Mortality associated with wildfire smoke exposure in Washington state, 2006-2017: a case-crossover study
www.nrfirescience.org/resource/20688
Background: Wildfire events are increasing in prevalence in the western United States. Research has found mixed results on the degree to which exposure to wildfire smoke is associated with an increased risk of mortality. Methods: We tested for an association between exposure to wildfire smoke and non-traumatic mortality in...
Author(s): Annie Doubleday, Jill Schulte, Lianne Sheppard, Matthew C. Kadlec, Ranil Dhammapala, Julie Fox, Tania M. Busch Isaksen
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Immunologic effects of forest fire exposure show increases in IL-1? and CRP
www.nrfirescience.org/resource/21999
With increasing heat and droughts world-wide, wildfires are becoming a more serious global threat to the world's population. Wildfire smoke is composed of approximately 80% to 90% of fine (<2.5 um) and ultrafine (<1 um) particulate matter (PM) which are also common to ambient pollution; these can penetrate the bloodstream...
Author(s): Mary M. Prunicki, Christopher C. Dant, Shu Cao, Holden Maecker, Francois Haddad, Juyong Brian Kim, Michael Snyder, Joseph Wu, Kari Nadeau
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

The Smoke That You Shouldn't Have
www.nrfirescience.org/resource/21943
In 2018, Fire Management Today carried an article on smoke exposure (6 Minutes for Safety 2018). The article describes actions you can take to mitigate smoke exposure and techniques for reducing the exposure of firefighters to heavy smoke. The article is very informative, with a lot of good points to consider. I would suggest...
Author(s): Randall C. Thomas
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

The delayed effect of wildfire season particulate matter on subsequent influenza season in a mountain west region of the USA
www.nrfirescience.org/resource/21503
Particularly in rural settings, there has been little research regarding the health impacts of fine particulate matter (PM2.5) during the wildfire season smoke exposure period on respiratory diseases, such as influenza, and their associated outbreaks months later. We examined the delayed effects of PM2.5 concentrations for the short...
Author(s): Erin L. Landguth, Zachary A. Holden, Jonathan M. Graham, Benjamin Stark, Elham Bayat Mokhtari, Emily Kaleczyc, Stacey Anderson, Shawn P. Urbanski, William Matt Jolly, Erin O. Semmens, Dyer A. Warren, Alan Swanson, Emily Stone, Curtis W. Noonan
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Health impacts of bushfire smoke exposure in Australia

www.nrfirescience.org/resource/21311
Smoke exposure from bushfires, such as those experienced in Australia during 2019-2020, can reach levels up to 10 times those deemed hazardous. Short?term and extended exposure to high levels of air pollution can be associated with adverse health effects, although the most recent fires have brought into sharp focus that several...
Author(s): Clare M. Walter, Elena K. Schneider-Futschik, Luke D. Knibbs, Louis B. Irving
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Wildland fire emission factors in North America: synthesis of existing data, measurement needs and management applications
www.nrfirescience.org/resource/20774
Field and laboratory emission factors (EFs) of wildland fire emissions for 276 known air pollutants sampled across Canada and the US were compiled. An online database, the Smoke Emissions Repository Application (SERA), was created to enable analysis and summaries of existing EFs to be used in smoke management and emissions...
Author(s): Susan J. Prichard, Susan M. O'Neill, Paige C. Eagle, Anne Andreu, Brian Drye, Joel Dubowy, Shawn P. Urbanski, Tara Strand
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Wildland firefighter smoke exposure and risk of lung and cardiovascular disease
www.nrfirescience.org/resource/22027
Wildland firefighters are exposed to health hazards including inhaling hazardous pollutants from the combustion of live and dead vegetation (smoke) and breathe soil dust, while working long shifts with no respiratory protection. This research brief summarizes a study analyzing long-term health impacts of smoke exposure for wildland...
Author(s): Kathleen M. Navarro, Linda Mutch
Year Published: 2020
Type: Document
Research Brief or Fact Sheet

Modelling hourly spatio-temporal PM2.5 concentration in wildfire scenarios using dynamic linear models
www.nrfirescience.org/resource/21989
Particulate matter with aerodynamic diameter < 2.5 ?m (PM2.5) is one of the main pollutants generated in wildfire events with negative impacts on human health. In research involving wildfires and air quality, it is common to use emission models. However, the commonly used emission approach can generate errors and...
Author(s): Joseph Sánchez-Balseca, Agustí Pérez-Foguet
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

The COVID-19 pandemic and wildfire smoke: potentially concomitant disasters
www.nrfirescience.org/resource/21813
As we enter the wildfire season in the northern hemisphere, the potential for a dangerous interaction between SARS-CoV-2 and smoke pollution should be recognized and acknowledged. This is challenging because the public health threat of COVID-19 is immediate and clear, whereas the public

health threat of wildfire smoke seems distant...
Author(s): Sarah B. Henderson
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Sub-Daily Exposure to Fine Particulate Matter and Ambulance Dispatches during Wildfire Seasons: A Case-Crossover Study in British Columbia, Canada
www.nrfirescience.org/resource/21394
Background: Exposure to fine particulate matter (PM2.5) during wildfire seasons has been associated with adverse health outcomes. Previous studies have focused on daily exposure, but PM2.5 levels in smoke events can vary considerably within 1 d. Objectives: We aimed to assess the immediate and lagged relationship between sub-...
Author(s): Jiayun Yao, Michael Brauer, Julie Wei, Kimberlyn M. McGrail, Fay H. Johnston, Sarah B. Henderson
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Knowing your audience: a typology of smoke sense participants to inform wildfire smoke health risk communication
www.nrfirescience.org/resource/21284
Central to public health risk communication is understanding the perspectives and shared values among individuals who need the information. Using the responses from a Smoke Sense citizen science project, we examined perspectives on the issue of wildfire smoke as a health risk in relation to an individual's preparedness to adopt...
Author(s): Mary Clare Hano, Steven E. Prince, Linda Wei, Bryan Hubbell, Ana G. Rappold
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

The effectiveness of adding fire for air quality benefits challenged: A case study of increased fine particulate matter from wilderness fire smoke with more active fire management
www.nrfirescience.org/resource/20792
The Lion Fire 2011 (LF11) and Lion Fire 2017 (LF17) were similar in size, location, and smoke transport. The same locations were used to monitor both fires for ground level fine particulate matter (PM2.5). Ground level PM2.5 is used to determine the relative smoke exposure from fire management tactics used during LF11 and LF17. The...
Author(s): Don Schweizer, Ricardo Cisneros, Kathleen M. Navarro
Year Published: 2020
Type: Document
Book or Chapter or Journal Article

Black carbon in the Lower Fraser Valley, British Columbia: impact of 2017 wildfires on local air quality and aerosol optical properties
www.nrfirescience.org/resource/20449
Exposure to wildfire smoke is a public health issue of increasing prominence in North America, particularly in western states and provinces. In this study, Aethalometer data collected at six sites in the Lower Fraser Valley (LFV), British Columbia, from September 2016 through August 2017 were analyzed to investigate the relative...
Author(s): Robert M. Healy, Jonathan M. Wang, Uwayemi Sofowote, Yushan Su, Jerzy Debosz,

Michael Noble, Anthony Munoz, Cheol-Heon Jeong, Nathan Hilker, Greg J. Evans, Geoff Doerksen
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Associations between respiratory health and ozone and fine particulate matter during a wildfire event
www.nrfirescience.org/resource/20034
Wildfires have been increasing in frequency in the western United States (US) with the 2017 and 2018 fire seasons experiencing some of the worst wildfires in terms of suppression costs and air pollution that the western US has seen. Although growing evidence suggests respiratory exacerbations from elevated fine particulate matter (...
Author(s): Colleen Reid, Ellen M. Considine, Gregory L. Watson, Donatello Telesca, Gabriele G. Pfister, Michael Jerrett
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Assessing relative differences in smoke exposure from prescribed, managed, and full suppression wildland fire
www.nrfirescience.org/resource/19522
A novel approach is presented to analyze smoke exposure and provide a metric to quantify health-related impacts. Our results support the current understanding that managing low-intensity fire for ecological benefit reduces exposure when compared to a high-intensity full suppression fire in the Sierra Nevada of California. More...
Author(s): D.W. Schweizer, Haiganoush K. Preisler, Ricardo Cisneros
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Association between fire smoke fine particulate matter and asthma-related outcomes: systematic review and meta-analysis
www.nrfirescience.org/resource/20559
Background: Asthma-related outcomes are regularly used by studies to investigate the association between human exposure to landscape fire smoke and health. Robust summary effect estimates are required to inform health protection policy for fire smoke exposure. Objective: To conduct a systematic review and meta-analysis to estimate...
Author(s): Nicolas Borchers-Arriagada, Joshua A. Horsley, Andrew J. Palmer, Geoffrey G. Morgan, Rachel Tham, Fay H. Johnston
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

A dataset on human perception of and response to wildfire smoke
www.nrfirescience.org/resource/20317
Wildfire smoke presents a growing threat in the Western U.S.; and human health, transportation, and economic systems in growing western communities suffer due to increasingly severe and widespread fires. While modelling wildfire activity and associated wildfire smoke distributions have substantially improved, understanding how...
Author(s): Mariah Fowler, Arash Modaresi Rad, Stephen Utych, Andrew Adams, Sanazsadat Alamian, Jennifer L. Pierce, Philip E. Dennison, John T. Abatzoglou, Amir AghaKouchak, Luke Montrose,

Mojtaba Sadegh
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Estimating fire smoke related health burden and novel tools to manage impacts on urban populations - Final Report to the Joint Fire Science Program
www.nrfirescience.org/resource/19727
Fire smoke is a major contributor to both particulate matter (PM) and ozone exposure in urban centers. Epidemiological, clinical, and toxicological studies have demonstrated a casual relationship between these pollutants and cardiovascular and respiratory related deaths and illnesses. Given the expected increase in fire events due...
Author(s): Brian J. Reich, Ana G. Rappold, Fay H. Johnston, Geoffrey G. Morgan, Neal L. Fann, Martin E. Cope, Richard A. Broome
Year Published: 2019
Type: Document
Technical Report or White Paper

Wildland firefighter smoke exposure and risk of lung cancer and cardiovascular disease mortality
www.nrfirescience.org/resource/19471
Wildland firefighters are exposed to wood smoke, which contains hazardous air pollutants, by suppressing thousands of wildfires across the U. S. each year. We estimated the relative risk of lung cancer and cardiovascular disease mortality from existing PM2.5 exposure-response relationships using measured PM4 concentrations from...
Author(s): Kathleen M. Navarro, Michael T. Kleinman, Chris E. Mackay, Timothy E. Reinhardt, John R. Balmes, George A. Broyles, Roger D. Ottmar, Luke P. Naher, Joseph W. Domitrovich
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Contribution of wildland-fire smoke to US PM2.5 and its influence on recent trends
www.nrfirescience.org/resource/19113
Seasonal-mean concentrations of particulate matter with diameters smaller than 2.5 ?m (PM2.5) have been decreasing across the United States (US) for several decades, with large reductions in spring and summer in the eastern US. In contrast, summertime-mean PM2.5 in the western US has not significantly decreased. Wildfires, a large...
Author(s): Katelyn O'Dell, Bonne Ford, Emily V. Fischer, Jeffrey R. Pierce
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Extensible Database of Validated Biomass Smoke Events for Health Research
www.nrfirescience.org/resource/18812
The extensible Biomass Smoke Validated Events Database is an ongoing, community driven, collection of air pollution events which are known to be caused by vegetation fires such as bushfires (also known as wildfire and wildland fires), or prescribed fuel reduction burns, and wood heaters. This is useful for researchers of health...
Author(s): Ivan C. Hanigan, Geoffrey G. Morgan, Grant J. Williamson, Farhad Salimi, Sarah B. Henderson, Murray R. Turner, David M. J. S. Bowman, Fay H. Johnston
Year Published: 2018

Type: Document
Book or Chapter or Journal Article

Developing an online tool for identifying at-risk populations to wildfire smoke hazards
www.nrfirescience.org/resource/17263
Wildfire episodes pose a significant public health threat in the United States. Adverse health impacts associated with wildfires occur near the burn area as well as in places far downwind due to wildfire smoke exposures. Health effects associated with exposure to particulate matter arising from wildfires can range from mild eye and...
Author(s): Ambarish Vaidyanathan, Fuyuen Yip, Paul Garbe
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Wildland fire smoke and human health
www.nrfirescience.org/resource/16639
The natural cycle of landscape fire maintains the ecological health of the land, yet adverse health effects associated with exposure to emissions from wildfire produce public health and clinical challenges. Systematic reviews conclude that a positive association exists between exposure to wildfire smoke or wildfire particulate...
Author(s): Wayne E. Cascio
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

The role of composition and particle size on the toxicity of wildfire emissions - JFSP Final Report
www.nrfirescience.org/resource/18785
Acute and chronic exposure to wildfire smoke can cause numerous documented cardiopulmonary effects, although determining the casual components within the thousands of different chemicals found in both the particle and gas phases remains a toxicological challenge. Specifically, little work has been done to evaluate and predict...
Author(s): M. Ian Gilmour
Year Published: 2018
Type: Document
Technical Report or White Paper

The health impacts and economic value of wildland fire episodes in the U.S.: 2008-2012
www.nrfirescience.org/resource/17239
Wildland fires degrade air quality and adversely affect human health. A growing body of epidemiology literature reports increased rates of emergency departments, hospital admissions and premature deaths from wildfire smoke exposure. Objective: Our research aimed to characterize excess mortality and morbidity events, and the economic...
Author(s): Neal L. Fann, Breanna Alman, Richard A. Broome, Geoffrey G. Morgan, Fay H. Johnston, George A. Pouliot, Ana G. Rappold
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

A Low-Cost Sensor Network for Wildfire Smoke Detection and Monitoring - Final Report to the

Joint Fire Science Program
www.nrfirescience.org/resource/17021
Wildfires and prescribed fires produce emissions that are harmful to human health. These health effects, however, are difficult to quantify, likely in part due to sparse data on exposure. The ability to measure fire emissions as they reach sensitive areas is critical to ensuring the protection of public health. Ground level...
Author(s): John Volckens, Scott Kelleher
Year Published: 2017
Type: Document
Technical Report or White Paper

Wildland firefighter exposure to hydrocarbons
www.nrfirescience.org/resource/16582
Wildland firefighters suppressing wildland fires or conducting prescribed fires work long shifts and are exposed to high levels of smoke with no respiratory protection. Inhalation of smoke is a safety concern for wildland firefighters and can potentially impair their performance and cause short and long term health impacts.
Author(s): Kathleen M. Navarro, Stacey S. Frederick
Year Published: 2017
Type: Document
Research Brief or Fact Sheet

Wildfire smoke exposure and human health: significant gaps in research for a growing public health issue
www.nrfirescience.org/resource/16286
Understanding the effect of wildfire smoke exposure on human health represents a unique interdisciplinary challenge to the scientific community. Population health studies indicate that wildfire smoke is a risk to human health and increases the healthcare burden of smoke-impacted areas. However, wildfire smoke composition is complex...
Author(s): Carolyn Black, Yohannes Tesfaigzi, Jed A. Bassein, Lisa A. Miller
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Application of an original wildfire smoke health cost benefits transfer protocol to the western US, 2005-2015
www.nrfirescience.org/resource/15529
Recent growth in the frequency and severity of US wildfires has led to more wildfire smoke and increased public exposure to harmful air pollutants. Populations exposed to wildfire smoke experience a variety of negative health impacts, imposing economic costs on society. However, few estimates of smoke health costs exist and none for...
Author(s): Benjamin A. Jones, Robert P. Berrens
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Smoke in a new era of fire
www.nrfirescience.org/resource/17804
Smoke from fire can sharply reduce air quality by releasing particulate matter, one of the most dangerous types of air pollution for human health. A third of U.S. households have someone sensitive to smoke. Minimizing the amount and impact of smoke is a high priority for land managers and

regulators. One tool for achieving that goal...
Author(s): Rachel White, Paul F. Hessburg, Narasimhan K. Larkin, J. Morgan Varner
Year Published: 2017
Type: Document
Technical Report or White Paper

Aligning smoke management with ecological and public health goals
www.nrfirescience.org/resource/15053
Past and current forest management affects wildland fire smoke impacts on downwind human populations. However, mismatches between the scale of benefits and risks make it difficult to proactively manage wildland fires to promote both ecological and public health. Building on recent literature and advances in modeling smoke and health...
Author(s): Jonathan Long, Leland W. Tarnay, Malcolm P. North
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

A multi-region analysis of factors that influence public acceptance of smoke from different fire sources
www.nrfirescience.org/resource/20884
The increase in area burned by wildfire has simultaneously brought increased concern about smoke impacts, both from wildfires and fires intentionally set to manage landscapes. Public concern about the potential health and other impacts of smoke can cause apprehension among managers who are considering prescribed burns, some to the...
Author(s): Christine Olsen, Eric L. Toman, Stacey S. Frederick
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Accelerating awareness, understanding, and adoption of wildland fire science information - Final Report to the Joint Fire Science Program
www.nrfirescience.org/resource/17026
Smoke from wildland fires has a significant impact on public health and transportation safety and presents a serious complication for air regulators seeking to design effective and efficient emission control strategies to meet and maintain air quality standards. Wildland fires produce numerous hazardous air pollutants and criteria...
Author(s): Shawn P. Urbanski
Year Published: 2017
Type: Document
Technical Report or White Paper

Occupational Exposure to Polycyclic Aromatic Hydrocarbon of Wildland Firefighters at Prescribed and Wildland Fires
www.nrfirescience.org/resource/16419
Wildland firefighters suppressing wildland fires or conducting prescribed fires work long shifts during which they are exposed to high levels of wood smoke with no respiratory protection. Polycyclic aromatic hydrocarbons (PAHs) are hazardous air pollutants formed during incomplete combustion. Exposure to PAHs was measured for 21...
Author(s): Kathleen M. Navarro, Ricardo Cisneros, Elizabeth M. Noth, John R. Balmes, Katharine Hammond
Year Published: 2017

Type: Document
Book or Chapter or Journal Article

Public use of information about smoke emissions: application of the risk information seeking and processing (RISP) model
www.nrfirescience.org/resource/16281
In the last few decades, the number of people living in fire-prone ecosystems has increased, placing more people and private property at risk to future fire events. Substantial research has demonstrated consistent public support for the use of prescribed fires in fuel-reduction efforts; however, continuing public concern regarding...
Author(s): Kathleen M. Rose, Eric Toman, Christine Olsen
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Social media approaches to modeling wildfire smoke dispersion: spatiotemporal and social scientific investigations
www.nrfirescience.org/resource/15552
Wildfires have significant effects on human populations, economically, environmentally, and in terms of their general well-being. Smoke pollution, in particular, from either prescribed burns or uncontrolled wildfires, can have significant health impacts. Some estimates suggest that smoke dispersion from fire events may affect the...
Author(s): Sonya Sachdeva, Sarah M. McCaffrey, Dexter Locke
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Effectiveness of public health messaging and communication channels during smoke events: a rapid systematic review
www.nrfirescience.org/resource/15062
Exposure to smoke emitted from wildfire and planned burns (i.e., smoke events) has been associated with numerous negative health outcomes, including respiratory symptoms and conditions. This rapid review investigates recent evidence (post-2009) regarding the effectiveness of public health messaging during smoke events. The...
Author(s): Jennifer A. Fish, Micah D. J. Peters, Imogen Ramsey, Greg Sharplin, Nadia Corsini, Marion Eckert
Year Published: 2017
Type: Document
Book or Chapter or Journal Article, Synthesis

How smoke from fires can affect your health
www.nrfirescience.org/resource/17800
Smoke is made up of a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat from smoke is from fine particles. These microscopic particles can penetrate deep into your lungs. They can cause a range of health problems, from burning eyes and a runny nose to...
Year Published: 2017
Type: Document
Research Brief or Fact Sheet

Air-quality impacts and intake fraction of PM2.5 during the 2013 Rim Megafire
www.nrfirescience.org/resource/19466
The 2013 Rim Fire was the third largest wildfire in California history and burned 257 314 acres in the Sierra Nevada Mountains. We evaluated air-quality impacts of PM2.5 from smoke from the Rim Fire on receptor areas in California and Nevada. We employed two approaches to examine the air-quality impacts: (1) an evaluation of PM2....
Author(s): Kathleen M. Navarro, Ricardo Cisneros, Susan M. O'Neill, Narasimhan K. Larkin, Don Schweizer, John R. Balmes
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
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

Forest fire policy: change conventional thinking of smoke management to prioritize long-term air quality and public health
www.nrfirescience.org/resource/14467
Wildland fire smoke is inevitable. Size and intensity of wildland fires are increasing in the western USA. Smoke-free skies and public exposure to wildland fire smoke have effectively been postponed through suppression. The historic policy of suppression has systematically both instilled a public expectation of a smoke-free...
Author(s): D.W. Schweizer, Richard Cisneros
Year Published: 2016
Type: Document
Book or Chapter or Journal Article

Characterizing public tolerance of smoke from wildland fires in communities across the United States
www.nrfirescience.org/resource/14813
Little is known about public tolerance of smoke from wildland fires. By combining data from two household surveys, we sought to determine whether tolerance of smoke from wildland fires varies with its origin or managerial rationale, to describe geographical variation in tolerance of smoke, and to describe the relationship between...
Author(s): Jesse M. Engebretson, Troy E. Hall, Jarod Blades, Christine Olsen, Eric Toman, Stacey S. Frederick
Year Published: 2016
Type: Document
Book or Chapter or Journal Article

Future mega-fires and smoke impacts
www.nrfirescience.org/resource/15579
“Megafire” events, in which large high-intensity fires propagate over extended periods, can cause both

immense damage to the local environment and catastrophic air quality impacts on cities and towns downwind. Increases in extreme events associated with climate change (e.g., droughts, heat waves) are projected to result in more...
Author(s): Narasimhan K. Larkin, John T. Abatzoglou, Donald McKenzie, Brian E. Potter, E. Ashley Steel, Brian J. Stocks
Year Published: 2015
Type: Document
Technical Report or White Paper

Wildfire smoke and public health risk
www.nrfirescience.org/resource/13562
Wildfire activity is predicted to increase with global climate change, resulting in longer fire seasons and larger areas burned. The emissions from fires are highly variable owing to differences in fuel, burning conditions and other external environmental factors. The smoke that is generated can impact human populations spread over...
Author(s): Fabienne Reisen, Sandra M. Duran, Michael D. Flannigan, Catherine Elliott, Karen Rideout
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
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

Verification of Spot Fire Weather Forecasts
www.nrfirescience.org/resource/15563
Software was developed to evaluate National Weather Service (NWS) spot forecasts. Fire management officials request spot forecasts from the NWS to provide detailed guidance as to atmospheric conditions in the vicinity of planned prescribed burns as well as wildfires that do not have incident meteorologists on site. A multi-year set...
Author(s): John D. Horel, Timothy J. Brown
Year Published: 2015
Type: Document
Technical Report or White Paper

Perverse incentives: the case of wildfire smoke regulation
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

Smoke management of wildland and prescribed fire: understanding public preferences and trade-offs
www.nrfirescience.org/resource/13012
Smoke from forest fires is a serious and increasing land management concern. However, a paucity of information exists that is specific to public perceptions of smoke. This study used conjoint analysis, a multivariate technique, to evaluate how four situational factors (i.e., smoke origin, smoke duration, health impact, and advanced...
Author(s): Jarod Blades, Steven R. Shook, Troy E. Hall
Year Published: 2014
Type: Document
Book or Chapter or Journal Article

Wildfire smoke and health impacts: a closer look at fire attributes and their marginal effects
www.nrfirescience.org/resource/12143
Existing studies on the economic impact of wildfire smoke have focused on single fire events or entire seasons without considering the marginal effect of daily fire progression on downwind communities. In addition, neither approach allows for an examination of the impact of even the most basic fire attributes, such as distance and...
Author(s): K. Moeltner, Man-Kuen Kim, E. Zhu, W. Yang
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

Influencing public perceptions of smoke management and prescribed burning programs: an analysis of opportunities existing in communication tactics, community-based partnerships and interagency decision making
www.nrfirescience.org/resource/13507
Historical fire suppression efforts have led to the alteration of forest structure and fuel conditions across the United States. Correspondingly, managers are now faced with higher fuel loads and denser vegetation as well as growing forest communities and wildland-urban interface. While managers recognize the ecological benefits of...
Author(s): Danielle K. Mazzotta
Year Published: 2012
Type: Document
Dissertation or Thesis

Research perspectives on the public and fire management: a synthesis of current social science on eight essential questions
www.nrfirescience.org/resource/12601
As part of a Joint Fire Science Program project, a team of social scientists reviewed existing fire social science literature to develop a targeted synthesis of scientific knowledge on the following questions: 1. What is the public's understanding of fire's role in the ecosystem? 2. Who are trusted sources of information about fire...
Author(s): Sarah M. McCaffrey, Christine Olsen
Year Published: 2012
Type: Document
Synthesis

Public perceptions and tolerance of smoke from prescribed and wildland fire
www.nrfirescience.org/resource/15554
A literature synthesis on public perceptions and tolerance of smoke. Topics explored include personal values and beliefs about smoke, beliefs about the controllability of fire and smoke, agency trust, individual characteristics related to perceptions and tolerance of smoke, and future research.
Author(s): Jarod Blades, Troy E. Hall
Year Published: 2011
Type: Document
Technical Report or White Paper

Situational awareness: nighttime smoke and fog on prescribed burns
www.nrfirescience.org/resource/12440
Nighttime smoke dispersal from most prescribed fires is critical for public health and safety. For this reason, prescribed fire training and guidelines include detailed information about smoke management and remind burn managers to be constantly aware of weather, fuel, and other situations that might lead to smoke dispersion...
Author(s): Anthony Matthews, Vince Carver
Year Published: 2011
Type: Document
Research Brief or Fact Sheet

The economic cost of adverse health effects from wildfire: a review
www.nrfirescience.org/resource/14534
The economic costs of adverse health effects associated with exposure to wildfire smoke should be given serious consideration in determining the optimal wildfire management policy. Unfortunately, the literature in this research area is thin. In an effort to better understand the nature of these economic costs, we review and...
Author(s): Ikuho Kochi, Geoffrey H. Donovan, Patricia A. Champ, John B. Loomis
Year Published: 2010
Type: Document
Book or Chapter or Journal Article

Real time monitoring of the three dimensional distribution of smoke aerosol levels from prescribed fires and wildfires - Final Report to the Joint Fire Science Program
www.nrfirescience.org/resource/11168
Particulates emitted by wildfires and prescribed fires can severely affect visibility and air quality resulting in car accidents, airport and road closures, and public health problems. Researchers have developed a new remote-sensing instrument (lidar) and are now calibrating and testing this and auxiliary instrumentation and new...
Author(s): Wei Min Hao, Vladimir A. Kovalev
Year Published: 2008
Type: Document
Technical Report or White Paper

Prescribed fire: what influences public approval?
www.nrfirescience.org/resource/8440
Except in remote areas, most prescribed fires will have some effect on members of the public. It is therefore important for land managers to work with the public before, during, and after a prescribed burn. To do this effectively, managers need to have an accurate idea of what people do and do not think about prescribed fire and...

Author(s): Sarah M. McCaffrey
Year Published: 2006
Type: Document
Technical Report or White Paper

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
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

Acceptability of smoke from prescribed forest burning in the northern inland west: a focus group approach
www.nrfirescience.org/resource/8393
Focus groups were used to gauge tolerance of smoke from broadcast prescribed forest burning in the wildland-urban interface of the northern Inland West. Focus group participants worked through issues surrounding prescribed burning as a management tool to determine if the origin of smoke made a difference in the acceptance of that...
Author(s): Brad R. Weisshaupt, Matthew S. Carroll, Keith A. Blatner, William D. Robinson, Pamela J. Jakes
Year Published: 2005
Type: Document
Book or Chapter or Journal Article

Federal Implementation Plans Under the Clean Air Act for Indian Reservations in Idaho, Oregon and Washington; Final Rule
www.nrfirescience.org/resource/12014
The Environmental Protection Agency (EPA) is taking final action on these Federal Implementation Plans (FIPs) under the Clean Air Act (CAA) for Indian reservations in Idaho, Oregon, and Washington. The FIPs put in place basic air quality regulations to protect health and welfare on Indian reservations located in the Pacific...
Author(s): U.S. Environmental Protection Agency
Year Published: 2005
Type: Document
Management or Planning Document

Smoke exposure at western wildfires
www.nrfirescience.org/resource/11193
Smoke exposure measurements among firefighters at wildfires in the Western United States between 1992 and 1995 showed that altogether most exposures were not significant, between 3 and 5 percent of the shift-average exposures exceeded occupational exposure limits for carbon monoxide and respiratory irritants. Exposure to benzene and...
Author(s): Timothy E. Reinhardt, Roger D. Ottmar
Year Published: 2000
Type: Document

Technical Report or White Paper

Interim air quality policy on wildland and prescribed fires
www.nrfirescience.org/resource/12446
This policy statement has been prepared in response to plans by some Federal, tribal and State wildland owners/managers to significantly increase the use of wildland and prescribed fires to achieve resource benefits in the wildlands. Many wildland ecosystems are considered to be unhealthy as a result of past management strategies....
Author(s): U.S. Environmental Protection Agency
Year Published: 1998
Type: Document
Technical Report or White Paper

Fire and smoke in Montana forests
www.nrfirescience.org/resource/13133
The concept of forest fire is especially difficult to deal with in an objective manner because fire has deep psychological associations for most animals, especially man. Moreover, attitudes toward forest fires have been greatly conditioned by what has been called the most effective advertising campaign in history...
Author(s): William R. Beaufait
Year Published: 1971
Type: Document
Book or Chapter or Journal Article