America and has shaped their plant and animal communities for millions of years. Native species and fundamental ecological processes are dependent on conditions created by fire. However, many western forests have experienced shifts in wildfire regimes and forest...

Author(s): Reed F. Noss, Jerry F. Franklin, William L. Baker, Tania L. Schoennagel, Peter B. Moyle

Year Published: 2006

Type: Document

Technical Report or White Paper

### **Overcoming barriers to the use of science in national parks (session summary)**

[www.nrfirescience.org/resource/12564](http://www.nrfirescience.org/resource/12564)

Following passage of the 1998 National Parks Omnibus Management Act (also known as the Thomas Bill), the National Park Service (NPS) secured funding through the Natural Resource Challenge (NRC) to promote scientifically sound management of parks, increase the scientific community's involvement in providing needed information, and...

Author(s): Vita Wright

Year Published: 2006

Type: Document

Conference Proceedings

### **Using focus groups to involve citizens in resource management - investigating perceptions of smoke as a barrier to prescribed forest burning**

[www.nrfirescience.org/resource/11214](http://www.nrfirescience.org/resource/11214)

Participants in a series of focus groups discussed how their tolerance for smoke varied by the source of the smoke and found their opinions changing as they talked with other participants. Even those opposed to smoke from agricultural burning eventually found smoke from prescribed forest burning would be acceptable under appropriate...

Author(s): Brad R. Weisshaupt, Matthew S. Carroll, Keith A. Blatner, Pamela J. Jakes

Year Published: 2006

Type: Document

Technical Report or White Paper

### **Wilderness fire management in a changing world**

[www.nrfirescience.org/resource/7963](http://www.nrfirescience.org/resource/7963)

Several strategies are available for reducing accumulated forest fuels and their associated risks, including naturally or accidentally ignited wildland fires, management ignited prescribed fires, and a variety of mechanical and chemical methods (Omi 1996). However, a combination of policy, law, philosophy, and logistics suggest...

Author(s): Carol Miller

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

### **Snag longevity in relation to wildfire and postfire salvage logging**

[www.nrfirescience.org/resource/8142](http://www.nrfirescience.org/resource/8142)

Snags create nesting, foraging, and roosting habitat for a variety of wildlife species. Removal of snags through postfire salvage logging reduces the densities and size classes of snags remaining after wildfire. We determined important variables associated with annual persistence rates (the probability a snag remains standing from 1...

Author(s): Robin E. Russell, Victoria A. Saab, Jonathan G. Dudley, Jay J. Rotella  
Year Published: 2006  
Type: Document  
Book or Chapter or Journal Article

### **Ponderosa pine ecosystems**

[www.nrfirescience.org/resource/11142](http://www.nrfirescience.org/resource/11142)

Ponderosa pine is one of the most widely distributed tree species in western North America. It is highly-valued as a source of lumber, but also is key to the health and social value western forests, whether growing in pure stands or in mixture with other conifer and hardwood species. In recent years, management objectives for...

Author(s): Russell T. Graham, Theresa B. Jain  
Year Published: 2006  
Type: Document  
Synthesis, Technical Report or White Paper

### **Monitoring changes in soil quality from post-fire logging in the inland northwest**

[www.nrfirescience.org/resource/11015](http://www.nrfirescience.org/resource/11015)

The wildland fires of 2000, 2002, and 2003 created many opportunities to conduct post-fire logging operations in the Inland Northwest. Relatively little information is available on the impact of post-fire logging on long-term soil productivity or on the best method for monitoring these changes. We present a USDA Forest Service...

Author(s): Deborah S. Page-Dumroese, Martin F. Jurgensen, Ann Abbott, Thomas M. Rice, Joanne M. Tirocke, Sue Farley, Sharon DeHart  
Year Published: 2006  
Type: Document  
Conference Proceedings

### **Fire and restoration of sagebrush ecosystems**

[www.nrfirescience.org/resource/15377](http://www.nrfirescience.org/resource/15377)

Wildlife managers often resort to prescribed fire to restore sagebrush (*Artemisia* spp.) ecosystems thought to have been affected by fire exclusion. However, a fire mosaic of burned and unburned areas may be tolerated by certain wildlife but can be detrimental to sagebrush obligates. This article assesses evidence about the...

Author(s): William L. Baker  
Year Published: 2006  
Type: Document  
Book or Chapter or Journal Article

### **Vegetation response to restoration treatments in ponderosa pine-Douglas-fir forests**

[www.nrfirescience.org/resource/11503](http://www.nrfirescience.org/resource/11503)

The study site is located at the University of Montana's Lubrecht Experimental Forest, Missoula County, Montana, USA. This study is 1 of 13 in a nationwide network of Fire/Fire Surrogate (FFS) studies investigating the interdisciplinary effects of treatments designed to reduce fire hazard and restore the structure and function of...

Author(s): Kerry L. Metlen, Erich K. Dodson, Carl E. Fiedler  
Year Published: 2006  
Type: Document  
Research Brief or Fact Sheet

### **Whitebark pine guidelines for planting prescriptions**

[www.nrfirescience.org/resource/11005](http://www.nrfirescience.org/resource/11005)

This paper reviews general literature, research studies, field observations, and standard Forest Service survival surveys of high-elevation whitebark pine plantations and presents a set of guidelines for outplanting prescriptions. When planting whitebark pine, the recommendations are: 1) reduce overstory competition; 2) reduce...

Author(s): Joe H. Scott, Ward W. McCaughey

Year Published: 2006

Type: Document

Conference Proceedings

### **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

### **New technology for fuel breaks and green strips in urban interface and wildland areas**

[www.nrfirescience.org/resource/11039](http://www.nrfirescience.org/resource/11039)

Threat from wildfire can be greatly minimized through proactive efforts that reduce and slow spread through use of green strips or fuel breaks, and decrease fire volatility by reducing fuel load. This results in greater safety to fire fighters and protection to key urban interface areas or wildlife habitat. The fight against western...

Author(s): Jennifer L. Vollmer

Year Published: 2005

Type: Document

Conference Proceedings

### **Forest structure and fire hazard in dry forests of the Western United States**

[www.nrfirescience.org/resource/11163](http://www.nrfirescience.org/resource/11163)

ANNOTATION: This document synthesizes the relevant scientific knowledge that can assist fuel-treatment projects on national forests and other public lands and contribute to National Environmental Policy Act (NEPA) analyses and other assessments. It is intended to support science-based decision making for fuel management in dry...

Author(s): David L. Peterson, Morris C. Johnson, James K. Agee, Theresa B. Jain, Donald McKenzie, Elizabeth D. Reinhardt

Year Published: 2005

Type: Document

Synthesis, Technical Report or White Paper

### **Reseeding big sagebrush: techniques and issues**

[www.nrfirescience.org/resource/11006](http://www.nrfirescience.org/resource/11006)

Reestablishing big sagebrush on rangelands now dominated by native perennial grasses, introduced perennial grasses, or exotic annual grasses, particularly cheatgrass (*Bromus tectorum*), serves to stabilize soil, improve moisture availability and nutrient recycling, increase biological diversity, and foster community stability and...

Author(s): Nancy L. Shaw, Ann M. DeBolt, Roger Rosentreter  
Year Published: 2005  
Type: Document  
Conference Proceedings

### **When to prescribe**

[www.nrfirescience.org/resource/11500](http://www.nrfirescience.org/resource/11500)

Prescribed fire can be the most practical and affordable way to reduce dangerous accumulations of combustible fuels. At the same time, prescribed fire can help restore the ecological process of fire to fire-adapted ecosystems through its influence on soil nutrients, growth and mortality of plants, seedling establishment and...

Author(s): Carol Miller

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

### **Restoring Wyoming big sagebrush**

[www.nrfirescience.org/resource/8420](http://www.nrfirescience.org/resource/8420)

The widespread occurrence of big sagebrush can be attributed to many adaptive features. Big sagebrush plays an essential role in its communities by providing wildlife habitat, modifying local environmental conditions, and facilitating the reestablishment of native herbs. Currently, however, many sagebrush steppe communities are...

Author(s): Cindy R. Lysne

Year Published: 2005

Type: Document

Conference Proceedings, Synthesis

### **Assessing the causes, consequences and spatial variability of burn severity: a rapid response proposal - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11149](http://www.nrfirescience.org/resource/11149)

In this rapid response project, we have collected data on post-fire effects and pre-fire fuels and vegetation from 10 large fires that burned in 2003 and 2004. We use field and remotely sensed data collected during and soon after wildfires to quantify the interactions and spatial variability in fire effects, fuels, fire behavior,...

Author(s): Penelope Morgan, Andrew T. Hudak, Peter R. Robichaud, Kevin C. Ryan

Year Published: 2005

Type: Document

Technical Report or White Paper

### **Simple algorithm to determine the near-edge smoke boundaries with scanning lidar**

[www.nrfirescience.org/resource/7957](http://www.nrfirescience.org/resource/7957)

We propose a modified algorithm for the gradient method to determine the near-edge smoke plume boundaries using backscatter signals of a scanning lidar. The running derivative of the ratio of the signal standard deviation (STD) to the accumulated sum of the STD is calculated, and the location of the global maximum of this function is...

Author(s): Vladimir A. Kovalev, Cyle E. Wold, Jenny O. Newton, Wei Min Hao

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

### **Strategies to enhance plant structure and diversity in crested wheatgrass seedings**

[www.nrfirescience.org/resource/8417](http://www.nrfirescience.org/resource/8417)

Crested wheatgrass (*Agropyron cristatum* sensu amplo [L.] Gaertn.) is an introduced, caespitose grass that has been seeded on millions of acres of Western rangelands. In some areas, crested wheatgrass seedings overlap with critical sage-grouse (*Centrocercus urophasianus*; *C. minimus*) habitat, raising the question of how plant...

Author(s): Michael L. Pellant, Cindy R. Lysne

Year Published: 2005

Type: Document

Conference Proceedings, Synthesis

### **Visualizing a forest landscape today and tomorrow**

[www.nrfirescience.org/resource/11102](http://www.nrfirescience.org/resource/11102)

Description not entered

Author(s): J. Greg Jones

Year Published: 2005

Type: Document

Research Brief or Fact Sheet

### **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

### **Land-base changes in the United States: long-term assessments of forest land condition**

[www.nrfirescience.org/resource/126](http://www.nrfirescience.org/resource/126)

Forest land conditions affect the potential of U.S. forests to sustain a wide array of forest goods and environmental services (e.g., biodiversity) that society demands. Forest survey data collected by U.S. Department of Agriculture Forest Service Forest Inventory and Analysis (FIA) units are being used in long-term assessments of U...

Author(s): Ralph J. Alig

Year Published: 2005

Type: Document

Technical Report or White Paper

### **Restoration of ponderosa pine forests in the interior western U.S. after logging, grazing, and fire suppression**

[www.nrfirescience.org/resource/8195](http://www.nrfirescience.org/resource/8195)

No description entered.

Author(s): Merrill R. Kaufmann, Kevin C. Ryan, Peter Z. Fule, William H. Romme

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

### **Dry forests and wildland fires of the inland Northwest USA: contrasting the landscape ecology of the pre-settlement and modern eras**

[www.nrfirescience.org/resource/7941](http://www.nrfirescience.org/resource/7941)

Prior to Euro-American settlement, dry ponderosa pine and mixed conifer forests (hereafter, the 'dry forests') of the Inland Northwest were burned by frequent low- or mixed-severity fires. These mostly surface fires maintained low and variable tree densities, light and patchy ground fuels, simplified forest structure, and favored...

Author(s): Paul F. Hessburg, James K. Agee, Jerry F. Franklin

Year Published: 2005

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Plant succession and approaches to community restoration**

[www.nrfirescience.org/resource/8418](http://www.nrfirescience.org/resource/8418)

The processes of vegetation change over time, or plant succession, are also the processes involved in plant community restoration. Restoration efforts attempt to use designed disturbance, seedbed preparation and sowing methods, and selection of adapted and compatible native plant materials to enhance ecological function. The large...

Author(s): Bruce A. Roundy

Year Published: 2005

Type: Document

Conference Proceedings, Synthesis

### **Sage-grouse habitat restoration symposium proceedings**

[www.nrfirescience.org/resource/11007](http://www.nrfirescience.org/resource/11007)

Declines in habitat of greater sage-grouse and Gunnison sage-grouse across the western United States are related to degradation, loss, and fragmentation of sagebrush ecosystems resulting from development of agricultural lands, grazing practices, changes in wildfire regimes, increased spread of invasive species, gas and oil...

Author(s): Nancy L. Shaw, Michael L. Pellant, Stephen B. Monsen

Year Published: 2005

Type: Document

Conference Proceedings

### **Landscape restoration for greater sage-grouse: implications for multiscale planning and monitoring**

[www.nrfirescience.org/resource/8419](http://www.nrfirescience.org/resource/8419)

Habitats and populations of greater sage-grouse (*Centrocercus urophasianus*) have declined throughout western North America in response to a myriad of detrimental land uses. Successful restoration of this species' habitat, therefore, is of keen interest to Federal land agencies who oversee management of most remaining habitat. To...

Author(s): Michael J. Wisdom, Mary M. Rowland, Miles A. Hemstrom, Barbara C. Wales

Year Published: 2005

Type: Document

Conference Proceedings, Synthesis

### **Restoring dry and moist forests of the inland northwestern U. S.**

[www.nrfirescience.org/resource/7903](http://www.nrfirescience.org/resource/7903)

The complex topography of the inland northwestern U.S. (58.4 million ha) interacts with continental and maritime air masses to create a highly variable climate, which results in a variety of forest settings. Historically (1850 to 1900), approximately 20% of the area was covered by dry forests (*Pinus*

ponderosa, *Pseudotsuga menziesii*...  
Author(s): Theresa B. Jain, Russell T. Graham  
Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article

**Automated forecasting of smoke dispersion and air quality using NASA terra and aqua satellite data (Task 5) - Final Report to the Joint Fire Science Program**

[www.nrfirescience.org/resource/11150](http://www.nrfirescience.org/resource/11150)

This document contains a description of the air quality forecasting system in operation at the Missoula Fire Science Laboratory. This air quality forecasting system has been steadily assimilating new techniques and algorithms as they have been developed over the past four years. Individual components as well as assemblies of...

Author(s): Wei Min Hao, Shawn P. Urbanski  
Year Published: 2005  
Type: Document  
Technical Report or White Paper

**Physiological response of ponderosa pine in western Montana to thinning, prescribed fire, and burning season**

[www.nrfirescience.org/resource/8147](http://www.nrfirescience.org/resource/8147)

Low-elevation ponderosa pine (*Pinus ponderosa* Dougl. ex. Laws.) forests of the northern Rocky Mountains historically experienced frequent low-intensity fires that maintained open uneven-aged stands. A century of fire exclusion has contributed to denser ponderosa pine forests with greater competition for resources, higher tree stress...

Author(s): Anna Sala, Gregory D. Peters, Lorna R. McIntyre, Michael G. Harrington  
Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article

**Effective management strategies for sage-grouse and sagebrush: a question of triage?**

[www.nrfirescience.org/resource/8367](http://www.nrfirescience.org/resource/8367)

The sagebrush (*Artemisia* spp.) ecosystem once occupied over 150 million acres of western North America (Barbour and Billings 1988). The ecosystem still occupies over 100 million acres (Connelly et al. 2004, Wisdom et al. 2005), but the abundance and condition of sagebrush communities is declining rapidly in response to a variety of...

Author(s): Michael J. Wisdom, Mary M. Rowland, Robin J. Tausch  
Year Published: 2005  
Type: Document  
Book or Chapter or Journal Article

**Fire ecology of ponderosa pine and the rebuilding of fire-resilient ponderosa pine ecosystems**

[www.nrfirescience.org/resource/11074](http://www.nrfirescience.org/resource/11074)

The ponderosa pine ecosystems of the West have change dramatically since Euro-American settlement 140 years ago due to past land uses and the curtailment of natural fire. Today, ponderosa pine forests contain overabundance of fuel, and stand densities have increased from a range of 49-124 trees ha<sup>-1</sup> (20-50 trees acre<sup>-1</sup>) to a range...

Author(s): Stephen A. Fitzgerald  
Year Published: 2005  
Type: Document  
Conference Proceedings, Synthesis

**Monitoring changes in weed populations: post-fire and post-herbicide treatment**

[www.nrfirescience.org/resource/11040](http://www.nrfirescience.org/resource/11040)

Description not entered

Author(s): Elaine Kennedy Sutherland

Year Published: 2004

Type: Document

Conference Proceedings

**Restoring vigor and reducing hazard in an old growth western larch stand (Montana)**

[www.nrfirescience.org/resource/7926](http://www.nrfirescience.org/resource/7926)

Description not entered

Author(s): Carl E. Fiedler, Michael G. Harrington

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

**Lewis's Woodpecker (*Melanerpes lewis*): a technical conservation assessment**

[www.nrfirescience.org/resource/11498](http://www.nrfirescience.org/resource/11498)

Lewis's woodpecker (*Melanerpes lewis*) is a locally common but patchily distributed woodpecker species usually seen in open forests of western North America. The combination of its sporadic distribution, its diet of adult-stage free-living insects (primarily aerial), its preference to nest in burned landscapes, and its variable...

Author(s): Stephen C. Abele, Victoria A. Saab, Edward O. Garton

Year Published: 2004

Type: Document

Technical Report or White Paper

**Forbs for seeding range and wildlife habitats**

[www.nrfirescience.org/resource/11120](http://www.nrfirescience.org/resource/11120)

Description not entered

Author(s): Richard Stevens, Stephen B. Monsen

Year Published: 2004

Type: Document

Technical Report or White Paper

**Guidelines for restoration and rehabilitation of principal plant communities**

[www.nrfirescience.org/resource/11121](http://www.nrfirescience.org/resource/11121)

Range and wildland improvement projects conducted throughout the Intermountain region normally occur within specific plant communities. Each plant community has unique features that require different equipment, planting techniques, and plant materials to conduct improvement projects. Plant communities or associations discussed in...

Author(s): Richard Stevens, Stephen B. Monsen

Year Published: 2004

Type: Document

Technical Report or White Paper

**Establishment of aerially seeded big sagebrush following southern Idaho wildfires**

[www.nrfirescience.org/resource/11412](http://www.nrfirescience.org/resource/11412)

In the western United States, big sagebrush (*Artemisia tridentata*) steppe communities dominate approximately 60 million ha (148 million acres) and comprise the largest vegetation type (Wambolt and Hoffman 2001). However, due to the invasion of exotic plants, fire has become a driving force in the ecology and management of sagebrush...

Author(s): Cindy R. Lysne, Michael L. Pellant

Year Published: 2004

Type: Document

Technical Report or White Paper

### **Basic considerations for range and wildlife revegetation and restoration**

[www.nrfirescience.org/resource/11118](http://www.nrfirescience.org/resource/11118)

Plummer and others (1968) proposed 10 principles to follow when planning and implementing rangeland revegetation programs. These principles - or basic considerations for rangeland managers - are applicable to most sites in the Western United States (Jordan 1981; Merkel and Herbal 1973), and many projects in the Intermountain area...

Author(s): Richard Stevens

Year Published: 2004

Type: Document

Technical Report or White Paper

### **Fuels planning: science synthesis and integration; environmental consequences fact sheet 7: fire and weeds**

[www.nrfirescience.org/resource/14945](http://www.nrfirescience.org/resource/14945)

Weed infestations cause an economic loss of \$13 billion per year even though \$9.5 billion per year is spent on weed control measures. In addition to these economic costs, weeds are replacing native species, altering native plant and animal communities, affecting ecosystem health and function, threatening biodiversity and Threatened...

Author(s): Steve Sutherland

Year Published: 2004

Type: Document

Research Brief or Fact Sheet

### **Enhancing moist forest restoration opportunities in riparian systems**

[www.nrfirescience.org/resource/10976](http://www.nrfirescience.org/resource/10976)

In northern Rocky Mountain moist forests, riparian systems contain many attributes that create unique biophysical conditions that alter disturbances and microenvironments; thus creating distinct forest structures, species composition, and management challenges. For example, browsing, limited opening size, competition from...

Author(s): Theresa B. Jain, Russell T. Graham

Year Published: 2004

Type: Document

Conference Proceedings, Synthesis

### **Human and nature interactions: a dynamic land base of many goods and services**

[www.nrfirescience.org/resource/149](http://www.nrfirescience.org/resource/149)

Availability of land is fundamental for sustainable forestry, providing the basis for the production of a wide array of goods and services (for example, biodiversity, forest carbon sequestration). This paper summarizes types of land-related data contained in major U.S. data bases, and gives examples of how such data were used in...

Author(s): Ralph J. Alig

Year Published: 2004

Type: Document  
Conference Proceedings

### **Introduction to the effects of wildland fire on aquatic ecosystems in the western USA**

[www.nrfirescience.org/resource/8130](http://www.nrfirescience.org/resource/8130)

Description not entered

Author(s): Bruce E. Rieman, Robert E. Gresswell, Michael K. Young, Charles H. Luce

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Responses of stream benthic macroinvertebrates to fire**

[www.nrfirescience.org/resource/7964](http://www.nrfirescience.org/resource/7964)

Synthesis of published research on the responses of stream benthic macroinvertebrates to fire in western United States indicates a consistent pattern of response that can guide resource management and future research. Direct effects of fire generally are minor or indiscernible. Indirect effects, resulting primarily from increased...

Author(s): G. Wayne Minshall

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Combining simulation and optimization for evaluating the effectiveness of fuel treatments for four different fuel conditions at landscape scales**

[www.nrfirescience.org/resource/8431](http://www.nrfirescience.org/resource/8431)

The effectiveness of applying landscape level fuel treatments is analysed for four different landscape conditions by using both simulation and optimization. The four landscape conditions in the Bitterroot National Forest, Montana, represent a gradient of fuel conditions ranging from light, scattered, to heavy concentrated fuels....

Author(s): Jimmie D. Chew, J. Greg Jones, Christine Stalling, Janet Sullivan, Steve Slack

Year Published: 2003

Type: Document

Conference Proceedings

### **Prescribed fire effects on dalmation toadflax**

[www.nrfirescience.org/resource/8281](http://www.nrfirescience.org/resource/8281)

Prescribed fires are important for rangeland restoration and affect plant community composition and species interactions. Many rangeland plant communities have been, or are under the threat of noxious weed invasion, however there is little information on how fire effects weeds. Our objective was to determine the effects of...

Author(s): James S. Jacobs, Roger L. Sheley

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Comparing two methods of identifying ecological restoration opportunities**

[www.nrfirescience.org/resource/8430](http://www.nrfirescience.org/resource/8430)

Two methods for identifying ecological restoration opportunities in the Northern Region of the Forest Service are compared. Different analysis methods are often used to address issues at different planning scales. The first method is a nonspatial characterization of current vegetation conditions using

Forest Inventory and Analysis (...  
Author(s): Jimmie D. Chew  
Year Published: 2003  
Type: Document  
Conference Proceedings

### **Fire and aquatic ecosystems of the western USA: current knowledge and key questions**

[www.nrfirescience.org/resource/7912](http://www.nrfirescience.org/resource/7912)

Understanding of the effects of wildland fire and fire management on aquatic and riparian ecosystems is an evolving field, with many questions still to be resolved. Limitations of current knowledge, and the certainty that fire management will continue, underscore the need to summarize available information. Integrating fire and...

Author(s): Peter A. Bisson, Bruce E. Rieman, Charles H. Luce, Paul F. Hessburg, Danny C. Lee, Jeffrey L. Kershner, Gordon H. Reeves, Robert E. Gresswell  
Year Published: 2003  
Type: Document  
Book or Chapter or Journal Article, Synthesis

### **Quick response small catchment monitoring techniques for comparing postfire rehabilitation treatment effectiveness**

[www.nrfirescience.org/resource/11000](http://www.nrfirescience.org/resource/11000)

Increased runoff and erosion commonly occur after wildfires with the onset of precipitation events. Various erosion mitigation treatments are often used after wildfires to reduce flooding and sedimentation. The effectiveness of these treatments has not been well documented in the literature; therefore we undertook a rapid response...

Author(s): Peter R. Robichaud, Robert E. Brown  
Year Published: 2003  
Type: Document  
Conference Proceedings

### **An environmental narrative of Inland Northwest United States forests, 1800-2000**

[www.nrfirescience.org/resource/18561](http://www.nrfirescience.org/resource/18561)

Fire was arguably the most important forest and rangeland disturbance process in the Inland Northwest United States for millennia. Prior to the Lewis and Clark expedition, fire regimes ranged from high severity with return intervals of one to five centuries, to low severity with fire-free periods lasting three decades or less...

Author(s): Paul F. Hessburg, James K. Agee  
Year Published: 2003  
Type: Document  
Book or Chapter or Journal Article

### **Countering misinformation concerning big sagebrush**

[www.nrfirescience.org/resource/15448](http://www.nrfirescience.org/resource/15448)

This paper examines the scientific merits of eight axioms of range or vegetative management pertaining to big sagebrush. These axioms are: (1) Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) does not naturally exceed 10 percent canopy cover and mountain big sagebrush (*A. t. ssp. vaseyana*) does not naturally exceed 20...

Author(s): Bruce L. Welch, Craig Criddle  
Year Published: 2003  
Type: Document  
Technical Report or White Paper

### **On the impact of fire suppression and BAER restoration on weeds**

[www.nrfirescience.org/resource/11043](http://www.nrfirescience.org/resource/11043)

In 2000, wildfires burned more than 200,000 acres on the Bitterroot National Forest of Montana and nearly 1.5 million acres in the Northern and Intermountain Regions. Management activities associated with fire suppression and post-fire restoration have had the unintentional consequence of promoting invasive weeds. As part of fire...

Author(s): Elaine Kennedy Sutherland

Year Published: 2003

Type: Document

Conference Proceedings

### **Comparing potential fuel treatment trade-off models: initial results**

[www.nrfirescience.org/resource/8412](http://www.nrfirescience.org/resource/8412)

Understanding the trade-offs between short-term and long-term consequences of fire impacts on ecosystems is needed before a comprehensive fuels management program can be implemented nationally. We are evaluating 3 potential trade-off models at 8 locations in major U.S. fuel types. We present results of the initial testing of the 3...

Author(s): David R. Weise, Richard A. Kimberlin, Michael J. Arbaugh, Jimmie D. Chew, J. Greg Jones, James Merzenich, Marc R. Wiitala, Robert E. Keane, Mark D. Schaaf, Jan W. van Wagtendonk

Year Published: 2003

Type: Document

Conference Proceedings

### **Key issues in fire regime research for fuels management and ecological restoration**

[www.nrfirescience.org/resource/11025](http://www.nrfirescience.org/resource/11025)

The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific...

Author(s): Thomas T. Veblen

Year Published: 2003

Type: Document

Conference Proceedings

### **Vegetation dynamics under fire exclusion and logging in a Rocky Mountain watershed, 1856-1996**

[www.nrfirescience.org/resource/8264](http://www.nrfirescience.org/resource/8264)

How have changes in land management practices affected vegetation patterns in the greater Yellowstone ecosystem? This question led us to develop a deterministic, successional, vegetation model to 'turn back the clock' on a study area and assess how patterns in vegetation cover type and structure have changed through different...

Author(s): Alisa L. Gallant, Andrew J. Hansen, John S. Councilman, Duane K. Monte, David W. Betz

Year Published: 2003

Type: Document

Book or Chapter or Journal Article

### **Status of native fishes in the western United States and issues for fire and fuels management**

[www.nrfirescience.org/resource/8131](http://www.nrfirescience.org/resource/8131)

Conservation of native fishes and changing patterns in wildfire and fuels are defining challenges for

managers of forested landscapes in the western United States. Many species and populations of native fishes have declined in recorded history and some now occur as isolated remnants of what once were larger more complex systems....

Author(s): Bruce E. Rieman, Danny C. Lee, Denver P. Burns, Robert E. Gresswell, Michael K. Young, Rick Stowell, John N. Rinne, Phil Howell

Year Published: 2003

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests**

[www.nrfirescience.org/resource/8121](http://www.nrfirescience.org/resource/8121)

Fire exclusion policies have affected stand structure and wildfire hazard in north American ponderosa pine forests. Wildfires are becoming more severe in stands where trees are densely stocked with shade-tolerant understory trees. Although forest managers have been employing fuel treatment techniques to reduce wildfire hazard for...

Author(s): Jolie Pollet, Philip N. Omi

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **Wildland fire in ecosystems: effects of fire on air**

[www.nrfirescience.org/resource/12587](http://www.nrfirescience.org/resource/12587)

This state-of-knowledge review about the effects of fire on air quality can assist land, fire, and air resource managers with fire and smoke planning, and their efforts to explain to others the science behind fire-related program policies and practices to improve air quality. Chapter topics include air quality regulations and fire;...

Author(s): David V. Sandberg, Roger D. Ottmar, Janice L. Peterson, John Core

Year Published: 2002

Type: Document

Technical Report or White Paper

### **Effects of wildfire and post-fire salvage logging on avian communities in conifer-dominated forests of the western United States**

[www.nrfirescience.org/resource/7956](http://www.nrfirescience.org/resource/7956)

Description not entered

Author(s): Natasha B. Kotliar, Sallie Hejl, Richard L. Hutton, Victoria A. Saab, C. P. Melcher, Mary E. McFadzen

Year Published: 2002

Type: Document

Book or Chapter or Journal Article

### **Use of fire and silvicultural techniques for whitebark pine restoration successes, caveats, and assessment techniques**

[www.nrfirescience.org/resource/10982](http://www.nrfirescience.org/resource/10982)

Whitebark pine (*Pinus albicaulis*) is a keystone species in upper subalpine forests of many parts of the northern Rocky Mountains and Cascades in the United States and Canada. These diverse ecosystems have been declining in parts of its range because of recent mountain pine beetle (*Dendroctonus ponderosae*) and blister rust (...)

Author(s): Robert E. Keane, Katherine Kendall, Robert Crabtree

Year Published: 2002

Type: Document

**Selection of fire-created snags at two spatial scales by cavity-nesting birds**

[www.nrfirescience.org/resource/11198](http://www.nrfirescience.org/resource/11198)

We examined the use of snag stands by seven species of cavity-nesting birds from 1994-1998. Selection of snags was studied in logged and unlogged burned forests at two spatial scales: microhabitat (local vegetation characteristics) and landscape (composition and patterning of surrounding vegetation types). We modeled nest occurrence...

Author(s): Victoria A. Saab, Ree Brannon, Jonathan G. Dudley, Larry Donohoo, Dave Vanderzanden, Vicky Johnson, Henry Lachowski

Year Published: 2002

Type: Document

Technical Report or White Paper

**Ponderosa pine ecosystems restoration and conservation: steps toward stewardship; April 25-27, 2000; Flagstaff, AZ**

[www.nrfirescience.org/resource/11888](http://www.nrfirescience.org/resource/11888)

This volume is divided into three sections: (1) Ecological, Biological, and Physical Science; (2) Social and Cultural; and (3) Economics and Utilization. Effective ecological restoration requires a combination of science and management. The authors of the first section exemplified this integration in the course of addressing a broad...

Author(s): Regina K. Vance, Carleton B. Edminster, W. Wallace Covington, Julie A. Blake

Year Published: 2001

Type: Document

Conference Proceedings

**Real-time smoke particulate sampling; fire storm 2000**

[www.nrfirescience.org/resource/11202](http://www.nrfirescience.org/resource/11202)

Reports the findings of a study comparing the results of instruments measuring smoke particulate in real time to gravimetric samplers in Missoula and Hamilton, Montana, during the summer of 2000. Real-time, particulate monitoring instruments were evaluated to determine their accuracy when measuring smoke particulate concentrations...

Author(s): Andy Trent, Mary A. Davies, Richard Karsky, Richard W. Fisher

Year Published: 2001

Type: Document

Technical Report or White Paper

**Can the fire-dependent whitebark pine be saved?**

[www.nrfirescience.org/resource/7927](http://www.nrfirescience.org/resource/7927)

In recent decades, whitebark pine has been declining due to epidemics and fire exclusion (Keane and Arno 1993; Kendall and Arno 1990). In the northern Rocky Mountains, a project is underway to explore the feasibility of using fire and silviculture to restore the tree's high-elevation habitat.

Author(s): Robert E. Keane

Year Published: 2001

Type: Document

Book or Chapter or Journal Article, Synthesis

**Alternative ponderosa pine restoration treatments in the western United States**

[www.nrfirescience.org/resource/8409](http://www.nrfirescience.org/resource/8409)

Compared to presettlement times, many ponderosa pine forest of the United States are now more

dense and have greater quantities of fuels. Widespread treatments are needed in these forests to restore ecological integrity and to reduce the risk of uncharacteristically severe fires. Among possible restorative treatments, however, the...

Author(s): James D. McIver, Charles P. Weatherspoon, Carleton B. Edminster

Year Published: 2001

Type: Document

Conference Proceedings

### **Maintaining the mosaic: the role of indigenous burning in land management**

[www.nrfirescience.org/resource/16097](http://www.nrfirescience.org/resource/16097)

This article highlights the findings of the literature on aboriginal fire from the human- and the land-centered disciplines, and suggests that the traditional knowledge of indigenous peoples be incorporated into plans for reintroducing fire to the nation's forests. Traditional knowledge represents the outcome of long experimentation...

Author(s): R.W. Kimmerer, Frank K. Lake

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **Restoration concepts and techniques**

[www.nrfirescience.org/resource/8399](http://www.nrfirescience.org/resource/8399)

Innovative techniques are needed to restore the health of whitebark pine (*Pinus albicaulis*) communities in the northern Rocky Mountains of the United States, inland West, and adjacent areas of Canada, because of the detrimental effects of the exotic disease white pine blister rust (*Cronartium ribicola*) coupled with fire exclusion...

Author(s): Robert E. Keane, Stephen F. Arno

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

### **Strategies for managing whitebark pine in the presence of white pine blister rust**

[www.nrfirescience.org/resource/7902](http://www.nrfirescience.org/resource/7902)

Description not entered

Author(s): Raymond J. Hoff, Dennis E. Ferguson, GERAL I. McDONALD, Robert E. Keane

Year Published: 2001

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Fire and invasive species within the temperate and boreal coniferous forests of western North America**

[www.nrfirescience.org/resource/10966](http://www.nrfirescience.org/resource/10966)

Invasive, nonnative plant species have been a concern of land managers within the temperate and boreal coniferous forest eco-region for nearly a century. Fire management, timber harvest, grazing, mining, recreation, and agriculture have not only exacerbated invasive species establishment and spread, but have been impacted by such...

Author(s): Richy J. Harrod, Sarah Reichard

Year Published: 2000

Type: Document

Conference Proceedings, Synthesis

### **Silvicultural treatments**

[www.nrfirescience.org/resource/11891](http://www.nrfirescience.org/resource/11891)

Sustainable, ecologically-based management of pine/fir forests requires silviculturists to integrate several treatments that emulate historic disturbance processes. Restoration prescriptions typically include cleaning or heavy understory thinning, improvement cutting to reduce the proportion of firs, and modified selection cutting...

Author(s): Carl E. Fiedler

Year Published: 2000

Type: Document

Conference Proceedings

### **Mixed-severity fire regimes in the Northern Rocky Mountains: consequences of fire exclusion and options for the future**

[www.nrfirescience.org/resource/8426](http://www.nrfirescience.org/resource/8426)

Findings from fire history studies have increasingly indicated that many forest ecosystems in the northern Rocky Mountains were shaped by mixed-severity fire regimes, characterized by fires of variable severities at intervals averaging between about 30 and 100 years. Perhaps because mixed-severity fire regimes and their resulting...

Author(s): Stephen F. Arno, David J. Parsons, Robert E. Keane

Year Published: 2000

Type: Document

Conference Proceedings, Synthesis

### **The use of shaded fuelbreaks in landscape fire management**

[www.nrfirescience.org/resource/8372](http://www.nrfirescience.org/resource/8372)

Shaded fuelbreaks and larger landscape fuel treatments, such as prescribed fire, are receiving renewed interest as forest protection strategies in the western United States. The effectiveness of fuelbreaks remains a subject of debate because of differing fuelbreak objectives, prescriptions for creation and maintenance, and their...

Author(s): James K. Agee, Bernhard Bahro, Mark A. Finney, Philip N. Omi, David B. Sapsis, Carl N. Skinner, Jan W. van Wagendonk, Charles P. Weatherspoon

Year Published: 2000

Type: Document

Book or Chapter or Journal Article, Synthesis

### **Synergy between ecological needs and economic aspects of ecosystem restoration**

[www.nrfirescience.org/resource/11050](http://www.nrfirescience.org/resource/11050)

The implementation of properly designed treatments to restore and sustain desired forest conditions in the Inland Northwest, besides moving forest stands more rapidly to an ecologically desirable and sustainable condition, can generate positive revenues from the timber to be removed. These treatments also have potential to increase...

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

Year Published: 2000

Type: Document

Technical Report or White Paper

### **Building consensus: legitimate hope or seductive paradox?**

[www.nrfirescience.org/resource/11186](http://www.nrfirescience.org/resource/11186)

To understand how participants in a natural resource planning situation described the nature of consensus, we interviewed scientists, agency planners and managers, and public representatives in two planning processes on the Bitterroot National Forest in west-central Montana. While most

interviewees felt the agency had included...

Author(s): Stephen F. McCool, Kathleen Guthrie, Jane Kapler Smith

Year Published: 2000

Type: Document

Technical Report or White Paper

### **Landscape trends (1753-1993) of whitebark pine (*Pinus albicaulis*) forests in the west big hole range of Idaho/Montana**

[www.nrfirescience.org/resource/7965](http://www.nrfirescience.org/resource/7965)

*Pinus albicaulis* (whitebark pine) is an important tree species in subalpine forests of the Northern Rocky Mountains. Populations have been declining at unprecedented rates due to the introduction of an exotic pathogen and fire suppression. We initiated this study to evaluate historical trends in *Pinus albicaulis* abundance along with...

Author(s): Michael P. Murray, Stephen C. Bunting, Michael P. Murray

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

### **Toward an integrated classification of ecosystems: defining opportunities for managing fish and forest health**

[www.nrfirescience.org/resource/18639](http://www.nrfirescience.org/resource/18639)

Many of the aquatic and terrestrial ecosystems of the Pacific Northwest United States have been simplified and degraded in part through past land-management activities. Recent listings of fishes under the Endangered Species Act and major new initiatives for the restoration of forest health have precipitated contentious debate among...

Author(s): Bruce E. Rieman, Paul F. Hessburg, Danny C. Lee, Russell F. Thurow, James R. Sedell

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

### **Birds in a sagebrush sea: Managing sagebrush habitat for bird communities**

[www.nrfirescience.org/resource/15329](http://www.nrfirescience.org/resource/15329)

This booklet presents land management recommendations to help bird communities in sagebrush habitats. It was prepared for the Western Working Group of Partners in Flight, a partnership of private citizens, industry groups, government agencies, universities, nongovernment organizations, and others interested in bird conservation. Why...

Author(s): Christine Paige, Sharon Ritter

Year Published: 1999

Type: Document

Management or Planning Document

### **Use of the helitorch to enhance diversity on riparian corridors in mature pinyon-juniper communities: a conceptual approach**

[www.nrfirescience.org/resource/12109](http://www.nrfirescience.org/resource/12109)

As pinyon-juniper have increased their dominance throughout the Great Basin, other perennial plants have declined in abundance. Riparian areas traditionally have the greatest biodiversity found in the region. The increase of pinyon-juniper can generally be attributed to a change in the disturbance regime. To increase the plant...

Author(s): G. Allen Rasmussen, Robin J. Tausch, Stephen C. Bunting

Year Published: 1999

Type: Document

**Proceedings: ecology and management of pinyon-juniper communities within the Interior West; September 15-18, 1997; Provo, UT**

[www.nrfirescience.org/resource/11884](http://www.nrfirescience.org/resource/11884)

A symposium held September 15-18, 1997, in Provo, UT, and Sanpete County, UT, provided information on the ecology, management, resource values, and restoration of pinyon-juniper communities in the Interior Western United States. The conference was hosted by the USDA Forest Service, Rocky Mountain Research Station and the Utah...

Author(s): Stephen B. Monsen, Richard Stevens

Year Published: 1999

Type: Document

Conference Proceedings

**Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/douglas-fir forests of southwestern Idaho**

[www.nrfirescience.org/resource/11413](http://www.nrfirescience.org/resource/11413)

From 1994 to 1996, researchers monitored 695 nests of nine cavity-nesting bird species and measured vegetation at nest sites and at 90 randomly located sites in burned ponderosa pine forests of southwestern Idaho. Site treatments included two types of salvage logging, and unlogged controls. All bird species selected nest sites with...

Author(s): Victoria A. Saab, Jonathan G. Dudley

Year Published: 1998

Type: Document

Technical Report or White Paper

**Length and timing of grazing on postburn productivity of two bunchgrasses in an Idaho experimental range**

[www.nrfirescience.org/resource/8213](http://www.nrfirescience.org/resource/8213)

Plant mortality and productivity in semiarid grasslands may be affected by the length of time grazing is excluded during the postfire regeneration period. The degree of grazing tolerance for the semiarid bunchgrass species, *Festuca idahoensis* and *Agropyron spicatum*, exposed to fire, and how the variation in grazing tolerance was...

Author(s): Stephen C. Bunting, Ronald Robberecht, Guillermo E. Defosse

Year Published: 1998

Type: Document

Book or Chapter or Journal Article

**Appendix A - Biological assessment, TCEF research project for Lewis and Clark National Forest**

[www.nrfirescience.org/resource/11505](http://www.nrfirescience.org/resource/11505)

An environmental analysis has been prepared which describes and evaluates the management alternatives for the timber harvest and burning within the Tenderfoot Creek Experimental Forest (TCEF) project area. The project area lies within the headwaters of the Tenderfoot drainage of the Lewis and Clark National Forest. The purpose of...

Author(s): Donald Godtel

Year Published: 1998

Type: Document

Management or Planning Document

**Environmental assessment: Tenderfoot Creek Experimental Forest - Vegetative treatment**

**research project, Kings Hill Ranger District, Lewis and Clark National Forest, Meagher County, Montana**

[www.nrfirescience.org/resource/11513](http://www.nrfirescience.org/resource/11513)

Environmental assessment of the Tenderfoot Research Project. This research project proposes to harvest timber in two treatment subwatersheds, Spring Park Creek and Sun Creek. The silvicultural system proposed is a two-aged system termed 'shelterwood with reserves,' that uses even distribution of single or small groups and uneven...

Author(s): Gloria E. Flora, Ward W. McCaughey

Year Published: 1998

Type: Document

Management or Planning Document

**Restoring fire in lodgepole pine forests of the Intermountain West**

[www.nrfirescience.org/resource/8347](http://www.nrfirescience.org/resource/8347)

We are developing new management treatments for regenerating and sustaining lodgepole pine (*Pinus contorta*) forests through emulation of natural disturbance processes. Lodgepole pine is the principal forest cover on over 26 million hectares in western North America. While infrequent, stand replacing fires following mountain pine...

Author(s): Colin C. Hardy, Ward W. McCaughey

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

**Wildfire and native fish: issues of forest health and conservation of sensitive species**

[www.nrfirescience.org/resource/8129](http://www.nrfirescience.org/resource/8129)

Issues related to forest health and the threat of larger, more destructive wildfires have led to major new initiatives to restructure and recompose forest communities in the western United States. Proposed solutions will depend, in part, on silvicultural treatments and prescribed burning. Large fires can produce dramatic changes in...

Author(s): Bruce E. Rieman, Jim Clayton

Year Published: 1997

Type: Document

Book or Chapter or Journal Article

**Decision support systems for ecosystem management: an evaluation of existing systems**

[www.nrfirescience.org/resource/12413](http://www.nrfirescience.org/resource/12413)

This report evaluates 24 computer-aided decision support systems (DSS) that can support management decision-making in forest ecosystems. It compares the scope of each system, spatial capabilities, computational methods, development status, input and output requirements, user support availability, and system performance....

Author(s): H. Todd Mowrer

Year Published: 1997

Type: Document

Management or Planning Document, Technical Report or White Paper

**Vegetation structure in old-growth stands in the Coram Research Natural Area in northwestern Montana**

[www.nrfirescience.org/resource/13138](http://www.nrfirescience.org/resource/13138)

Forest stand structure, understory composition, and tree seedling composition are described for eight permanent tenth-hectare plots established in Engelmann spruce/subalpine fir, western larch, and interior Douglas-fir forest cover types in northwestern Montana. Sites have been protected as examples

of old-growth stands since the...

Author(s): Caryl L. Elzinga, Raymond C. Shearer

Year Published: 1997

Type: Document

Technical Report or White Paper

### **Prescribed fire applications: restoring ecological structure and process in ponderosa pine forests**

[www.nrfirescience.org/resource/11247](http://www.nrfirescience.org/resource/11247)

The decision to include the fire process as part of a restoration treatment for a particular forest site is most logically made in conjunction with the decision for a silvicultural treatment. In other words, forest managers do not typically wait to visually or quantitatively evaluate the post harvest site before deciding whether or...

Author(s): Michael G. Harrington

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Reestablishing fire-adapted communities to riparian forests in the ponderosa pine zone**

[www.nrfirescience.org/resource/11248](http://www.nrfirescience.org/resource/11248)

Ecological research has implicated the practice of fire exclusion as a major contributor to forest health problems in the semiarid ponderosa pine (*Pinus ponderosa*) zone of the Inland West (Mutch and others 1993; Sampson and others 1994). Prior to 1900, frequent, low-intensity fires occurred on upland forests in this forest zone at...

Author(s): Matthew K. Arno

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Restoring recreational and residential forests**

[www.nrfirescience.org/resource/11249](http://www.nrfirescience.org/resource/11249)

Several decades of fire suppression following logging around the turn-of-the-century has produced dense, evenage stands of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). They contrast with the original forests where frequent, low-intensity fires gave rise to open, parklike, and often uneven-age stands of...

Author(s): Joe H. Scott

Year Published: 1996

Type: Document

Technical Report or White Paper

### **The use of fire in forest restoration**

[www.nrfirescience.org/resource/11235](http://www.nrfirescience.org/resource/11235)

The 26 papers in this document address the current knowledge of fire as a disturbance agent, fire history and fire regimes, applications of prescribed fire for ecological restoration, and the effects of fire on the various forested ecosystems of the north-western United States. The main body of this document is organized in three...

Author(s): Colin C. Hardy, Stephen F. Arno

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Restoring historic landscape patterns through management: restoring fire mosaics on the landscape**

[www.nrfirescience.org/resource/11250](http://www.nrfirescience.org/resource/11250)

Seral, fire dependent lodgepole pine (*Pinus contorta* Dougl.) communities are an important component of upper elevation forests throughout the Northern Rockies, where they cover 4 million acres, or about 17 percent of the land base. On the Bitterroot National Forest, lodgepole pine occurs mostly between 5,500 and 7,500 feet.

Author(s): Catherine A. Stewart

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Silvicultural applications: restoring ecological structure and process in ponderosa pine forests**

[www.nrfirescience.org/resource/11246](http://www.nrfirescience.org/resource/11246)

A primary goal of restoration treatments in ponderosa pine (*Pinus ponderosa*)/fir forests is to create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, disease, and severe fire. An additional goal in some stands is to manipulate existing species composition and site conditions to favor...

Author(s): Carl E. Fiedler

Year Published: 1996

Type: Document

Technical Report or White Paper

### **The concept: restoring ecological structure and process in ponderosa pine forests**

[www.nrfirescience.org/resource/11245](http://www.nrfirescience.org/resource/11245)

Elimination of the historic pattern of frequent low-intensity fires in ponderosa pine and pine-mixed conifer forests has resulted in major ecological disruptions. Prior to 1900, open stands of large, long-lived, fire-resistant ponderosa pine were typical. These were accompanied in some areas by other fire-dependent species such as...

Author(s): Stephen F. Arno

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Examples of fire restoration in Glacier National Park**

[www.nrfirescience.org/resource/11252](http://www.nrfirescience.org/resource/11252)

Covering just over 1 million acres, Glacier National Park straddles the Continental Divide in northwestern Montana. Diverse vegetation communities include moist western cedar- western hemlock (*Thuja plicata* - *Tsuga heterophylla*) old growth forests similar to those of the Pacific Coast, dry western grasslands and prairies, dense...

Author(s): Laurie L. Kurth

Year Published: 1996

Type: Document

Technical Report or White Paper

### **Coarse-scale restoration planning and design in Interior Columbia River Basin ecosystems: an example for restoring declining whitebark pine forests**

[www.nrfirescience.org/resource/11243](http://www.nrfirescience.org/resource/11243)

During the last 2 years, many people from numerous government agencies and private institutions compiled a scientific assessment of the natural and human resources of the Interior Columbia River

Basin (Jensen and Bourgeron 1993). This assessment is meant to guide the development of a coarse-scale Environmental Impact Statement for...

Author(s): Robert E. Keane, James P. Menakis, Wendel J. Hann

Year Published: 1996

Type: Document

Management or Planning Document, Technical Report or White Paper

### **Ecological implications of sagebrush manipulation: A literature review**

[www.nrfirescience.org/resource/15427](http://www.nrfirescience.org/resource/15427)

The Montana Department of Fish, Wildlife & Parks (FWP) has long recognized the importance of sagebrush/grassland vegetative communities as wildlife habitat. Efforts to manipulate these communities concern FWP because of the potential implications to wildlife. Some groups believe sagebrush control generally will have beneficial...

Author(s): Joel G. Peterson

Year Published: 1995

Type: Document

Management or Planning Document

### **Germination and establishment ecology of big sagebrush: Implications for community restoration**

[www.nrfirescience.org/resource/15421](http://www.nrfirescience.org/resource/15421)

Big sagebrush (*Artemisia tridentata*) seedling recruitment is limited by seed production and dispersal in space and time, by genetic constraints of specific ecotypes, and by environmental factors that include weather, microsite attributes, soil microbiota, herbivory, and inter- and intraspecific competition.

Establishing this species...

Author(s): Susan E. Meyer

Year Published: 1994

Type: Document

Conference Proceedings

### **Social and political issues in ecological restoration**

[www.nrfirescience.org/resource/12415](http://www.nrfirescience.org/resource/12415)

There are four major questions affecting the future of ecological restoration. The first and most serious question is philosophical. Should we attempt to restore ecosystems? Some people want to separate humans from nature because they believe that human intervention is bad or imperfect. They define "natural" as the absence of human...

Author(s): Thomas M. Bonnicksen

Year Published: 1994

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Rapid decline of whitebark pine in western Montana: evidence from 20-year re-measurements**

[www.nrfirescience.org/resource/12916](http://www.nrfirescience.org/resource/12916)

Whitebark pine (*Pinus albicaulis*), an important producer of food for wildlife, is decreasing in abundance in western Montana due to attacks by the white pine blister rust fungus (*Cronartium ribicola*), epidemics of mountain pine beetle (*Dendroctonus ponderosae*) and successional replacement mainly by subalpine fir (*Abies lasiocarpa*)....

Author(s): Robert E. Keane, Stephen F. Arno

Year Published: 1993

Type: Document

Book or Chapter or Journal Article

### **Deterioration of fire-killed and fire-damaged timber in the Western United States**

[www.nrfirescience.org/resource/11159](http://www.nrfirescience.org/resource/11159)

Fire-killed and fire-damaged timber are an important source of fiber and are becoming more important because of a decrease in the land base available for timber harvest. Forest managers need to know the causes of deterioration and degrade, the expected losses in product volume and value, and the impact of time on deterioration. This...

Author(s): Eini C. Lowell, Susan A. Willits, Robert L. Krahmer

Year Published: 1992

Type: Document

Technical Report or White Paper

### **GIS applications to the indirect effects of forest fires in mountainous terrain**

[www.nrfirescience.org/resource/12032](http://www.nrfirescience.org/resource/12032)

Snow-avalanche paths and landslides are common geomorphic features in Glacier National Park (GNP), Montana, and represent hazards to human occupancy and utilization of the park. Forest fires have been spatially extensive there, and it is well documented that areas subjected to forest fires become increasingly susceptible to...

Author(s): David R. Butler, Stephen J. Walsh, George P. Malanson

Year Published: 1991

Type: Document

Technical Report or White Paper

### **Twenty-year natural regeneration following five silvicultural prescriptions in spruce-fir forests of the intermountain west**

[www.nrfirescience.org/resource/11965](http://www.nrfirescience.org/resource/11965)

No single combination of five cutting-site preparation treatments resulted in superior natural regeneration in spruce-fir stands in Wyoming, Utah, and Idaho. Best results were generally obtained by partial cutting, with minimal disturbance of litter and organic matter, especially on harsh, high-elevation sites. Most sites remained...

Author(s): Ward W. McCaughey, Carl E. Fiedler, Wyman C. Schmidt

Year Published: 1991

Type: Document

Technical Report or White Paper

### **Some thoughts on prescribed natural fires**

[www.nrfirescience.org/resource/12420](http://www.nrfirescience.org/resource/12420)

Wildland fire is a significant component of nearly all North American ecosystems. High intensity, stand-replacement fires are normal in certain ecosystems, especially in the northern Rocky Mountains. Wilderness fire managers are obligated to let fire operate as a natural influence to the extent that this is possible. Where...

Author(s): Jack D. Cohen

Year Published: 1991

Type: Document

Technical Report or White Paper

### **Adaptive fire policy**

[www.nrfirescience.org/resource/12424](http://www.nrfirescience.org/resource/12424)

Adaptive resource management is a continuous learning process in which current knowledge always leads to further experimentation and discovery. Adaptive management evolves by learning from

mistakes. Designing adaptive management strategies involves four tasks. First, the problem must be defined and bounded. There is growing...

Author(s): James M. Saveland

Year Published: 1991

Type: Document

Conference Proceedings, Technical Report or White Paper

### **Hydrocarbon and biomass fuel fire field tests**

[www.nrfirescience.org/resource/11021](http://www.nrfirescience.org/resource/11021)

Biomass and hydrocarbon fuel fires are two common sources of obscuring smoke which present significant operational challenges over a broad range of possible viewing wavelengths. This is especially true of very large fires where the primary smoke particles (approx. 0.1-0.3 um diameter) obscure vision by both scattering and absorption...

Author(s): Lawrence F. Radke, Dean A. Hegg, J. David Nance, Jaime H. Lyons, Krista K. Laursen, R. J. Ferek, Peter V. Hobbs, Raymond E. Weiss

Year Published: 1990

Type: Document

Conference Proceedings

### **Vegetation response to helicopter logging and broadcast burning in Douglas-fir habitat types at Silver Creek, central Idaho**

[www.nrfirescience.org/resource/11963](http://www.nrfirescience.org/resource/11963)

Shrub frequency, cover, and height, and herb frequency and cover were measured on plots from two Douglas-fir habitat types in three cutting units. The plots were measured prior to helicopter yarding and broadcast burning and then 1, 2, 5, and 10 years later. The broadcast burning was more severe on one cutting unit than the other...

Author(s): Kathy Geier-Hayes

Year Published: 1989

Type: Document

Technical Report or White Paper

### **Sagebrush over time: A photographic study of rangeland change**

[www.nrfirescience.org/resource/15404](http://www.nrfirescience.org/resource/15404)

This publication is not available online. It will have to be ordered from a library.

Author(s): Kendall L. Johnson

Year Published: 1986

Type: Document

Conference Proceedings

### **Site treatments influence development of a young mixed-species western larch stand**

[www.nrfirescience.org/resource/13136](http://www.nrfirescience.org/resource/13136)

More intensive management could be applied to many young stands in conifer forests of the Northern Rockies. Vast areas are stocked with stands that contain a mixture of conifer species. An important mixed species cover type in this region is the western larch type (formerly called the larch-Douglas-fir type...

Author(s): Dennis M. Cole, Wyman C. Schmidt

Year Published: 1986

Type: Document

Technical Report or White Paper

### **Livestock grazing influences on community structure, fire intensity, and fire frequency within the Douglas-fir/ninebark habitat type**

[www.nrfirescience.org/resource/13126](http://www.nrfirescience.org/resource/13126)

Influences of livestock grazing on community structure, fire intensity, and normal fire frequency in the Douglas-fir/ninebark (*Pseudotsuga menziesii*/*Physocarpus malvaceus*) habitat type were studied at the University of Idaho's experimental forest in northern Idaho. Livestock grazing caused increased tree numbers...

Author(s): G. Thomas Zimmerman, Leon F. Neuenschwander

Year Published: 1984

Type: Document

Book or Chapter or Journal Article

### **Characteristics of fireline blasted with linear explosives: initial test results**

[www.nrfirescience.org/resource/11929](http://www.nrfirescience.org/resource/11929)

Based on limited data, water-gel provided a slightly wider and deeper fireline with more feathering of ejected material than did Ensign-Bickford cord. Soil moisture conditions, closeness of blasting material to the ground, and other factors may explain these differences.

Author(s): Richard J. Barney

Year Published: 1984

Type: Document

Research Brief or Fact Sheet

### **Early postfire revegetation in a western Montana Douglas-fir forest**

[www.nrfirescience.org/resource/11960](http://www.nrfirescience.org/resource/11960)

Development of natural vegetation and seeded grasses on a severely burned Douglas-fir forest area is described for the first 5 postfire years. Results are described separately for ravine and upland sites. Results of special studies of moss recovery and tree seedling distribution are also reported.

Author(s): Marilyn F. Crane, James R. Habeck, William C. Fischer

Year Published: 1984

Type: Document

Technical Report or White Paper

### **The sagebrush-grass region: A review of the ecological literature**

[www.nrfirescience.org/resource/15435](http://www.nrfirescience.org/resource/15435)

The objective of this paper is to provide a comprehensive review of literature on the vegetation of the sage brush region of North America. Despite its prime importance as a grazing resource, and the problems produced by its use and misuse, research on this large and varied ecosystem was quite limited during the first half of this...

Author(s): E.W. Tisdale, M. Hironaka

Year Published: 1981

Type: Document

Synthesis

### **Wildland fire research needs in the West: Forest Service managers' views**

[www.nrfirescience.org/resource/11910](http://www.nrfirescience.org/resource/11910)

This report discusses fire-related research needs in the western regions of the Forest Service. These needs were expressed by personnel at all management levels. Responses were one part of a more general study designed to establish information requirements for integrating fire into land management planning.

Author(s): Richard J. Barney

Year Published: 1979

Type: Document  
Technical Report or White Paper

### **Vegetal development on the Sleeping Child burn in western Montana, 1961 to 1973**

[www.nrfirescience.org/resource/11951](http://www.nrfirescience.org/resource/11951)

In the year following the 1961 Sleeping Child forest fire on the Bitterroot National Forest, Montana, 11 permanent transects were established within the burn. Vegetation development was recorded through 1973, but only four transects were considered indicative of seral forest succession independent of superimposed management...

Author(s): L. Jack Lyon

Year Published: 1976

Type: Document

Technical Report or White Paper

### **IFTDSS Map Studio**

[www.nrfirescience.org/resource/17598](http://www.nrfirescience.org/resource/17598)

Demonstration of IFTDSS Map Studio (Part of a 5 part series presented in March and April of 2018).

Type: Media

Webinar

### **A Three-Step Decision Support Framework for Taking Climate Adaptation Actions**

[www.nrfirescience.org/resource/15933](http://www.nrfirescience.org/resource/15933)

We will present a framework for using available climate science to set forward-looking conservation goals and select among a menu of climate adaptation strategies. This decision support framework is designed to catalyze adaptation actions by bridging recent advances in climate science and adaptation planning, while also helping...

Type: Media

Webinar

### **Fire.org**

[www.nrfirescience.org/resource/114](http://www.nrfirescience.org/resource/114)

Fire.org is the home page of Systems for Environmental Management, a Montana nonprofit research and educational corporation. For over 29 years we've specialized in issues concerning wildland fire planning, behavior, fuel, weather, and effects. Here we post many of the publications and software packages we've developed in cooperation...

Type: Website

Website

### **Do it yourself tinkering - Modifying LANDFIRE data for the Northern Rockies**

[www.nrfirescience.org/resource/15229](http://www.nrfirescience.org/resource/15229)

What do you do if you're a land manager who needs consistent, current, cross-boundary datasets, but the available data do not meet your needs? Modify the data. In this webinar, Kori Blankenship, Fire Ecologist with The Nature Conservancy, discusses how to adjust spatial data to meet your needs.

Type: Media

Webinar

### **Interview with Tom Harbour - Part two of three**

[www.nrfirescience.org/resource/13867](http://www.nrfirescience.org/resource/13867)

Bill Gabbert interviewed Mr. Harbor for Wildfire Today two weeks before his retirement date. In this

segment, Mr. Harbour talks about how many firefighters the USFS will have in 2016, tracking firefighters and the location of a flaming front, smokejumpers, the agency's responsibility regarding protecting structures, and the...

Type: Media

Video

### **From pixels to landscapes, leveraging LANDFIRE for land management**

[www.nrfirescience.org/resource/14857](http://www.nrfirescience.org/resource/14857)

LANDFIRE products have become the toolbox for large landscape management, way beyond obvious applications to do with fire and fuels. From mapping arbuscular fungi to modeling scary cryptic zooid habitat, from tracking grizzly bears to protecting butterflies, from developing full-scale state forest assessments to looking at climate...

Type: Media

Webinar

### **Sticky legal issues surrounding restoration**

[www.nrfirescience.org/resource/13052](http://www.nrfirescience.org/resource/13052)

Navigating adaptive management and cumulative effects analysis to satisfy legal requirements and address stakeholder concerns.

Type: Media

Webinar

### **Simulating the effects of climate change and resource management on ecosystems: case studies from forest and rangeland systems using State-and-Transition Simulation Modeling**

[www.nrfirescience.org/resource/15151](http://www.nrfirescience.org/resource/15151)

This presentation was part of the 13th Biennial Scientific Conference on the Greater Yellowstone Ecosystem held at Jackson Lake Lodge in Grand Teton National Park, October 4-6, 2016. The conference theme was Building on the Past, Leading into the Future: Sustaining the Greater Yellowstone Ecosystem in the Coming Century.

Type: Media

Webinar

### **20-year reassessment of the health and status of whitebark pine in the Bob Marshall Wilderness**

[www.nrfirescience.org/resource/14782](http://www.nrfirescience.org/resource/14782)

This presentation by Carol Treadwell, Executive Director, Bob Marshall Wilderness Foundation was part of the 2016 Whitebark Pine Ecosystem Foundation Annual Science and Management Workshop - Successes and Challenges in Managing the Jewel in the Crown of the Continent that occurred September 16, 2016 in Whitefish, MT.

Type: Media

Webinar

### **Heart of the Rockies Initiative Conservation Atlas: a tool to inform private land conservation decisions in the Northern Rockies**

[www.nrfirescience.org/resource/13042](http://www.nrfirescience.org/resource/13042)

The Heart of the Rockies Initiative conservation atlas is an interactive DataBasin portal that allows our conservation partners to access and apply a dynamic compilation of science products in landscape integrity, connectivity, and climate change impacts and responses. Portal data are derived from numerous agency, university, and...

Type: Media

Webinar

### **Introduction to Wildland Fuel Management**

[www.nrfirescience.org/resource/18089](http://www.nrfirescience.org/resource/18089)

This video is an introduction on how to manage wildland fuels. The objectives of this video are to: 1) Define wildland fuel management; 2) Explain how fuels are modified; 3) Describe some common desired outcomes; 4) Introduce fuel management in the Wildland Urban Interface; 5) Explore fuel management considerations to return fire to...

Type: Media

Webinar

### **Sagebrush Ecosystems in a Changing Climate: Key Opportunities for Adaptive Management**

[www.nrfirescience.org/resource/15514](http://www.nrfirescience.org/resource/15514)

Sagebrush steppe rangelands comprise a large fraction of North America, but they are in decline due to increases in wildfire and invasive plants, factors that relate strongly to climate and weather variability. When intact, plant communities in sagebrush steppe appear well adapted to cold wet winters and hot dry summers along with...

Type: Media

Webinar

### **Fire Management Planning using LANDFIRE**

[www.nrfirescience.org/resource/17979](http://www.nrfirescience.org/resource/17979)

Fire Management Planning using LANDFIRE. Megan Sebasky, Wisconsin Department of Natural Resources

Type: Media

Video

### **Every fire is an opportunity to treat a landscape**

[www.nrfirescience.org/resource/14315](http://www.nrfirescience.org/resource/14315)

On the afternoon of May 20, the Slide Fire was reported towards the south end of Oak Creek Canyon between Flagstaff and Sedona, Arizona. The canyon is steep and rugged - not the type of country that firefighters prefer for taking on a fire directly. After the initial threat to nearby homes passed, fire managers decided to use a...

Type: Media

Video

### **Fires of 2000 overview: a fire manager perspective**

[www.nrfirescience.org/resource/13311](http://www.nrfirescience.org/resource/13311)

In this video, Jacquie Parks, Fire and Fuels Management Specialist with the Bitterroot National Forest, describes fire management challenges during the Bitterroot fires of 2000. This was filmed at the Bitterroot National Forest headquarters in Hamilton, MT, which was one of the stops during the Fires of 2000 field trip that was part...

Type: Media

Video

### **Climate change and the 2012 Planning Rule**

[www.nrfirescience.org/resource/14731](http://www.nrfirescience.org/resource/14731)

This presentation was recorded at the Adaptive Silviculture for Climate Change (ASCC) Northern Rockies Workshop was held June 28, 2016 at the Supervisor's Office of the Flathead National Forest in Kalispell, Montana, bringing together natural resource managers, collaborators and stakeholders

from across the region.

Type: Media

Webinar

### **Taking action on climate change in the Crown of the Continent**

[www.nrfirescience.org/resource/15505](http://www.nrfirescience.org/resource/15505)

The Crown Adaptation Partnership (CAP) is a stakeholder-driven process that brings together representatives from jurisdictions across the Crown of the Continent to establish a shared understanding of the effects of climate change, prioritize climate conservation targets, and identify and implement adaptation strategies that have the...

Type: Media

Webinar

### **Integration of ecological principals into land management - What has been done over the last decade and what still needs to be done?**

[www.nrfirescience.org/resource/14286](http://www.nrfirescience.org/resource/14286)

A 23-minute video in which Robert Keane and Wendel Hann discuss advances in fire technology, particularly modeling, assessments, and mapping, since 2000, and technological needs for the future, including those that include climate change. Presented at the Fifth International Fire Ecology and Management Congress: Uniting Research,...

Type: Media

Video

### **Using social network analysis to evaluate change in a large-scale collaborative management initiative**

[www.nrfirescience.org/resource/15106](http://www.nrfirescience.org/resource/15106)

To design and implement large landscape conservation projects, individuals and agencies are increasingly organizing into networks to facilitate the exchange of ideas, build relationships, identify common interests, and solve problems of mutual interest in a landscape. Coordinating the actions of a diffuse, networked system to...

Type: Media

Webinar

### **Choosing the question and the model in the wildland fire decision support system (WFDSS)**

[www.nrfirescience.org/resource/13231](http://www.nrfirescience.org/resource/13231)

Rick Stratton, USFS Fire Analyst from the Region 6 & Pacific Northwest Research Station (Portland Oregon) gave a talk to a gathering of fire management officers and line officers April 3, 2015. In this 30-min edited clip, he gives a down-to-earth overview of common questions asked when dealing with fires and how to select the...

Type: Media

Webinar

### **Wildland fire: shared problems, shared solutions**

[www.nrfirescience.org/resource/14668](http://www.nrfirescience.org/resource/14668)

Plenary speech by Vicki Christiansen, associate deputy chief, US Forest Service, at the 5th Fire Behavior and Fuels Conference. April 13, 2016. Portland, OR. International Association of Wildland Fire (IAWF).

Type: Media

Webinar

## **LANDFIRE – All Lands Data from Vegetation to Fuels: Planning, Engagement, and Feedback**

[www.nrfirescience.org/resource/15499](http://www.nrfirescience.org/resource/15499)

This webinar, led by LANDFIRE Business Lead Henry Bastian, will cover more than a decade old program (LANDFIRE) at producing and updating land cover data products across all 50 United States and insular areas. Although many have thought of LANDFIRE as only a wildland fire data set, the rich array of data layers and databases (...)

Type: Media

Webinar

## **Smoke management: preparing and informing the public**

[www.nrfirescience.org/resource/12859](http://www.nrfirescience.org/resource/12859)

For several months during 2011, wildfires throughout the Southwest Area and Mexico caused air quality impacts on public health across the region, with significant impacts measured hundreds of miles away from individual wildfires. In order to address the emerging issue, a concerted multi-state interagency air quality coordination...

Type: Media

Webinar

## **Who's to blame? Fire management in mixed-ownership landscapes**

[www.nrfirescience.org/resource/15097](http://www.nrfirescience.org/resource/15097)

Fuels are the only component of the fire triangle that forest and fire managers can alter to change fire behavior. There have been numerous studies examining how fuel reduction treatments and salvage logging alter fire behavior, severity, and its' ecological impacts. However, less attention has been paid to how different forest...

Type: Media

Webinar

## **LANDFIRE - All Lands Data from Vegetation to Fuels: Planning, Engagement, and Feedback**

[www.nrfirescience.org/resource/15945](http://www.nrfirescience.org/resource/15945)

This webinar, led by LANDFIRE Business Lead Henry Bastian, will cover more than a decade old program (LANDFIRE) at producing and updating land cover data products across all 50 United States and insular areas. Although many have thought of LANDFIRE as only a wildland fire data set, the rich array of data layers and databases (...)

Type: Media

Webinar

## **Climate, weather, and sagebrush seed sources: experimental insights on challenges and opportunities**

[www.nrfirescience.org/resource/13219](http://www.nrfirescience.org/resource/13219)

Matt Germino, Research Ecologist, USGS Snake River Field Station, Boise, ID, discusses experimental insights on challenges and opportunities regarding climate, weather, and sagebrush seed sources.

Type: Media

Webinar

## **Residual Fire Regimes and Their Value in a Post-suppression Management Era**

[www.nrfirescience.org/resource/16776](http://www.nrfirescience.org/resource/16776)

In regions where forests have developed in response to decades of fire suppression or exclusion, there often persist isolated, residual fire regimes with characteristics similar to those inferred from pre-suppression era fire histories. In this webinar, we will discuss how these surviving fire regimes and the

people who live among...

Type: Media

Webinar

### **The smoke management challenge and the need for leadership**

[www.nrfirescience.org/resource/14096](http://www.nrfirescience.org/resource/14096)

A 50-minute presentation recorded in February 2009 as part of Effective Communication for Smoke Management in a Changing Air Quality Environment. It briefly outlines the rules, policies, and guidance dictating smoke management. This presentation is still applicable, though some of the maps may no longer be current.

Type: Media

Video

### **Bridging the Divide - Video 3: Forest Management**

[www.nrfirescience.org/resource/15943](http://www.nrfirescience.org/resource/15943)

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

### **The Impacts of Wildfire Characteristics and Employment on the Adaptive Management Strategies in the Intermountain West**

[www.nrfirescience.org/resource/18758](http://www.nrfirescience.org/resource/18758)

Widespread development and shifts from rural to urban areas within the Wildland-Urban Interface (WUI) has increased fire risks to local populations, as well as introduced complex and long-term costs and benefits to communities. We use an interdisciplinary approach to investigate how trends in fire characteristics influence adaptive...

Author(s): Liana Prudencio, Ryan Choi, Emily Esplin, Muyang Ge, Natalie Gillard, Jeffrey Haight, Patrick Belmont, Courtney Flint

Type: Document

Book or Chapter or Journal Article

### **Lubrecht Experimental Forest - College of Forestry and Conservation - The University of Montana \*CC TEST\***

[www.nrfirescience.org/resource/204](http://www.nrfirescience.org/resource/204)

The Lubrecht Experimental Forest is a 28,000-acre outdoor classroom and laboratory located 30 miles northeast of Missoula, Montana in the Blackfoot River drainage. Students and faculty use Lubrecht as a study and research site to learn about forest ecology, watershed management, timber harvest, wildlife research, and more. The...

Type: Demonstration Site

Experimental Forest

### **Virtual Reality Tool Used for Training**

[www.nrfirescience.org/resource/17605](http://www.nrfirescience.org/resource/17605)

Prevalence of commercially available Virtual Reality systems and platforms has triggered a serious assessment for use in the training environment. This interactive presentation is intended to demonstrate how Virtual Reality can be used in training to reduce exposure to hazards, communicate concepts in an immersive digital...

Type: Media

Seminar

### **Using Fire and Grazing to Maintain Productive and Ecologically Resilient Grasslands**

[www.nrfirescience.org/resource/15936](http://www.nrfirescience.org/resource/15936)

Fire, grazing, and climate are the major forces that maintain ecological health in grasslands. Today's grasslands are increasingly threatened by climate change, habitat loss and fragmentation, and degradation of ecological processes and communities. The effective use of fire and grazing management to conserve remaining grassland...

Type: Media

Webinar

### **Navigating IFTDSS**

[www.nrfirescience.org/resource/17596](http://www.nrfirescience.org/resource/17596)

An introduction to the layout of the IFTDSS application. Part of a webinar series running through March of 2018.

Type: Media

Webinar

### **Interview with Tom Harbour - Part three of three**

[www.nrfirescience.org/resource/13868](http://www.nrfirescience.org/resource/13868)

Tom Harbour, National Director of Fire and Aviation Management for the U.S. Forest Service, was interviewed by Bill Gabbert for Wildfire Today, December 14, 2015. In this final installment of the three part series, Mr. Harbour talked about the Cantwell-Hastings Bill that requires a criminal investigation of firefighter...

Type: Media

Video

### **A science framework for assessing threats to sagebrush ecosystems and greater sage-grouse and prioritizing conservation and restoration actions**

[www.nrfirescience.org/resource/14880](http://www.nrfirescience.org/resource/14880)

On September 26, Jeanne Chambers, U.S. Forest Service Rocky Mountain Research Station, and Steve Hanser, U.S. Geological Survey, discussed the tools and methods developed as part of the Science Framework for the Conservation and Restoration Strategy of Sec. Order 3336. Department of the Interior Secretary Order 3336 called...

Type: Media

Webinar

### **Mobile Mapping - An Introduction to Avenza Maps**

[www.nrfirescience.org/resource/15858](http://www.nrfirescience.org/resource/15858)

Avenza Maps is becoming popular on firelines because it has made mobile GIS technology easy to access across devices. It allows for quick transfer of information with downloadable maps, easy search functions and GPS tracking abilities.

Type: Media

Webinar

### **Advancement of smoke emissions models utilizing geospatial and remote sensing data for wildland fire management and risk reduction**

[www.nrfirescience.org/resource/13058](http://www.nrfirescience.org/resource/13058)

A Southern Fire Exchange webinar presented by Joe Roise of the North Carolina State University, Siamak Khorram of the University of California, Berkeley, and Duncan Lutes with the USDA Forest Service. This webinar presented an introduction to some recent interdisciplinary research attempting to improve wildland fire smoke emission...

Type: Media

Webinar

### **Elizabeth Reinhardt - Beyond Hazardous Fuels: Restoring Fire (Opening Plenary)**

[www.nrfirescience.org/resource/16191](http://www.nrfirescience.org/resource/16191)

This 21 minute presentation was given at the 3rd SW Fire Ecology Conference & Applied Fire Science Workshop in Tucson, Arizona by Elizabeth Reinhardt, Retired US Forest Service.

Type: Media

Video

### **Interview with Tom Harbour - Part one of three**

[www.nrfirescience.org/resource/13866](http://www.nrfirescience.org/resource/13866)

Tom Harbour, National Director of Fire and Aviation Management for the U.S. Forest Service, was interviewed by Bill Gabbert for Wildfire Today, December 14, 2015. In this Part 1 of 3, Mr. Harbour talked about his early years, how studying chemical engineering helped him in his USFS job, working with politicians, and what it was like...

Type: Media

Video

### **Managing wildfire: blazing the trail in the Southwest**

[www.nrfirescience.org/resource/15595](http://www.nrfirescience.org/resource/15595)

Recent changes in federal fire management policy have given fire managers increased flexibility to manage wildfires for multiple objectives. Fire managers can allow one flank of a fire to continue burning through remote backcountry, while actively suppressing another flank that threatens homes, infrastructure, or other values. Fire...

Type: Media

Video

### **Vulnerability of tree species and biome types to climate change in the U.S. Northern Rocky Mountains and Yellowstone**

[www.nrfirescience.org/resource/13043](http://www.nrfirescience.org/resource/13043)

This presentation assesses components of vulnerability of tree species and biome types to projected future climate within the Great Northern Landscape Conservation Cooperative (GNLCC) in the US Northern Rockies and the ecosystems surrounding Glacier and Yellowstone/Grand Teton National Parks. We drew on the results of five published...

Type: Media

Webinar

### **Changes in forest structure since 1860 in ponderosa pine dominated forests in the Colorado and Wyoming Front Range, USA**

[www.nrfirescience.org/resource/17557](http://www.nrfirescience.org/resource/17557)

Management practices since the late 19th century, including fire exclusion and harvesting, have altered the structure of ponderosa pine (*Pinus ponderosa* Douglas ex P. Lawson & C. Lawson) dominated forests across the western United States. These structural changes have the potential to contribute to uncharacteristic wildfire...

Author(s): Michael A. Battaglia, Benjamin Gannon, Peter M. Brown, Paula J. Fornwalt, Anthony S.

Cheng, Laurie S. Huckaby  
Type: Document  
Book or Chapter or Journal Article

### **Maximizing minimums: mapping basic requirements for greater sage-grouse**

[www.nrfirescience.org/resource/14381](http://www.nrfirescience.org/resource/14381)

Mapping broad regional distributions of a species can be limited by availability of consistent data. Statistical models also face trade-offs between model fit and prediction: results derived from local studies often fail when applied to new environments outside the original inference space. We used a method first described in 1901...

Type: Media

Webinar

### **Putting climate change on the map: developing specific, spatial management strategies for whitebark pine in the Greater Yellowstone Ecosystem**

[www.nrfirescience.org/resource/15148](http://www.nrfirescience.org/resource/15148)

This presentation was part of the 13th Biennial Scientific Conference on the Greater Yellowstone Ecosystem held at Jackson Lake Lodge in Grand Teton National Park, October 4-6, 2016. The conference theme was Building on the Past, Leading into the Future: Sustaining the Greater Yellowstone Ecosystem in the Coming Century.

Type: Media

Webinar

### **Applying resilience thinking**

[www.nrfirescience.org/resource/13406](http://www.nrfirescience.org/resource/13406)

Based on the recently published "Principles for Building Resilience: Sustaining Ecosystem Services in Social-Ecological Systems", this video presents an insightful overview of seven principles that could help you to apply ideas from resilience thinking into your practices.

Type: Media

Video

### **Restoring and conserving 5-needle pine in the crown of the continent: a multi-stakeholder approach**

[www.nrfirescience.org/resource/14770](http://www.nrfirescience.org/resource/14770)

This presentation by Regan Nelson, Crown Conservation Initiative Coordinator, was part of the 2016 Whitebark Pine Ecosystem Foundation Annual Science and Management Workshop - Successes and Challenges in Managing the Jewel in the Crown of the Continent that occurred September 16, 2016 in Whitefish, MT.

Type: Media

Webinar

### **Drought Refugia: Remote Sensing Approaches and Management Applications**

[www.nrfirescience.org/resource/15516](http://www.nrfirescience.org/resource/15516)

During droughts, localized areas of the landscape (drought refugia) retain surface water and soil moisture needed to sustain wildlife and vegetation. Remote sensing from satellite imagery offers powerful tools to identify refugia and study their responses to changing weather patterns over time. This talk will present two recent...

Type: Media

Webinar

### **Western aspen regeneration ecology**

[www.nrfirescience.org/resource/13716](http://www.nrfirescience.org/resource/13716)

This presentation briefly describes the changing view of regeneration ecology in western aspen, the findings underlying this changing view, and the silvicultural implications. We will discuss the traditional view of western aspen regeneration, describe field observations and genetic results that challenge some aspects of this view,...

Type: Media

Webinar

### **Evolving paradigms of aspen ecology and management**

[www.nrfirescience.org/resource/14331](http://www.nrfirescience.org/resource/14331)

The Evolving Paradigms of Aspen Ecology and Management webinar was part 2 of a longer recording. It starts at time 28:30. In recent years, fundamental assumptions concerning aspen clonal age, regeneration, and genetic diversity have been challenged, and these findings have important implications for management and persistence of...

Type: Media

Webinar

### **A strategy for managing forest adaptation to climate change with a case study of aspen and spruce in southwestern Colorado**

[www.nrfirescience.org/resource/13335](http://www.nrfirescience.org/resource/13335)

A review of sudden aspen decline will illustrate anticipated impacts of climate change on forests. Bioclimate modeling will be briefly introduced as a means of approximately quantifying and mapping those impacts. These models, optimized for a local planning area such as a national forest, can be used as part of a...

Type: Media

Webinar

### **Adaptation and silvicultural decision-making**

[www.nrfirescience.org/resource/14733](http://www.nrfirescience.org/resource/14733)

Linda Nagel's presentation begins at 28:25. This talk was given at the Adaptive Silviculture for Climate Change (ASCC) Northern Rockies Workshop which was held June 28, 2016 at the Supervisor's Office of the Flathead National Forest in Kalispell, Montana, bringing together natural resource managers, collaborators and stakeholders...

Type: Media

Webinar

### **Sage steppe resilience mapping in the Green River Basin**

[www.nrfirescience.org/resource/15507](http://www.nrfirescience.org/resource/15507)

In partnership with the Southern Rockies and Great Northern Landscape Conservation Cooperatives, we are pleased to announce several upcoming webinars for the Green River Basin Landscape Conservation Design (GRB LCD). The purpose of these webinars is to share several spatial data products developed by Conservation Science Partner and...

Type: Media

Webinar

### **Working across fence lines: multijurisdictional planning and prescribed fire**

[www.nrfirescience.org/resource/14308](http://www.nrfirescience.org/resource/14308)

Fire cuts across administrative boundaries and our restoration work needs to as well. Whether it is

multijurisdictional planning or multiagency prescribed burning, working across boundaries presents a unique set of challenges. In this webinar, Eytan Krasilovksy discussed multijurisdictional NEPA planning in the Rio Trampas watershed...

Type: Media

Webinar

### **National forest and rangeland management initiative webinar: rangeland management strategies and tools**

[www.nrfirescience.org/resource/15116](http://www.nrfirescience.org/resource/15116)

The Western Governors' Association webinar "Rangeland Management Strategies and Tools: Promoting Resiliency and Addressing Invasive Species" examined new developments for increased resilience to the threats posed to western rangelands by invasive species, drought, wildfire and other stressors. Panelists discussed techniques that...

Type: Media

Webinar

### **Successful vegetation management practices in the sagebrush-steppe**

[www.nrfirescience.org/resource/15502](http://www.nrfirescience.org/resource/15502)

This webinar will walk the audience through the Vegetation Management Practices learning series, produced by the Bureau of Land Management and The Nature Conservancy. This learning series responds to action item #5 within the fuels section of the Integrated Rangeland Fire Management Strategy to implement a comprehensive knowledge...

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

### **Recovery and Adaptation after Wildfire, 2000-2013**

[www.nrfirescience.org/resource/15957](http://www.nrfirescience.org/resource/15957)

Becoming a fire-adapted community that can live with wildfire is envisioned as a continuous, iterative process of adaptation. We combined national and case study research to examine how experience with wildfire alters the built environment and community- and government-level wildfire mitigation, planning, and regulations. By...

Type: Media

Webinar

### **Introduction to remote sensing for wildfire applications: satellite sensors and data products for wildfire applications**

[www.nrfirescience.org/resource/13229](http://www.nrfirescience.org/resource/13229)

This webinar covered satellite data processing levels; Satellites and sensors for wildfire applications (Landsat, MODIS, MERRA, SMAP); Satellite data products and tools for data access for national and global wildfire applications (LANDFIRE, FIRMS: web fire mapper, global fire maps, Worldview); Demo of FIRMS MODIS active fires.

Type: Media

Webinar

### **Predicting local smoke dispersion during low-intensity wildland fires in forested environments**

[www.nrfirescience.org/resource/12835](http://www.nrfirescience.org/resource/12835)

Smoke generated from low-intensity prescribed fires used for fuels management can have an adverse impact on local air quality, raising human health and safety concerns especially in wildland-urban-interface areas. Local smoke behavior is a complex process and is highly dependent on local ambient atmospheric conditions (e.g....

Type: Media

Webinar

### **Biodiversity and ecosystem services in managed forests**

[www.nrfirescience.org/resource/14218](http://www.nrfirescience.org/resource/14218)

This presentation was recorded during the 2016 State of the State and Forest Health Conference in Corvallis, OR.

Type: Media

Video

### **Balancing forest ecosystem restoration and old-forest species conservation in the Sierra Nevada, CA**

[www.nrfirescience.org/resource/15091](http://www.nrfirescience.org/resource/15091)

Concern over the social, economic, and ecological consequences of increasingly frequent "megafires" in California's Sierra Nevada have led some to propose large-scale forest restoration to increase ecosystem resilience. However, restoration efforts (e.g., forest thinning) may have collateral impacts on declining old-forest species....

Type: Media

Webinar

### **Bridging the Divide - Video 4: The Future of Our Forests**

[www.nrfirescience.org/resource/15944](http://www.nrfirescience.org/resource/15944)

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

Video

### **Fire and fuel management in a changing fire environment: Forest Service perspectives**

[www.nrfirescience.org/resource/13215](http://www.nrfirescience.org/resource/13215)

Discussion of fire and fuel management presented by Elizabeth Reinhardt at Northern Arizona University in February 2014.

Type: Media

Webinar

### **LANDFIRE #1: LANDFIRE 101**

[www.nrfirescience.org/resource/12806](http://www.nrfirescience.org/resource/12806)

This is the first 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

### **Recovery and adaptation after wildfire across the United States, 2009-2011**

[www.nrfirescience.org/resource/15292](http://www.nrfirescience.org/resource/15292)

Becoming a fire-adapted community that can live with wildfire is envisioned as a continuous, iterative process of adaptation. In eight case study sites across the United States we examined how destructive wildfire affected altered progress towards becoming fire-adapted, focusing on the role of planning and WUI regulations (building...

Type: Media

Webinar

### **Sagebrush Ecosystems in a Changing Climate: Opportunities for Adaptive Management**

[www.nrfirescience.org/resource/15940](http://www.nrfirescience.org/resource/15940)

Sagebrush steppe rangelands comprise a large fraction of North America, but they are in decline due to increases in wildfire and invasive plants, factors that relate strongly to climate and weather variability. When intact, plant communities in sagebrush steppe appear well adapted to cold wet winters and hot dry summers along with...

Type: Media

Webinar