

Balancing ecological costs and benefits of fire for population viability of disturbance-dependent butterflies

www.nrfirescience.org/resource/17368

Disturbance is a fundamental ecological process and driver of population dynamics. Ecologists seek to understand the effects of disturbance on ecological systems and to use disturbance to modify habitats degraded by anthropogenic change. Demographic responses by plants to disturbance are often well described, but demographic...

Author(s): Norah Warchola, Elizabeth E. Crone, Cheryl B. Schultz

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Wildfire-vegetation dynamics affect predictions of climate change impact on bird communities

www.nrfirescience.org/resource/17360

Community-level climate change indicators have been proposed to appraise the impact of global warming on community composition. However, non-climate factors may also critically influence species distribution and biological community assembly. The aim of this paper was to study how fire-vegetation dynamics can modify our ability to...

Author(s): Adrián Regos, Miguel Clavero, Manuela D'Amen, Antoine Guisan, Lluís Brotons

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Snowshoe hare multi-level habitat use in a fire-adapted ecosystem

www.nrfirescience.org/resource/17333

Prescribed burning has the potential to improve habitat for species that depend on pyric ecosystems or other early successional vegetation types. For species that occupy diverse plant communities over the extent of their range, response to disturbances such as fire might vary based on post-disturbance vegetation dynamics among plant...

Author(s): Laura C. Gigliotti, Benjamin C. Jones, Matthew J. Lovallo, Duane R. Diefenbach

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Trophic cascades at multiple spatial scales shape recovery of young aspen in Yellowstone

www.nrfirescience.org/resource/17170

Throughout much of the 20th century, the heights of young quaking aspen (*Populus tremuloides*) in Yellowstone National Park's northern ungulate winter range were suppressed due to intensive herbivory by Rocky Mountain elk (*Cervus elaphus*). However, following the 1995–96 reintroduction of gray wolves (*Canis lupus*), completing the...

Author(s): Robert L. Beschta, Luke E. Painter, William J. Ripple

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

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

Annotated Bibliography: Research on Greater Sage-grouse since January 2015

www.nrfirescience.org/resource/16966

The greater sage-grouse (*Centrocercus urophasianus*; hereafter GRSG) has been a focus of scientific investigation and management action for the past two decades. The 2015 U.S. Fish and Wildlife Service listing determination of “not warranted” was in part due to a large-scale collaborative effort to develop strategies to conserve...

Author(s): Sarah Carter, D.J. Manier, Robert S. Arkle, A.N. Johnston, Susan L. Phillips, Steven E. Hanser, Z.H. Bowen

Year Published: 2018

Type: Document

Technical Report or White Paper

Greater sage-grouse science (2015–17)—Synthesis and potential management implications

www.nrfirescience.org/resource/16961

The greater sage-grouse (*Centrocercus urophasianus*; hereafter called “sage-grouse”), a species that requires sagebrush (*Artemisia* spp.), has experienced range-wide declines in its distribution and abundance. These declines have prompted substantial research and management investments to improve the understanding of sage-grouse...

Author(s): Steven E. Hanser, Patricia A. Deibert, John C. Tull, Natasha B. Carr, Cameron L. Aldridge, Travis D. Bargsten, Thomas J. Christiansen, Peter S. Coates, Michele R. Crist, Kevin E. Doherty, Ethan A. Ellsworth, Lee J. Foster, Vicki A. Herren, Kevin H. Miller, Ann Moser, Robin M. Naeve, Karen L. Prentice, Thomas E. Remington, Mark A. Ricca, Douglas J. Shinneman, Richard L. Truex, Lief A. Wiechman, Dereck C. Wilson, Z.H. Bowen

Year Published: 2018

Type: Document

Synthesis

Overlapping bark beetle outbreaks, salvage logging and wildfire restructure a lodgepole pine ecosystem

www.nrfirescience.org/resource/17365

The 2010 Church’s Park Fire burned beetle-killed lodgepole pine stands in Colorado, including recently salvage-logged areas, creating a fortuitous opportunity to compare the effects of salvage logging, wildfire and the combination of logging followed by wildfire. Here, we examine tree regeneration, surface fuels, understory plants...

Author(s): Charles C. Rhoades, Kristen Pelz, Paula J. Fornwalt, Brett Wolk, Anthony S. Cheng

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Fire-induced change in floral abundance, density, and phenology benefits bumble bee foragers

www.nrfirescience.org/resource/17345

Fire is a dominant, and well-studied, structuring force in many temperate and semi-arid communities; yet, few studies have investigated the effects of fire on multi-trophic interactions. Here, we ask how fire-induced changes in flowering affect the abundance of bumble bee foragers (*Bombus vosnesenskii*) and

whether differences in...

Author(s): John M. Mola, Neal M. Williams

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Bird conservation potential of fire and herbicide treatments in thinned pine stands

www.nrfirescience.org/resource/17324

Fire-maintained pine (*Pinus* spp.) forests, characterized by a diverse herbaceous layer, sparse midstory layer, and a dominant pine overstory, once covered approximately 30 million ha in the southeastern United States. Fire suppression, landscape changes, and land management changes have contributed to reduced suitability of many...

Author(s): Raymond B. Iglay, Rachel E. Greene, Bruce D. Leopold, Darren A. Miller

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Ten Years of Monitoring Illustrates a Cascade of Effects of White Pine Blister Rust and Focuses Whitebark Pine Restoration in the Canadian Rocky and Columbia Mountains

www.nrfirescience.org/resource/17189

Whitebark pine forests are declining due to infection by white pine blister rust and mountain pine beetle, combined with the effects of climate change and fire suppression. The Canadian Rocky and Columbia Mountains represent a large portion of the whitebark range; a vast area, exemplifying the need for knowledge about whitebark pine...

Author(s): Brenda Shepherd, Brad Jones, Robert Sissons, Jed Cochrane, Jane Park, Cyndi M. Smith, Natalie Staff

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Simulation of net ecosystem productivity of a lodgepole pine forest after mountain pine beetle attack using a modified version of 3-PG

www.nrfirescience.org/resource/17169

The most recent mountain pine beetle (MPB) (*Dendroctonus ponderosae*) outbreak in British Columbia (BC), which began in the late 1990s, killed ~54% of the mature merchantable lodgepole pine and was expected to impact gross primary productivity (GPP), ecosystem respiration (R) and thus net ecosystem productivity (NEP) of infested...

Author(s): Gesa Meyer, T. Andrew Black, Rachhpal S. Jassal, Zoran Nesic, Nicholas C. Coops, Andreas Christen, Arthur L. Fredeen, David L. Spittlehouse, Nicholas J. Grant, Vanessa N. Foord, Rebecca Bowler

Year Published: 2018

Type: Document

Book or Chapter or Journal Article

Conflicting Perspectives on Spotted Owls, Wildfire, and Forest Restoration

www.nrfirescience.org/resource/16339

Evidence of increasing fire extent and severity in the western US in recent decades has raised concern over the effects of fire on threatened species such as the spotted owl (*Strix occidentalis* Xantus de Vesey), which nests in forests with large trees and high canopy cover that are vulnerable to high-severity wildfire. A dichotomy...

Author(s): Joseph L. Ganey, Ho Yi Wan, Samuel A. Cushman, Christina D. Vojta

Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Fires following bark beetles: factors controlling severity and disturbance interactions in ponderosa pine

www.nrfirescience.org/resource/16316

Previous studies have suggested that bark beetles and fires can be interacting disturbances, whereby bark beetle– caused tree mortality can alter the risk and severity of subsequent wildland fires. However, there remains considerable uncertainty around the type and magnitude of the interaction between fires following bark beetle...

Author(s): Carolyn Hull Sieg, Rodman Linn, F. Pimont, Chad M. Hoffman, Joel D. McMillin, Judith Winterkamp, Scott L. Baggett

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

The Influence of Western Spruce Budworm on Fire in Spruce-Fir Forests

www.nrfirescience.org/resource/16730

Western spruce budworm (*Choristoneura freemani* Razowski; WSBW) is the most significant defoliator of coniferous trees in the western United States. Despite its important influence on Western forests, there are still gaps in our knowledge of WSBW's impact on fire, and little research has been done on this relationship in high-...

Author(s): Eric Vane, Kristen M. Waring, Adam Polinko

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Montana Climate Assessment VIGNETTE: forest Management and a Changing Climate with Diana Six

www.nrfirescience.org/resource/15727

Diana Six has been studying pine bark beetles for 25 years, and still can't say she completely understands them. Lately, she's been diving into a topic she has always found even more confounding - forest management. This article describes an interview with Six that describes forest resilience in face of climate change.

Year Published: 2017

Type: Document

Research Brief or Fact Sheet

Recent and future climate suitability for whitebark pine mortality from mountain pine beetles varies across the western US

www.nrfirescience.org/resource/16680

Recent mountain pine beetle outbreaks in whitebark pine forests have been extensive and severe. Understanding the climate influences on these outbreaks is essential for developing management plans that account for potential future mountain pine beetle outbreaks, among other threats, and informing listing decisions under the...

Author(s): Polly C. Buotte, Jeffrey A. Hicke, Haiganoush K. Preisler, John T. Abatzoglou, Kenneth F. Raffa, Jesse A. Logan

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Long-term demography of the Northern Goshawk in a variable environment

www.nrfirescience.org/resource/16619

The Nearctic northern goshawk (*Accipiter gentilis atricapillis*) is a resident of conifer, broadleaf, and mixed forests from the boreal to the southwestern montane regions of North America. We report on a 20-year mark-recapture investigation (1991-2010) of the distribution and density of breeders, temporal and spatial variability in...

Author(s): Richard T. Reynolds, Jeffrey Lambert, Curtis H. Flather, Gary C. White, Benjamin J. Bird, Scott L. Baggett, Carrie Lambert, Shelley Bayard de Volo

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Interactions of landscape disturbances and climate change dictate ecological pattern and process: spatial modeling of wildfire, insect, and disease dynamics under future climates

www.nrfirescience.org/resource/15531

Context: Interactions among disturbances, climate, and vegetation influence landscape patterns and ecosystem processes. Climate changes, exotic invasions, beetle outbreaks, altered fire regimes, and human activities may interact to produce landscapes that appear and function beyond historical analogs. Objectives We used the...

Author(s): Rachel A. Loehman, Robert E. Keane, Lisa M. Holsinger, Zhiwei Wu

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Separating Trends in Whitebark Pine Radial Growth Related to Climate and Mountain Pine Beetle Outbreaks in the Northern Rocky Mountains, USA

www.nrfirescience.org/resource/17206

Drought and mountain pine beetle (*Dendroctonus ponderosae* Hopkins) outbreaks have affected millions of hectares of high-elevation conifer forests in the Northern Rocky Mountains during the past century. Little research has examined the distinction between mountain pine beetle outbreaks and climatic influence on radial growth in...

Author(s): Saskia L. van de Gevel, Evan R. Larson, Henri D. Grissino-Mayer

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Estimating aboveground tree biomass for beetle-killed lodgepole pine in the Rocky Mountains of northern Colorado

www.nrfirescience.org/resource/16593

The recent mountain pine beetle (*Dendroctonus ponderosae* Hopkins) epidemic has affected millions of hectares of conifer forests in the Rocky Mountains. Land managers are interested in using biomass from beetle-killed trees for bioenergy and biobased products, but they lack adequate information to accurately estimate biomass in...

Author(s): Woodam Chung, Paul Evangelista, Nathaniel Anderson, Anthony Vorster, Hee Han, Krishna Poudel, Robert Sturtevant

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Using resilience and resistance concepts to manage persistent threats to sagebrush ecosystems and greater sage-grouse

www.nrfirescience.org/resource/16558

Conservation of imperiled species often demands addressing a complex suite of threats that undermine species viability. Regulatory approaches, such as the US Endangered Species Act (1973), tend to focus on anthropogenic threats through adoption of policies and regulatory mechanisms. However, persistent ecosystem-based threats, such...

Author(s): Jeanne C. Chambers, Jeremy D. Maestas, David A. Pyke, Chad S. Boyd, Michael L. Pellant, Amarina Wuenschel

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Restoring Sage-Grouse Habitat after Fire: Success of Different Restoration Methods across an Elevation Gradient - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/17006

Greater sage-grouse (*Centrocercus urophasianus*) are threatened by a continued loss of sagebrush (*Artemisia* spp.) habitat. Recent, large scale wildfires have elevated the risk to sage-grouse as it may take up to several decades to more than a century for naturally recovery of sage-grouse habitat (i.e. reestablishment of sagebrush)....

Author(s): Kirk W. Davies, Matthew Madsen, Chad S. Boyd, Michael A. Gregg, April Hulet, Urban Strachan

Year Published: 2017

Type: Document

Technical Report or White Paper

Evidence of compounded disturbance effects on vegetation recovery following high-severity wildfire and spruce beetle outbreak

www.nrfirescience.org/resource/16510

Spruce beetle (*Dendroctonus rufipennis*) outbreaks are rapidly spreading throughout subalpine forests of the Rocky Mountains, raising concerns that altered fuel structures may increase the ecological severity of wildfires. Although many recent studies have found no conclusive link between beetle outbreaks and increased fire size or...

Author(s): Amanda R. Carlson, Jason S. Sibold, Timothy J. Assal, Jose F. Negron

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

A multicentury dendrochronological reconstruction of western spruce budworm outbreaks in the Okanogan Highlands, northeastern Washington

www.nrfirescience.org/resource/16464

The western spruce budworm (*Choristoneura occidentalis occidentalis* Freeman) is recognized as the most ecologically and economically damaging defoliator in western North America. Synchronous western spruce budworm outbreaks can occur over much of a host species' range, causing widespread limb and tree mortality, regeneration...

Author(s): Todd M. Ellis, Aquila Flower

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Effects of fire on pollinators and pollination

www.nrfirescience.org/resource/15080

Summary: 1) Increased incidence of landscape fire and pollinator declines with co-extinctions of dependent plant species are both globally significant. Fire can alter species distributions, but its effects on plant–pollinator interactions are poorly understood so its present and future role in coupled plant–pollinator declines...

Author(s): Julian Brown, Alan York, Fiona J. Christie, Michael A. McCarthy

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Prescribed fire in grassland butterfly habitat: targeting weather and fuel conditions to reduce soil temperature and burn severity

www.nrfirescience.org/resource/16319

Prescribed burning is a primary tool for habitat restoration and management in fire-adapted grasslands. Concerns about detrimental effects of burning on butterfly populations, however, can inhibit implementation of treatments. Burning in cool and humid conditions is likely to result in lowered soil temperatures and to produce...

Author(s): Kathryn C. Hill, Jonathan D. Bakker, Peter W. Dunwiddie

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Fires following Bark Beetles: Factors Controlling Severity and Disturbance Interactions in Ponderosa Pine

www.nrfirescience.org/resource/16727

Previous studies have suggested that bark beetles and fires can be interacting disturbances, whereby bark beetle–caused tree mortality can alter the risk and severity of subsequent wildland fires. However, there remains considerable uncertainty around the type and magnitude of the interaction between fires following bark beetle...

Author(s): Carolyn Hull Sieg, Rodman Linn, F. Pimont, Chad M. Hoffman, Joel D. McMillin, Judith Winterkamp, Scott L. Baggett

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Uneven-aged silviculture can reduce negative effects of forest management on beetles

www.nrfirescience.org/resource/16656

Decline in biodiversity have increased the interest in alternative forest management approaches. Unevenaged silviculture has been proposed as a mean to maintain continuity of forest canopy cover, mimic small-scale disturbances and provide a stratified forest structure similar to that of old-growth forests and therefore better...

Author(s): Klara Joelsson, Joakim Hjältén, Timothy Work, Heloise Gibb, Jean-Michel Roberge, Therese Löfroth

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Emerging technology to measure habitat quality and behavior of grouse: Examples from studies of greater sage-grouse

www.nrfirescience.org/resource/16612

An increasing number of threats, both natural (e.g. fires, drought) and anthropogenic (e.g. agriculture,

infrastructure development), are likely to affect both availability and quality of plants that grouse rely on for cover and food. As such, there is an increasing need to monitor plants and their use by grouse over space and time...

Author(s): Jennifer Sorensen Forbey, Gail L. Patricelli, Donna M. Delparte, Alan H. Krakauer, Peter J. Olsoy, Marcella R. Fremgen, Jordan D. Nobler, Lucas P. Spaete, Lisa A. Shipley, Janet L. Rachlow, Amy K. Dirksen, Anna Perry, Bryce A. Richardson, Nancy F. Glenn

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Genetic recapture identifies long-distance breeding dispersal in Greater Sage-Grouse (*Centrocercus urophasianus*)

www.nrfirescience.org/resource/16573

Dispersal can strongly influence the demographic and evolutionary trajectory of populations. For many species, little is known about dispersal, despite its importance to conservation. The Greater Sage-Grouse (*Centrocercus urophasianus*) is a species of conservation concern that ranges across 11 western U.S. states and 2 Canadian...

Author(s): Todd Cross, David E. Naugle, John Carlson, Michael K. Schwartz

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Simulations Inform Design Of Regional Occupancy-Based Monitoring For A Sparsely Distributed, Territorial Species

www.nrfirescience.org/resource/17463

Sparsely distributed species attract conservation concern, but insufficient information on population trends challenges conservation and funding prioritization. Occupancy-based monitoring is attractive for these species, but appropriate sampling design and inference depend on particulars of the study system. We employed spatially...

Author(s): Quresh Latif, Martha M. Ellis, Victoria A. Saab, Kim Mellen-McLean

Year Published: 2017

Type: Document

Book or Chapter or Journal Article

Climate change and wildfire effects in aridland riparian ecosystems: An examination of current and future conditions

www.nrfirescience.org/resource/16556

Aridland riparian ecosystems are limited, the climate is changing, and further hydrological change is likely in the American Southwest. To protect riparian ecosystems and organisms, we need to understand how they are affected by disturbance processes and stressors such as fire, drought, and non-native plant invasions. Riparian...

Author(s): D. Max Smith, Deborah M. Finch

Year Published: 2017

Type: Document

Technical Report or White Paper

Effects of time since burn, spatial scale and post-fire treatments on rainfall thresholds to produce runoff and erosion from plot to watershed-scale - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/16994

Colorado's Front Range forested watersheds provide municipal water supplies for downstream

communities. Many of these watersheds have been affected by wildfires and subsequent runoff, erosion and sedimentation of waterways. Natural resource managers need information on the frequency and duration of post-fire runoff and erosion,...

Author(s): Stephanie Kampf, Codie Wilson, Joseph W. Wagenbrenner

Year Published: 2017

Type: Document

Technical Report or White Paper

Quaking aspen in Utah: integrating recent science with management

www.nrfirescience.org/resource/15175

Quaking aspen is widely regarded as a key resource for humans, livestock, and wildlife with these values often competing with each other, leading to overuse of aspen in some locations and declines. We review trends in aspen science and management, particularly in Utah. Historically, research conducted here holds a prestigious place...

Author(s): Paul C. Rogers, Sam St. Clair

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Avian relationships with wildfire at two dry forest locations with different historical fire regimes

www.nrfirescience.org/resource/14479

Wildfire is a key factor influencing bird community composition in western North American forests. We need to understand species and community responses to wildfire and how responses vary regionally to effectively manage dry conifer forests for maintaining biodiversity. We compared avian relationships with wildfire burn severity...

Author(s): Quresh Latif, Jamie Sanderlin, Victoria A. Saab, William M. Block, Jonathan G. Dudley

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Transferability of habitat suitability models for nesting woodpeckers associated with wildfire

www.nrfirescience.org/resource/15000

Following wildfire, forest managers are challenged with meeting both socioeconomic demands (e.g., salvage logging) and mandates requiring habitat conservation for disturbance-associated wildlife (e.g., woodpeckers). Habitat suitability models for nesting woodpeckers can be informative, but tests of model transferability are needed...

Author(s): Quresh Latif, Victoria A. Saab, Jeff P. Hollenbeck, Jonathan G. Dudley

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Burned forest characterization at single-tree level with airborne laser scanning for assessing wildlife habitat

www.nrfirescience.org/resource/14180

Abundance, size, and spatial distribution of standing dead trees (snags), are key indicators of forest biodiversity and ecosystem health. These metrics represent critical habitat components for various wildlife species of conservation concern, including the Black-backed Woodpecker (*Picoides arcticus*), which is strongly associated...

Author(s): Angeles Casas, Mariano Garcia, Rodney B. Siegel, Alexander Koltunov, Carlos Ramirez, Susan L. Ustin

Year Published: 2016

Type: Document
Book or Chapter or Journal Article

Effects of prescribed fire on wildlife and wildlife habitat in selected ecosystems of North America

www.nrfirescience.org/resource/14715

Prescribed fire is applied widely as a management tool in North America to meet various objectives such as reducing fuel loads and fuel continuity, returning fire to an ecosystem, enhancing wildlife habitats, improving forage, preparing seedbeds, improving watershed conditions, enhancing nutrient cycling, ...

Author(s): William M. Block, L. Mike Conner, Paul A. Brewer, Paulette Ford, Jonathan Haufler, Andrea Litt, Ronald E. Masters, Laura R. Mitchell, Jane Park

Year Published: 2016

Type: Document

Technical Report or White Paper

Where do animals come from during post-fire population recovery? Implications for ecological and genetic patterns in post-fire landscapes

www.nrfirescience.org/resource/17232

Identifying where animals come from during population recovery can help to understand the impacts of disturbance events and regimes on species distributions and genetic diversity. Alternative recovery processes for animal populations affected by fire include external recolonization, nucleated recovery from refuges, or in situ...

Author(s): Sam C. Banks, Lachlan McBurney, David Blair, Ian D. Davies, David B. Lindenmayer

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

A 20-year reassessment of the health and status of whitebark pine forests in the Bob Marshall Wilderness Complex, Montana

www.nrfirescience.org/resource/14676

Whitebark pine plays a prominent role in high elevation ecosystems of the northern Rocky Mountains. It is an important food source for many birds and mammals as well as an essential component of watershed stabilization. Whitebark pine is vanishing from the landscape due to three main factors: white pine blister rust, mountain pine...

Author(s): Signe B. Leirfallom, Robert E. Keane, Molly L. Retzlaff

Year Published: 2016

Type: Document

Technical Report or White Paper

Centrocercus minimus, Centrocercus urophasianus (Gunnison sage-grouse, greater sage-grouse)

www.nrfirescience.org/resource/10784

This FEIS species review synthesizes information on the relationship of Centrocercus minimus, Centrocercus urophasianus (Gunnison sage-grouse, greater sage-grouse) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided...

Author(s): Robin J. Innes

Year Published: 2016

Type: Document

Synthesis

Effects of post-fire logging on fuel dynamics in a mixed-conifer forest, Oregon, USA: a 10-year assessment

www.nrfirescience.org/resource/14429

Removal of fire-killed trees (i.e. post-fire or salvage logging) is often conducted in part to reduce woody fuel loads and mitigate potential reburn effects. Studies of post-salvage fuel dynamics have primarily used chronosequence or modelling approaches, with associated limitations; longitudinal studies tracking fuels over time...

Author(s): John L. Campbell, Daniel C. Donato, Joseph B. Fontaine

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

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

Conservation and restoration of sagebrush ecosystems and sage-grouse: an assessment of USDA Forest Service Science

www.nrfirescience.org/resource/14004

Sagebrush ecosystems are among the largest and most threatened ecosystems in North America. Greater sage-grouse has served as the bellwether for species conservation in these ecosystems and has been considered for listing under the Endangered Species Act eight times. In September 2015, the decision was made not to list greater sage-...

Author(s): Deborah M. Finch, Douglas A. Boyce, Jeanne C. Chambers, Chris J. Colt, R. Kasten Dumroese, Stanley G. Kitchen, Clinton McCarthy, Susan E. Meyer, Bryce A. Richardson, Mary M. Rowland, Mark A. Rumble, Michael K. Schwartz, Monica S. Tomosy, Michael J. Wisdom

Year Published: 2016

Type: Document

Synthesis, Technical Report or White Paper

Short-term impacts of fire-mediated habitat alterations on an isolated bighorn sheep population

www.nrfirescience.org/resource/14889

Habitat alterations may improve and expand wildlife habitats, and bolster waning wildlife populations. We used global positioning system (GPS) locations to monitor 38 bighorn sheep (*Ovis canadensis* Shaw) that were translocated to the Seminoe Mountains, Wyoming, USA, in 2009 and 2010, and 24 bighorns captured in 2011 to investigate...

Author(s): Justin G. Clapp, Jeffrey L. Beck

Year Published: 2016

Type: Document
Book or Chapter or Journal Article

The integrated rangeland fire management strategy actionable science plan

www.nrfirescience.org/resource/14697

The Integrated Rangeland Fire Management Strategy (hereafter Strategy, DOI 2015) outlined the need for coordinated, science-based adaptive management to achieve long-term protection, conservation, and restoration of the sagebrush (*Artemisia* spp.) ecosystem. A key component of this management approach is the...

Author(s): Integrated Rangeland Fire Management Strategy Actionable Science Plan Team

Year Published: 2016

Type: Document

Management or Planning Document

Positive effects of fire on birds may appear only under narrow combinations of fire severity and time-since-fire

www.nrfirescience.org/resource/14642

We conducted bird surveys in 10 of the first 11 years following a mixed-severity fire in a dry, low-elevation mixed-conifer forest in western Montana, United States. By defining fire in terms of fire severity and time-since-fire, and then comparing detection rates for species inside 15 combinations of fire severity and time-since-...

Author(s): Richard L. Hutto, David A. Patterson

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

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

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

Climate influences on whitebark pine mortality from mountain pine beetle in the Greater Yellowstone Ecosystem

www.nrfirescience.org/resource/14565

Extensive mortality of whitebark pine, beginning in the early to mid-2000s, occurred in the Greater Yellowstone Ecosystem (GYE) of the western US, primarily from mountain pine beetle but also from other threats such as white pine blister rust. The climatic drivers of this recent mortality and the potential for future whitebark pine...

Author(s): Polly C. Buotte, Jeffrey A. Hicke, Haiganoush K. Preisler, John T. Abatzoglou, Kenneth F. Raffa, Jesse A. Logan

Year Published: 2016

Type: Document

Book or Chapter or Journal Article

Biomass and fire dynamics in a temperate forest-grassland mosaic: Integrating multi-species herbivory, climate, and fire with the FireBGCv2/GrazeBGC system

www.nrfirescience.org/resource/13195

Landscape fire succession models (LFSMs) predict spatially-explicit interactions between vegetation succession and disturbance, but these models have yet to fully integrate ungulate herbivory as a driver of their processes. We modified a complex LFSM, FireBGCv2, to include a multi-species herbivory module, GrazeBGC. The system is...

Author(s): Robert A. Riggs, Robert E. Keane, Norm Cimon, Rachel Cook, Lisa M. Holsinger, John Cook, Timothy DelCurto, Scott L. Baggett, Donald Justice, David Powell, Martin Vavra, Bridgett J. Naylor

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Temperate forest health in an era of emerging megadisturbance

www.nrfirescience.org/resource/13722

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

Impacts of fire on snowshoe hares in Glacier National Park, Montana, USA

www.nrfirescience.org/resource/13460

Forest fires fundamentally shape the habitats available for wildlife. Current predictions for fire under a warming climate suggest larger and more severe fires may occur, thus challenging scientists and managers to understand and predict impacts of fire on focal species, especially species of management concern. Snowshoe hares (...)

Author(s): Ellen Cheng, Karen E. Hodges, Scott Mills

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Too hot to trot? Evaluating the effects of wildfire on patterns of occupancy and abundance for a climate-sensitive habitat specialist

www.nrfirescience.org/resource/13185

Wildfires are increasing in frequency and severity as a result of climate change in many ecosystems; however, effects of altered disturbance regimes on wildlife remain poorly quantified. Here, we leverage an unexpected opportunity to investigate how fire affects the occupancy and abundance of a climate-sensitive habitat specialist,...

Author(s): Johanna Varner, Mallory S. Lambert, Joshua J. Horns, Sean Laverty, Laurie Dizney, Erik A. Beever, M. Denise Dearing

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Indicators of climate change in Idaho: an assessment framework for coupling biophysical

change and social perception

www.nrfirescience.org/resource/15637

Climate change is well documented at the global scale, but local and regional changes are not as well understood. Finer, local- to regional-scale information is needed for creating specific, place-based planning and adaptation efforts. Here the development of an indicator-focused climate change assessment in Idaho is described. This...

Author(s): P. Zion Klos

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

Using bird ecology to learn about the benefits of severe fire

www.nrfirescience.org/resource/15556

In this chapter in the book "The Ecological Importance of Mixed Severity Fires: Nature's Phoenix, the authors do not provide an encyclopedic review of the more than 450 published papers that describe some kind of effect of fire on birds. Instead, they chose to highlight underappreciated principles or lessons that emerge from...

Author(s): Richard L. Hutto, Monica L. Bond, Dominick A. DellaSala

Year Published: 2015

Type: Document

Book or Chapter or Journal Article

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

www.nrfirescience.org/resource/15504

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

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

Year Published: 2015

Type: Document

Technical Report or White Paper

Temperate forest health in an era of emerging megadisturbance

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

Simulated western spruce budworm defoliation reduces torching and crowning potential: a sensitivity analysis using a physics-based fire model

www.nrfirescience.org/resource/16893

The widespread, native defoliator western spruce budworm (*Choristoneura occidentalis* Freeman) reduces canopy fuels, which might affect the potential for surface fires to torch (ignite the crowns of individual trees) or crown (spread between tree crowns). However, the effects of defoliation on fire

behaviour are poorly understood. We...

Author(s): Greg M. Cohn, Russell A. Parsons, Emily K. Heyerdahl, Daniel G. Gavin, Aquila Flower

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

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

Future Forests Webinar Series, webinar proceedings and summary: ongoing research and management responses to the mountain pine beetle outbreak

www.nrfirescience.org/resource/12963

The Future Forest Webinar Series facilitated dialogue between scientists and managers about the challenges and opportunities created by the mountain pine beetle (MPB) epidemic. The series consisted of six webinar facilitated by the USFS Rocky Mountain Research Station, the Northern and Rocky Mountain Regions, and the Colorado Forest...

Year Published: 2014

Type: Document

Conference Proceedings

Post-epidemic fire risk and behavior

www.nrfirescience.org/resource/13708

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

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

Year Published: 2014

Type: Document

Conference Proceedings

The ecological importance of severe fire - Site visits to Lolo Creek and Blue Mountain burned areas

www.nrfirescience.org/resource/12652

Dr. Dick Hutto, professor of Organismal Biology and Ecology at the University of Montana, took participants of the May 2014 Large Wildland Fires Conference to recently burned sites to discuss fire effects. Hutto was enthused and excited about "the magical biology" occurring on recently burned sites. Magical biology includes...

Author(s): Corey L. Gucker

Year Published: 2014

Type: Document
Research Brief or Fact Sheet

Ecological Consequences Of Mountain Pine Beetle Outbreaks For Wildlife In Western North American Forests

www.nrfirescience.org/resource/17469

Mountain pine beetle (*Dendroctonus ponderosae*) (MPB) outbreaks are increasingly prevalent in western North America, causing considerable ecological change in pine (*Pinus* spp.) forests with important implications for wildlife. We reviewed studies examining wildlife responses to MPB outbreaks and postoutbreak salvage logging to inform...

Author(s): Victoria A. Saab, Quresh Latif, Mary M. Rowland, Tracey N. Johnson, Anna D. Chalfoun, Steven W. Buskirk, Joslin E. Heyward, Matthew A. Dresser

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Interactions among the mountain pine beetle, fires, and fuels

www.nrfirescience.org/resource/12022

Bark beetle outbreaks and wildfires are principal drivers of change in western North American forests, and both have increased in severity and extent in recent years. These two agents of disturbance interact in complex ways to shape forest structure and composition. For example, mountain pine beetle, *Dendroctonus ponderosae* Hopkins...

Author(s): Michael J. Jenkins, Justin B. Runyon, Christopher J. Fettig, Wesley G. Page, Barbara J. Bentz

Year Published: 2014

Type: Document

Book or Chapter or Journal Article, Synthesis

Conflicting selection from fire and seed predation drives fine-scaled phenotypic variation in a widespread North American conifer

www.nrfirescience.org/resource/12964

Recent work has demonstrated that evolutionary processes shape ecological dynamics on relatively short timescales (eco-evolutionary dynamics), but demonstrating these effects at large spatial scales in natural landscapes has proven difficult. We used empirical studies and modeling to investigate how selective pressures from fire and...

Author(s): Matt V. Talluto, Craig W. Benkman

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Quantifying restoration effectiveness using multi-scale habitat models: implications for sage-grouse in the Great Basin

www.nrfirescience.org/resource/12947

A recurrent challenge in the conservation of wide-ranging, imperiled species is understanding which habitats to protect and whether we are capable of restoring degraded landscapes. For Greater Sage-grouse (*Centrocercus urophasianus*), a species of conservation concern in the western United States, we approached this problem by...

Author(s): Robert S. Arkle, David S. Pilliod, Steven E. Hanser, Matthew L. Brooks, Jeanne C. Chambers, James B. Grace, Kevin C. Knutson, David A. Pyke, Justin L. Welty, Troy A. Wirth

Year Published: 2014

Type: Document

Book or Chapter or Journal Article

Moving forward: responding to and mitigating effects of the MPB epidemic

www.nrfirescience.org/resource/13711

The final webinar in the Future Forest Webinar Series provided an example of how managers utilized available science to address questions about post-epidemic forest conditions. Assessments of current conditions and projected trends, and how these compare with historical patterns, provide important information for land management...

Author(s): Claudia Regan, Barry Bollenbacher, Rob Gump, Michael Hillis

Year Published: 2014

Type: Document

Conference Proceedings

Preliminary resource vulnerability assessment

www.nrfirescience.org/resource/13409

This document is an assessment of the FS Northern Region's key water resources, tree species, wildlife species, and disturbances, which includes descriptions of the species' current condition, existing stressors, sensitivity to and expected effects of climate changes, and adaptive capacity.

Author(s): Northern Region Adaptation Partnership

Year Published: 2014

Type: Document

Technical Report or White Paper

A technical guide for monitoring wildlife habitat

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

Disease in a dynamic landscape: host behavior and wildfire reduce amphibian chytrid infection

www.nrfirescience.org/resource/12017

Disturbances are often expected to magnify effects of disease, but these effects may depend on the ecology, behavior, and life history of both hosts and pathogens. In many ecosystems, wildfire is the dominant natural disturbance and thus could directly or indirectly affect dynamics of many diseases. To determine how probability of...

Author(s): Blake R. Hossack, Winsor H. Lowe, Joy L. Ware, Paul S. Corn

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Managing high-elevation sagebrush steppe: do conifer encroachment and prescribed fire affect habitat for pygmy rabbits?

www.nrfirescience.org/resource/11999

Both fire and conifer encroachment can markedly alter big sagebrush communities and thus habitat quality and quantity for wildlife. We investigated how conifer encroachment and spring prescribed

burning affected forage and cover resources for a sagebrush specialist, the pygmy rabbit. We studied these dynamics at spring prescribed...

Author(s): Bonnie A. Woods, Janet L. Rachlow, Stephen C. Bunting, Timothy R. Johnson, Kelly Bocking
Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Restoring habitat for the northern Idaho ground squirrel (*Urocitellus brunneus brunneus*): effects of prescribed burning on dwindling habitat

www.nrfirescience.org/resource/12137

Land use and fire exclusion have contributed to an increase in ponderosa pine (*Pinus ponderosa*) forest extent and density in west-central Idaho. Open areas within ponderosa pine forests are decreasing, thus reducing habitat for the endemic northern Idaho ground squirrel (NIDGS; *Urocitellus brunneus brunneus*). In 2000, the NIDGS was...

Author(s): E. F. Suronen, Beth A. Newingham

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Interactive effects of wildfire, forest management, and isolation on amphibian and parasite abundance

www.nrfirescience.org/resource/11970

Projected increases in wildfire and other climate-driven disturbances will affect populations and communities worldwide, including host-parasite relationships. Research in temperate forests has shown that wildfire can negatively affect amphibians, but this research has occurred primarily outside of managed landscapes where...

Author(s): Blake R. Hossack, Winsor H. Lowe, R. Ken Honeycutt, Sean A. Parks, Paul S. Corn

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

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

Landscape-scale eco-evolutionary dynamics: selection by seed predators and fire determine a major reproductive strategy

www.nrfirescience.org/resource/11982

Recent work in model systems has demonstrated significant effects of rapid evolutionary change on ecological processes (eco-evolutionary dynamics). Fewer studies have addressed whether eco-evolutionary dynamics structure natural ecosystems. We investigated variation in the frequency of serotiny in lodgepole pine (*Pinus contorta*), a...

Author(s): Matt V. Talluto, Craig W. Benkman
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

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

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

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

www.nrfirescience.org/resource/11977

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

Author(s): Robert W. Gray
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

Trial by fire

www.nrfirescience.org/resource/12135

1) Conservation partners across 11 western states are rallying in unprecedented fashion to reduce threats to sage-grouse and the sagebrush ecosystem they occupy. 2) Improvements made in the Bureau of Land Management's (BLM) wildfire policy are a tremendous step forward but the 2012 wildfire season is a harsh reminder that more...

Author(s): Tim Murphy, David E. Naugle, Randall Eardley, Jeremy D. Maestas, Tim Griffiths, Michael L. Pellant, San J. Stiver
Year Published: 2013
Type: Document
Book or Chapter or Journal Article

Accipiter gentilis (northern goshawk)

www.nrfirescience.org/resource/10662

This FEIS species review synthesizes information on the relationship of *Accipiter gentilis* (northern goshawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Katharine R. Stone
Year Published: 2013
Type: Document
Synthesis

Reduced ectoparasite loads of deer mice in burned forest: from fleas to trees?

www.nrfirescience.org/resource/12030

We tested whether reduced parasite loads might contribute to high post-fire abundances of deer mice (*Peromyscus maniculatus*). We performed parasite examinations of 54 mice captured in burned forest in the area of Davis Fire (western Montana, USA), and 26 mice captured in nearby unburned forest.

Mean abundance of ectoparasites (fleas...

Author(s): Rafal Zwolak, S. Meagher, J. W. Vaughn, S. Dziemian, Elizabeth E. Crone

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Progress in understanding bark beetle effects on fire behavior using physics-based models

www.nrfirescience.org/resource/13297

Bark beetle outbreaks are a major disturbance of forests throughout western North America affecting ecological processes and social and economic values (Amman 1977, Bond and Keeley 2005). Since the 1990s, bark beetle outbreaks have affected between 1.1 and 13.5 million acres in the western United States and an additional 13.5...

Author(s): Chad M. Hoffman, Carolyn Hull Sieg, Penelope Morgan, William E. Mell, Rodman Linn, Camille Stevens-Rumann, Joel D. McMillin, Russell A. Parsons, Helen Maffei

Year Published: 2013

Type: Document

Book or Chapter or Journal Article

Rapid increases and time-lagged declines in amphibian occupancy after wildfire

www.nrfirescience.org/resource/11998

Climate change is expected to increase the frequency and severity of drought and wildfire. Aquatic and moisture-sensitive species, such as amphibians, may be particularly vulnerable to these modified disturbance regimes because large wildfires often occur during extended droughts and thus may compound environmental threats. However...

Author(s): Blake R. Hossack, Winsor H. Lowe, Paul S. Corn

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management

www.nrfirescience.org/resource/8320

Declining forest health attributed to associations between extensive bark beetle-caused tree mortality, accumulations of hazardous fuels, wildfire, and climate change have catalyzed changes in forest health and wildfire protection policies of land management agencies. These changes subsequently prompted research to investigate the...

Author(s): Michael J. Jenkins, Wesley G. Page, Elizabeth G. Hebertson, Martin E. Alexander

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

Effects of bark beetle-caused tree mortality on wildfire

www.nrfirescience.org/resource/13294

Millions of trees killed by bark beetles in western North America have raised concerns about

subsequent wildfire, but studies have reported a range of conclusions, often seemingly contradictory, about effects on fuels and wildfire. In this study, we reviewed and synthesized the published literature on modifications to fuels and fire...

Author(s): Jeffrey A. Hicke, Morris C. Johnson, Jane L. Hayes, Haiganoush K. Preisler

Year Published: 2012

Type: Document

Book or Chapter or Journal Article, Synthesis

A new forest fire paradigm: the need for high-severity fires

www.nrfirescience.org/resource/14505

During the 2012 fire season from June through August, wildfires in the droughtstricken western and central United States burned more than 3.6 million acres of forest and shrubland. In the hot, dry, windy conditions seen that season, a single spark can start an understory fire that ascends into the...

Author(s): Monica L. Bond, Rodney B. Siegel, Richard L. Hutto, Victoria A. Saab, Stephen A. Shunk

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Effects of ungulate herbivory on aspen, cottonwood, and willow development under forest fuels treatment regimes

www.nrfirescience.org/resource/8337

Herbivory by domestic and wild ungulates can dramatically affect vegetation structure, composition and dynamics in nearly every terrestrial ecosystem of the world. These effects are of particular concern in forests of western North America, where intensive herbivory by native and domestic ungulates has the potential to substantially...

Author(s): Bryan A. Endress, Michael J. Wisdom, Martin Vavra, Catherine G. Parks, Brian L. Dick, Bridgett J. Naylor, Jennifer M. Boyd

Year Published: 2012

Type: Document

Book or Chapter or Journal Article

Fire and fish: a synthesis of observation and experience

www.nrfirescience.org/resource/11271

The effects of wildfire on aquatic systems and fishes occurring in them has been linked to the direct or immediate influence of the fire on water quality and the indirect or subsequent effects on watershed characteristics and processes that influence water quality and quantity, stream channels, and aquatic biota (Gresswell 1999)....

Author(s): Bruce E. Rierman, Robert E. Gresswell, John N. Rinne

Year Published: 2012

Type: Document

Synthesis, Technical Report or White Paper

Odocoileus hemionus (mule deer)

www.nrfirescience.org/resource/10521

This FEIS species review synthesizes information on the relationship of *Odocoileus hemionus* (mule deer) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Robin J. Innes

Year Published: 2012

Type: Document

Bark beetles and fire: two forces of nature transforming western forests

www.nrfirescience.org/resource/11984

Bark beetles are chewing a wide swath through forests across North America. Over the past few years, infestations have become epidemic in lodgepole and spruce-fir forests of the Intermountain West. The resulting extensive acreages of dead trees are alarming the public and raising concern about risk of severe fire. Researchers...

Author(s): Gail Wells

Year Published: 2012

Type: Document

Research Brief or Fact Sheet

The beauty of a burned forest

www.nrfirescience.org/resource/14506

In the Northern Rockies, forests that have escaped fire are rare. In the Crown, fire is just as important as rainfall and sunlight are to plants and animals. For the vast majority of forest types within the region, the predominant fire regime is one of infrequent, intense, stand-replacement fires—not one of...

Author(s): Richard L. Hutto

Year Published: 2011

Type: Document

Research Brief or Fact Sheet

A tool to estimate the impact of bark beetle activity on fuels and fire behavior

www.nrfirescience.org/resource/12129

Recent bark beetle outbreaks have resulted in the loss of hundreds of thousands of conifers on approximately 74 million acres (30 million hectares) of forest in western North America during the last decade. Stand conditions, drought, and warming temperatures have contributed to the severity of these outbreaks, particularly in high-...

Author(s): Michael J. Jenkins, Elizabeth G. Hebertson, Wesley G. Page, Wanda E. Lindquist

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Amphibian responses to wildfire in the western United States: emerging patterns from short-term studies

www.nrfirescience.org/resource/8285

The increased frequency and severity of large wildfires in the western United States is an important ecological and management issue with direct relevance to amphibian conservation. Although the knowledge of fire effects on amphibians in the region is still limited relative to most other vertebrate species, we reviewed the current...

Author(s): Blake R. Hossack, David S. Pilliod

Year Published: 2011

Type: Document

Book or Chapter or Journal Article, Synthesis

Cervus elaphus (elk)

www.nrfirescience.org/resource/10523

This FEIS species review synthesizes information on the relationship of *Cervus elaphus* (elk) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire

management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general...

Author(s): Robin J. Innes

Year Published: 2011

Type: Document

Synthesis

The magnificent high-elevation five-needle white pines: ecological roles and future outlook

www.nrfirescience.org/resource/11895

The High Five symposium is devoted to exchanging information about a small group of pines with little commercial value but great importance to the ecology of high-mountain ecosystems of the West. These High Five pines include the subalpine and treeline species-whitebark (*Pinus albicaulis*), Rocky Mountain bristlecone (*P. aristata*),...

Author(s): Diana F. Tomback, Peter Achuff, Anna W. Schoettle, John W. Schwandt, Ron J.

Mastrogiuseppe

Year Published: 2011

Type: Document

Conference Proceedings, Synthesis

Predicted fates of ground-nesting bees in soil heated by wildfire: thermal tolerances of life stages and a survey of nesting depths

www.nrfirescience.org/resource/12144

Periodic wildfire defines plant community composition and dynamics in many of the world's semi-arid biomes, whose climates and floras also favor wild bee diversity. Invasive flammable grasses, deforestation, historical fire suppression and human ignition are increasing fire frequency and intensifying its severity, as well as...

Author(s): James H. Cane, John L. Neff

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Woodpecker habitat after the fire

www.nrfirescience.org/resource/13508

Public land managers are asked to minimize fuel levels after fires, including using techniques such as salvage logging. They are also responsible for maintaining suitable wildlife habitat, especially for species of concern to state and federal agencies. An area where these responsibilities could conflict is in the use of salvage...

Author(s): Victoria A. Saab

Year Published: 2011

Type: Document

Research Brief or Fact Sheet

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

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

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

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

Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests?

www.nrfirescience.org/resource/13340

Disturbance interactions have received growing interest in ecological research in the last decade. Fire and bark beetle outbreaks have recently increased in severity and extent across western North America, raising concerns about their possible interactions. Although it is often presumed that bark beetle outbreaks increase...

Author(s): Martin Simard, William H. Romme, Jacob M. Griffin, Monica G. Turner

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Fuel and fire behavior in high-elevation five-needle pines affected by mountain pine beetle

www.nrfirescience.org/resource/12112

Bark beetle-caused tree mortality in conifer forests affects the quantity and quality of forest fuels and has long been assumed to increase fire hazard and potential fire behavior. In reality, bark beetles and their effects on fuel accumulation and subsequent fire hazard have only recently been described. We have extensively sampled...

Author(s): Michael J. Jenkins

Year Published: 2011

Type: Document

Conference Proceedings

Picoides arcticus (black-backed woodpecker)

www.nrfirescience.org/resource/10857

This FEIS species review synthesizes information on the relationship of *Picoides arcticus* (black-backed woodpecker) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic...

Author(s): Katharine R. Stone

Year Published: 2011

Type: Document

Synthesis

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

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

Influence of fire on native and nonnative salmonid populations and habitat in a western Montana basin

www.nrfirescience.org/resource/8286

Anticipated increases in the frequency and severity of wildfire may threaten the persistence of native salmonid populations in headwater streams in western North America. This study used extensive pre- and postfire data to assess whether wildfire leads to hypothesized declines in native westslope cutthroat trout *Oncorhynchus clarkii*...

Author(s): Clint M. Sestrich, Thomas E. McMahon, Michael K. Young

Year Published: 2011

Type: Document

Book or Chapter or Journal Article

Oreamnos americanus (mountain goat)

www.nrfirescience.org/resource/10522

This FEIS species review synthesizes information on the relationship of *Oreamnos americanus* (mountain goat) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology,...

Author(s): Robin J. Innes

Year Published: 2011

Type: Document

Synthesis

Bonasa umbellus (ruffed grouse)

www.nrfirescience.org/resource/10793

This FEIS species review synthesizes information on the relationship of *Bonasa umbellus* (ruffed grouse) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Rachelle Meyer

Year Published: 2011

Type: Document

Synthesis

Falco peregrinus (peregrine falcon)

www.nrfirescience.org/resource/10748

This FEIS species review synthesizes information on the relationship of *Falco peregrinus* (peregrine falcon) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology,...

Author(s): Peggy Luensmann

Year Published: 2010

Type: Document
Synthesis

Restoring whitebark pine forests of the northern Rocky Mountains, USA

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

Martes americana (American marten)

www.nrfirescience.org/resource/10856

This FEIS species review synthesizes information on the relationship of *Martes americana* (American marten) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology,...

Author(s): Katharine R. Stone

Year Published: 2010

Type: Document

Synthesis

Fire and mice: seed predation moderates fire's influence on conifer recruitment

www.nrfirescience.org/resource/8207

In fire-adapted ecosystems, fire is presumed to be the dominant ecological force, and little is known about how consumer interactions influence forest regeneration. Here, we investigated seed predation by deer mice (*Peromyscus maniculatus*) and its effects on recruitment of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (...)

Author(s): Rafal Zwolak, Dean E. Pearson, Yvette K. Ortega, Elizabeth E. Crone

Year Published: 2010

Type: Document

Book or Chapter or Journal Article

Alces americanus (moose)

www.nrfirescience.org/resource/10524

This FEIS species review synthesizes information on the relationship of *Alces americanus* (moose) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general...

Author(s): Robin J. Innes

Year Published: 2010

Type: Document

Synthesis

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

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

Blister rust and western forest biodiversity: ecology, values and outlook for white pines

www.nrfirescience.org/resource/8234

Eight white pine species are widely distributed among the forests of western Canada and the United States. The different forest communities with these species contribute biodiversity to the western landscape. The trees themselves provide various ecosystem services, including wildlife habitat and watershed protection. White pine...

Author(s): Diana F. Tomback, Peter Achuff

Year Published: 2010

Type: Document

Book or Chapter or Journal Article, Synthesis

Recovery of greater sage-grouse habitat features in Wyoming big sagebrush following prescribed fire

www.nrfirescience.org/resource/12127

The ability of prescribed fire to enhance habitat features for Greater Sage-Grouse (*Centrocercus urophasianus*) in Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) in western North America is poorly understood. We evaluated recovery of habitat features important to wintering, nesting, and early brood-rearing Sage-Grouse in...

Author(s): Jeffrey L. Beck, John W. Connelly, Kerry P. Reese

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

Effects of timber harvest following wildfire in western North America

www.nrfirescience.org/resource/11122

Timber harvest following wildfire leads to different outcomes depending on the biophysical setting of the forest, pattern of burn severity, operational aspects of tree removal, and other management activities. Fire effects range from relatively minor, in which fire burns through the understory and may kill a few trees, to severe, in...

Author(s): David L. Peterson, James K. Agee, Gregory H. Aplet, Dennis P. Dykstra, Russell T. Graham, John F. Lehmkuhl, David S. Pilliod, Donald F. Potts, Robert F. Powers, John D. Stuart

Year Published: 2009

Type: Document

Technical Report or White Paper

The effects of fire on avian communities: spatio-temporal attributes of the literature 1912-2003

www.nrfirescience.org/resource/12608

We reviewed the temporal, geographic, and biogeographic distribution, as well as relevant research and publication attributes, of 512 documents addressing the effects of fire on avian communities, to provide an assessment of the scope of this literature and recommendations for future research. We summarized relevant attributes of...

Author(s): Andreas Leidolf, John A. Bissonette

Year Published: 2009
Type: Document
Book or Chapter or Journal Article, Synthesis

Thermal characteristics of amphibian microhabitats in a fire-disturbed landscape

www.nrfirescience.org/resource/8402

Disturbance has long been a central issue in amphibian conservation, often regarding negative effects of logging or other forest management activities, but some amphibians seem to prefer disturbed habitats. After documenting increased use of recently burned forests by boreal toads (*Bufo boreas*), we hypothesized that burned habitats...

Author(s): Blake R. Hossack, Lisa A. Eby, C. Gregory Guscio, Paul S. Corn

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

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

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

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

Reciprocal interactions between bark beetles and wildfire in subalpine forests: landscape patterns and the risk of high-severity fire - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11136

The interactions of wildfire and bark beetle outbreaks and their reciprocal influences on fire behavior, bark beetle dynamics, and ecosystem structure are critical research issues in many coniferous forests of the Intermountain West. We combined field studies with new remote sensing methods to address three main questions regarding...

Author(s): Daniel B. Tinker

Year Published: 2009

Type: Document

Technical Report or White Paper

Integrated analysis for management of fire and fuels, terrestrial and aquatic - Final Report to the

Joint Fire Science Program

www.nrfirescience.org/resource/12111

The potential for fire to negatively impact habitat that supports a threatened or endangered species, either directly or indirectly through phenomena such as debris flows, presents resource managers with a tough choice: treat fuels to reduce the risk of fire but potentially degrade stream habitat or do not treat fuels knowing an...

Author(s): Charles H. Luce, Bruce E. Rieman, Paul F. Hessburg, Anne E. Black, Matthew R. Dare

Year Published: 2009

Type: Document

Technical Report or White Paper

Grus canadensis, Grus canadensis canadensis, Grus canadensis nesiototes, Grus canadensis pratensis, Grus canadensis pulla, Grus canadensis rowani, Grus canadensis tabida (sandhill crane species)

www.nrfirescience.org/resource/10855

[Full Title: Grus canadensis, Grus canadensis canadensis, Grus canadensis nesiototes, Grus canadensis pratensis, Grus canadensis pulla, Grus canadensis rowani, Grus canadensis tabida (sandhill crane, lesser sandhill crane, Cuban sandhill crane, Florida sandhill crane, Mississippi sandhill crane, Canadian sandhill crane, greater...

Author(s): Katharine R. Stone

Year Published: 2009

Type: Document

Synthesis

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

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

Listening to the message of the Black-backed Woodpecker, a hot fire specialist

www.nrfirescience.org/resource/11083

The Black-backed Woodpecker is an uncommon bird of the northern coniferous forests of North America. It is one of several species of fauna that are considered fire specialists. This woodpecker nests in cavities it creates in dead standing trees and feeds on wood-boring beetles and their larvae, which are also attracted to stressed...

Author(s): Elise LeQuire

Year Published: 2009

Type: Document

Research Brief or Fact Sheet

Influences of postfire salvage logging on forest birds in the Eastern Cascades, Oregon, USA

www.nrfirescience.org/resource/17447

In coniferous forests of western North American, fire is an important disturbance that influences the structure and composition of floral and faunal communities. The impacts of postfire management, including salvage logging and replanting, on these forests are not well known. We compared densities

and relative abundances of forest...

Author(s): Rebecca Cahall, John P. Hayes

Year Published: 2009

Type: Document

Book or Chapter or Journal Article

Postfire recovery of sagebrush communities: assessment using spot-5 and very large-scale aerial imagery

www.nrfirescience.org/resource/8278

Much interest lies in long-term recovery rates of sagebrush communities after fire in the western United States, as sagebrush communities comprise millions of hectares of rangelands and are an important wildlife habitat. Little is known about postfire changes in sagebrush canopy cover over time, especially at a landscape scale. We...

Author(s): Temuulen T. Sankey, Corey A. Moffet, Keith T. Weber

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

Bark beetles, fuels, fires, and implications for forest management in the Intermountain West

www.nrfirescience.org/resource/8239

Bark beetle-caused tree mortality in conifer forests affects the quantity and quality of forest fuels and has long been assumed to increase fire hazard and potential fire behavior. In reality, bark beetles, and their effects on fuel accumulation, and subsequent fire hazard, are poorly understood. We extensively sampled fuels in...

Author(s): Michael J. Jenkins, Elizabeth G. Hebertson, Wesley G. Page, C. Arik Jorgensen

Year Published: 2008

Type: Document

Book or Chapter or Journal Article, Synthesis

Indirect effects of fire severity on avian communities in ponderosa pine and aspen forests in western North America: a review

www.nrfirescience.org/resource/8365

description

Author(s): Kerri T. Vierling, Leigh B. Lentile

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

Recoupling fire and aspen recruitment after wolf reintroduction in Yellowstone National Park, USA

www.nrfirescience.org/resource/8232

We report on the recent growth of upland aspen (*Populus tremuloides* Michx.) thickets in northwestern Yellowstone National Park, USA following wolf (*Canis lupus* L.) reintroduction in 1995. We compared aspen growth patterns in an area burned by the 1988 fires to aspen growth patterns in an adjacent unburned area. Elk (*Cervus elaphus* L...

Author(s): Joshua S. Halofsky, William J. Ripple, Robert L. Beschta

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

The ecological importance of severe wildfires: some like it hot

www.nrfirescience.org/resource/8229

Many scientists and forest land managers concur that past fire suppression, grazing, and timber harvesting practices have created unnatural and unhealthy conditions in the dry, ponderosa pine forests of the western United States. Specifically, such forests are said to carry higher fuel loads and experience fires that are more severe...

Author(s): Richard L. Hutto

Year Published: 2008

Type: Document

Book or Chapter or Journal Article

Nucifraga columbiana (Clark's nutcracker)

www.nrfirescience.org/resource/10782

This FEIS species review synthesizes information on the relationship of *Nucifraga columbiana* (Clark's nutcracker) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic...

Author(s): Nancy E. McMurray

Year Published: 2008

Type: Document

Synthesis

Fire is for the birds in northern mixed-grass prairie

www.nrfirescience.org/resource/11082

Roughly 25,000 acres of grassland in the National Wildlife Refuges of North Dakota and eastern Montana are treated every year with prescribed fire, mostly on northern mixed-grass prairie. Although this shrinking ecosystem is fire-adapted, there have been very few studies of the effects of prescribed fire on wildlife, introduced and...

Author(s): Marjie Brown

Year Published: 2008

Type: Document

Research Brief or Fact Sheet

Gulo gulo (wolverine)

www.nrfirescience.org/resource/10747

This FEIS species review synthesizes information on the relationship of *Gulo gulo* (wolverine) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general...

Author(s): Peggy Luensmann

Year Published: 2008

Type: Document

Synthesis

Holocene records of Dendroctonus bark beetles in high elevation pine forests of Idaho and Montana, USA

www.nrfirescience.org/resource/8224

Paleoecological reconstructions from two lakes in the U.S. northern Rocky Mountain region of Idaho and Montana revealed the presence of bark beetle elytra and head capsules (cf. *Dendroctonus* spp., most likely *D. ponderosae*, mountain pine beetle). Occurrence of these macrofossils during the period of time associated with the 1920/...

Author(s): Andrea R. Brunelle, Gerald E. Rehfeldt, Barbara J. Bentz, A. Steven Munson
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

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

Burn and they will come! The western regional birds and burns study examines bird responses to prescribed fire

www.nrfirescience.org/resource/11088

Although prescribed fire is increasingly being used in ponderosa pine forests as a management tool to reduce the risk of future high-severity wildfire, its effects on wildlife habitat have rarely been examined. The Birds and Burns Network was created to assist managers in planning prescribed fire projects that will reduce fuels and...

Author(s): Jonathan Thompson
Year Published: 2008
Type: Document
Research Brief or Fact Sheet

Predicted fire behavior in selected mountain pine beetle-infested lodgepole pine

www.nrfirescience.org/resource/12113

Using custom fuel models developed for use with Rothermel's surface fire spread model, we predicted and compared fire behavior in lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) stands with endemic, current epidemic, and postepidemic mountain pine beetle (*Dendroctonus ponderosae* Hopkins) populations using standardized...

Author(s): Wesley G. Page, Michael J. Jenkins
Year Published: 2007
Type: Document
Book or Chapter or Journal Article

Rangifer tarandus (caribou)

www.nrfirescience.org/resource/10746

This FEIS species review synthesizes information on the relationship of *Rangifer tarandus* (caribou) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Peggy Luensmann
Year Published: 2007
Type: Document
Synthesis

Mustela nigripes (black-footed ferret)

www.nrfirescience.org/resource/10903

This FEIS species review synthesizes information on the relationship of *Mustela nigripes* (black-footed ferret) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology...

Author(s): Elena D. Ulev

Year Published: 2007

Type: Document

Synthesis

Cynomys ludovicianus (black-tailed prairie dog)

www.nrfirescience.org/resource/10898

This FEIS species review synthesizes information on the relationship of *Cynomys ludovicianus* (black-tailed prairie dog) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution,...

Author(s): Elena D. Ulev

Year Published: 2007

Type: Document

Synthesis

Understanding the influence of local and landscape conditions on the occurrence and abundance of Black-backed Woodpeckers in burned forest patches

www.nrfirescience.org/resource/15635

Wildfire is the predominant disturbance agent in the Northern Rockies. The nearly annual occurrence of wildfire at some point in a larger landscape has served as the environmental backdrop against which our native wildlife species have evolved. A number of native species have, in fact, become dependent on wildfires or wildfire-...

Author(s): Richard L. Hutto, Deborah Austin, Sallie Hejl

Year Published: 2007

Type: Document

Technical Report or White Paper

Strix nebulosa (great gray owl)

www.nrfirescience.org/resource/10900

This FEIS species review synthesizes information on the relationship of *Strix nebulosa* (great gray owl) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Elena D. Ulev

Year Published: 2007

Type: Document

Synthesis

Post-fire recovery of Wyoming big sagebrush shrub-steppe in central and southeast Montana

www.nrfirescience.org/resource/15386

Sagebrush is a widespread habitat throughout our study area and a number of species including Greater Sage-grouse, pronghorn, Brewers Sparrow, Sage Sparrow, Sage Thrasher and sagebrush vole

are sagebrush dependent, at least at some stage of their life cycles. Fire constitutes an important driver in structuring sagebrush ecosystems;...

Author(s): Stephen V. Cooper, Peter Lesica, Greg Kudray

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Home range size of Black-backed Woodpeckers in burned forests of southwestern Idaho

www.nrfirescience.org/resource/11416

We examined home range size of Black-backed Woodpeckers (*Picoides arcticus*) in burned ponderosa pine (*Pinus ponderosa*) / Douglas-fir (*Pseudotsuga menziesii*) forests of southwestern Idaho during 2000 and 2002 (6 and 8 years following fire). Home range size for 4 adult males during the post-fledging period was 115.6-420.9 ha using the...

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

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Habitat suitability models for cavity-nesting birds in a postfire landscape

www.nrfirescience.org/resource/11411

Models of habitat suitability in postfire landscapes are needed by land managers to make timely decisions regarding postfire timber harvest and other management activities. Many species of cavity-nesting birds are dependent on postfire landscapes for breeding and other aspects of their life history and are responsive to postfire...

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

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Do high-density patches of coarse wood and regenerating saplings create browsing refugia for aspen (*Populus tremuloides*) in Yellowstone National Park (USA)?

www.nrfirescience.org/resource/13546

Following the extensive 1988 fires in Yellowstone, a mosaic of high-density patches of fallen logs and regenerating lodgepole pine (*Pinus contorta* var. *latifolia* Engelm. ex Wats.) saplings developed in the landscape. Such patches could potentially provide browsing refugia for post-fire aspen (*Populus tremuloides* Michx.)...

Author(s): James D. Forester, Dean P. Anderson, Monica G. Turner

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Birds and burns of the Interior West: descriptions, habitats, and management in western forests

www.nrfirescience.org/resource/11123

This publication provides information about prescribed fire effects on habitats and populations of birds of the interior West and a synthesis of existing information on bird responses to fire across North America. Our literature synthesis indicated that aerial, ground, and bark insectivores favored recently burned habitats, whereas...

Author(s): Victoria A. Saab, William M. Block, Robin E. Russell, John F. Lehmkuhl, Lisa Bate, Rachel White

Year Published: 2007

Type: Document

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

www.nrfirescience.org/resource/12723

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

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

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Neotoma cinerea (bushy-tailed woodrat)

www.nrfirescience.org/resource/10902

This FEIS species review synthesizes information on the relationship of *Neotoma cinerea* (bushy-tailed woodrat) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology...

Author(s): Elena D. Ulev

Year Published: 2007

Type: Document

Synthesis

Lynx canadensis (Canada lynx)

www.nrfirescience.org/resource/10897

This FEIS species review synthesizes information on the relationship of *Lynx canadensis* (Canada lynx) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Elena D. Ulev

Year Published: 2007

Type: Document

Synthesis

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

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

Martes pennanti (fisher)

www.nrfirescience.org/resource/10796

This FEIS species review synthesizes information on the relationship of *Martes pennanti* (fisher) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general...

Author(s): Rachelle Meyer

Year Published: 2007

Type: Document

Synthesis

Responses of pond-breeding amphibians to wildfire: short-term patterns in occupancy and colonization

www.nrfirescience.org/resource/8249

Wildland fires are expected to become more frequent and severe in many ecosystems, potentially posing a threat to many sensitive species. We evaluated the effects of a large, stand-replacement wildfire on three species of pond-breeding amphibians by estimating changes in occupancy of breeding sites during the three years before and...

Author(s): Blake R. Hossack, Paul S. Corn

Year Published: 2007

Type: Document

Book or Chapter or Journal Article

Developing statistical wildlife habitat relationships for assessing cumulative effects of fuels treatments - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11160

The primary weakness in our current ability to evaluate future landscapes in terms of wildlife lies in the lack of quantitative models linking wildlife to forest stand conditions, including fuels treatments. This project focuses on 1) developing statistical wildlife habitat relationships models (WHR) utilizing Forest Inventory and...

Author(s): Samuel A. Cushman, Kevin S. McKelvey

Year Published: 2006

Type: Document

Technical Report or White Paper

***Perisoreus canadensis* (gray jay)**

www.nrfirescience.org/resource/10901

This FEIS species review synthesizes information on the relationship of *Perisoreus canadensis* (gray jay) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and...

Author(s): Elena D. Ulev

Year Published: 2006

Type: Document

Synthesis

***Piranga ludoviciana* (western tanager)**

www.nrfirescience.org/resource/10795

This FEIS species review synthesizes information on the relationship of *Piranga ludoviciana* (western tanager) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology...

Author(s): Rachelle Meyer

Year Published: 2006

Type: Document

Synthesis

Toward meaningful snag-management guidelines for postfire salvage logging in North American conifer forests

www.nrfirescience.org/resource/14507

The bird species in western North America that are most restricted to, and therefore most dependent on, severely burned conifer forests during the first years following a fire event depend heavily on the abundant standing snags for perch sites, nest sites, and food resources. Thus, it is critical to develop and apply appropriate...

Author(s): Richard L. Hutto

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Changes in downed wood and forest structure after prescribed fire in ponderosa pine forests

www.nrfirescience.org/resource/11002

Most prescribed fire plans focus on reducing wildfire hazards with little consideration given to effects on wildlife populations and their habitats. To evaluate effectiveness of prescribed burning in reducing fuels and to assess effects of fuels reduction on wildlife, we began a large-scale study known as the Birds and Burns Network...

Author(s): Victoria A. Saab, Lisa Bate, John F. Lehmkuhl, Brett G. Dickson, Scott Story, Stephanie Jentsch, William M. Block

Year Published: 2006

Type: Document

Conference Proceedings

Patagioenas fasciata (band-tailed pigeon)

www.nrfirescience.org/resource/10896

This FEIS species review synthesizes information on the relationship of *Patagioenas fasciata* (band-tailed pigeon) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic...

Author(s): Elena D. Ulev

Year Published: 2006

Type: Document

Synthesis

The effects of postfire salvage logging on cavity-nesting birds

www.nrfirescience.org/resource/12933

We investigated the effects of postfire salvage logging on cavity-nesting birds by comparing nest densities and patterns of nest reuse over a three-year period in seven logged and eight unlogged patches of mixed-conifer forest in the Blackfoot-Clearwater Wildlife Management Area, Montana. We found 563 active nests of 18 cavity-...

Author(s): Richard L. Hutto, Susan M. Gallo

Year Published: 2006

Type: Document

Book or Chapter or Journal Article

Gymnorhinus cyanocephalus (pinyon jay)

www.nrfirescience.org/resource/10904

This FEIS species review synthesizes information on the relationship of *Gymnorhinus cyanocephalus* (pinyon jay) to fire--how fire affects the species and its habitat, effects of the species on fuels and fire regimes, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology...

Author(s): Elena D. Ulev

Year Published: 2006

Type: Document

Synthesis

Wildlife and invertebrate response to fuel reduction treatments in dry coniferous forests of the Western United States: a synthesis

www.nrfirescience.org/resource/11192

This paper synthesizes available information on the effects of hazardous fuel reduction treatments on terrestrial wildlife and invertebrates in dry coniferous forest types in the West. We focused on thinning and/or prescribed fire studies in ponderosa pine (*Pinus ponderosa*) and dry-type Douglas-fir (*Pseudotsuga menziesii*), lodgepole...

Author(s): David S. Pilliod, Evelyn L. Bull, Jane L. Hayes, Barbara C. Wales

Year Published: 2006

Type: Document

Synthesis, Technical Report or White Paper

Snag longevity in relation to wildfire and postfire salvage logging

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

Sage-grouse habitat restoration symposium proceedings

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

Prescribed fire for fuel reduction in northern mixed-grass prairie: influence on habitat and population dynamics of indigenous wildlife - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11171

Prescribed fire is used increasingly to reduce accumulated fuels on National Wildlife Refuges (NWRs) and other reserves in the mixed-grass prairie region of the northern Great Plains. There is sparse documentation, however, on effects of prescribed fire on habitat and population dynamics of wildlife in

the region. This multi-...

Author(s): Robert K. Murphy, Todd A. Grant, Elizabeth M. Madden

Year Published: 2005

Type: Document

Technical Report or White Paper

Five-year operational trial of verbenone to deter mountain pine beetle (*Dendroctonus ponderosae*; Coleoptera: Scolytidae) attack of lodgepole pine (*Pinus contorta*)

www.nrfirescience.org/resource/11410

The antiaggregation pheromone verbenone was operationally tested for 5 yr to deter mass attack by the mountain pine beetle on lodgepole pine in campgrounds and administrative areas surrounding Redfish and Little Redfish Lakes at the Sawtooth National Recreation Area in central Idaho. Each year, five-gram verbenone pouches were...

Author(s): Robert Progar

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Prescribed fire strategies to restore wildlife habitat in ponderosa pine forests of the intermountain west (birds and burns network) - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11400

The goal of this project was to help evaluate the effectiveness of prescribed fire in reducing fuels, and to assess the effects of fuel reduction on habitats and populations of birds in ponderosa pine forests throughout the Interior West. Known as the Birds and Burns Network, we have study areas located on National Forest and The...

Author(s): Victoria A. Saab, William M. Block

Year Published: 2005

Type: Document

Technical Report or White Paper

Fire on the mountain: birds and burns in the Rocky Mountains

www.nrfirescience.org/resource/14591

Here we review the current state of knowledge about past fire regimes and how they have been altered by human activities. We also highlight the limited information on how avian communities respond to fire. We conclude with implications for fire management programs in the Rocky Mountains. See Kotliar et al. (...)

Author(s): Natasha B. Kotliar, Victoria A. Saab, Richard L. Hutto

Year Published: 2005

Type: Document

Technical Report or White Paper

Variation in fire regimes of the Rocky Mountains: implications for avian communities and fire management

www.nrfirescience.org/resource/8144

Information about avian responses to fire in the U.S. Rocky Mountains is based solely on studies of crown fires. However, fire management in this region is based primarily on studies of low-elevation ponderosa pine (*Pinus ponderosa*) forests maintained largely by frequent understory fires. In contrast to both of these trends, most...

Author(s): Victoria A. Saab, Hugh D. W. Powell, Natasha B. Kotliar, Karen R. Newlon

Year Published: 2005

Type: Document

Book or Chapter or Journal Article, Synthesis

Changes in bird abundance after wildfire: importance of fire severity and time since fire

www.nrfirescience.org/resource/8256

Fire can cause profound changes in the composition and abundance of plant and animal species, but logistics, unpredictability of weather, and inherent danger make it nearly impossible to study high-severity fire effects experimentally. We took advantage of a unique opportunity to use a before-after/control-impact (BACI) approach to...

Author(s): Kristina M. Smucker, Richard L. Hutto, Brian M. Steele

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

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

Effects of prescribed and wildland fire on aquatic ecosystems in western forests - Final Report to the Joint Fire Science Program

www.nrfirescience.org/resource/11161

The goal of the project is to understand how fire in upland and riparian forests influence stream communities and whether prescription burning mimics the ecological function of fire in a watershed. The project has two components: wildland fire and prescribed fire. To document the range of biotic and abiotic responses to wildland...

Author(s): David S. Pilliod, R. Bruce Bury, Paul S. Corn

Year Published: 2005

Type: Document

Technical Report or White Paper

Home range size and foraging habitat of Black-backed Woodpeckers

www.nrfirescience.org/resource/11417

We examined home range size of Black-backed Woodpeckers (*Picoides arcticus*) in burned ponderosa pine (*Pinus ponderosa*) / Douglas-fir (*Pseudotsuga menziesii*) forests of southwestern Idaho during 2000 and 2002 (6 and 8 years following fire). Home range size for 4 adult males during the post-fledging period was 115.6-420.9 ha using the...

Author(s): Jonathan G. Dudley

Year Published: 2005

Type: Document

Dissertation or Thesis

The role of fire in structuring sagebrush habitats and bird communities

www.nrfirescience.org/resource/15408

Fire is a dominant and highly visible disturbance in sagebrush (*Artemisia* spp.) ecosystems. In lower

elevation, xeric sagebrush communities, the role of fire has changed in recent decades from an infrequent disturbance maintaining a landscape mosaic and facilitating community processes to frequent events that alter sagebrush...

Author(s): Steve Knick, Aaron L. Holmes, Richard F. Miller

Year Published: 2005

Type: Document

Book or Chapter or Journal Article

Wildfire, channel disturbance, and stream temperature: spatio-temporal patterns and associations with the distribution of fish and amphibians in central Idaho

www.nrfirescience.org/resource/8407

Temperature is a critical factor in stream ecosystems, and one that is very likely to be altered by wildfire and associated channel disturbance. In central Idaho streams, temperatures after wildfires may increase following loss of shade from riparian vegetation, and changes in channel structure that increase exposure to solar...

Author(s): Jason B. Dunham, Charles H. Luce, Amanda E. Rosenberger, B. Gutierrez-Teira, David E. Nagel, Bruce E. Rieman

Year Published: 2005

Type: Document

Conference Proceedings

Fuels planning: science synthesis and integration; environmental consequences fact sheet 4: wildlife responses to fuels treatments: key considerations

www.nrfirescience.org/resource/14942

Managers face a difficult task in predicting the effects of fuels treatments on wildlife populations, mostly because information on how animals respond to fuels treatments is scarce or does not exist. This paper discusses key considerations-aspects of an animal's ecology and available information-that, despite the scarcity of...

Author(s): David S. Pilliod

Year Published: 2004

Type: Document

Research Brief or Fact Sheet

Forbs for seeding range and wildlife habitats

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

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

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

Factors influencing occupancy of nest cavities in recently burned forests

www.nrfirescience.org/resource/8143

Recently burned forests in western North America provide nesting habitat for many species of cavity-nesting birds. However, little is understood about the time frame and the variables affecting occupancy of postfire habitats by these birds. We studied factors influencing the occupancy and reuse of nest cavities from 1-7 years after...

Author(s): Victoria A. Saab, Jonathan G. Dudley, William L. Thompson

Year Published: 2004

Type: Document

Book or Chapter or Journal Article

Incorporating wildlife habitat needs into restoration and rehabilitation projects

www.nrfirescience.org/resource/11119

Description not entered

Author(s): Richard Stevens

Year Published: 2004

Type: Document

Technical Report or White Paper

Fire and amphibians in North America

www.nrfirescience.org/resource/16476

Information on amphibian responses to fire and fuel reduction practices is critically needed due to potential declines of species and the prevalence of new, more intensive fire management practices in North American forests. The goals of this review are to summarize the known and potential effects of fire and fuels management on...

Author(s): David S. Pilliod, R. Bruce Bury, Erin J. Hyde, Christopher A. Pearl, Paul S. Corn

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

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

Effects of thinning and prescribed burning on birds and small mammals

www.nrfirescience.org/resource/11504

Land management agencies are restoring ponderosa pine forests and reducing fuel loads by thinning followed by prescribed burning. However, little is known about how this combination of treatments will affect local wildlife. In this study, I focus on the following short-term wildlife responses: 1) differences in avian and small...

Author(s): Jennifer Woolf

Year Published: 2003
Type: Document
Dissertation or Thesis

Bird counts of burned versus unburned big sagebrush sites

www.nrfirescience.org/resource/11090

Burned-over big sagebrush sites dominated by perennial grasses supported fewer species of birds and fewer total number of birds than sites of unburned big sagebrush sites.

Author(s): Bruce L. Welch

Year Published: 2002

Type: Document

Research Brief or Fact Sheet

Selection of fire-created snags at two spatial scales by cavity-nesting birds

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

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

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

Conservation of greater sage-grouse on public lands in the Western U.S.: implications of recovery and management policies

www.nrfirescience.org/resource/11076

The role of the Policy Analysis Center for Western Public Lands is to provide integrated social, economic and ecological analyses of public land policies that affect communities in the West. Its mission is to help rural communities, policy makers, resource managers, resource users and others understand, analyze and engage...

Author(s): Carl L. Wambolt, Aaron J. Harp, Bruce L. Welch, Nancy L. Shaw, John W. Connelly, Kerry P. Reese, Clait E. Braun, Donald A. Klebenow, E. Durant McArthur, James G. Thompson, L. Allen Torell, John A. Tanaka

Year Published: 2002

Type: Document

Management or Planning Document

Reproductive success of Lewis's woodpecker in burned pine and cottonwood riparian forests

www.nrfirescience.org/resource/11418

Lewis's Woodpecker (*Melanerpes lewis*) has been characterized as a "burn specialist" because of its preference for nesting within burned pine forests. No prior study, however, has demonstrated the relative importance of crown-burned forests to this woodpecker species by examining its reproductive success in different forest types. We...

Author(s): Victoria A. Saab, Kerri T. Vierling

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

Effects of stand-replacement fire and salvage logging on a cavity-nesting bird community in eastern Cascades, Washington

www.nrfirescience.org/resource/17449

We monitored the response of cavity-nesting species to three snag density treatments (high = 37-80 snags/ha, medium = 15-35 snags/ha, and low = 0-12 snags/ha) during two breeding seasons 4-5 yr post-fire and logging in Douglas-fir-ponderosa pine forests in the eastern Cascades, Washington. Snag surveys were used to describe habitat...

Author(s): Maryellen Haggard, William L. Gaines

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

Delayed seed germination in whitebark pine and regeneration patterns following the Yellowstone fires

www.nrfirescience.org/resource/8185

Whitebark pine (*Pinus albicaulis*) seeds are dispersed by Clark's Nutcracker (*Nucifraga columbiana*), a bird that makes caches under 2-3 cm of soil. Cached seeds may delay germination for one or more years in part because of underdeveloped embryos at the time of seed dispersal. Consequently, whitebark pine may show a soil seed bank...

Author(s): Diana F. Tomback, Angela J. Anderies, Katherine S. Carsey, Mary L. Powell, Sabine Mellmann-Brown

Year Published: 2001

Type: Document

Book or Chapter or Journal Article

Aspen response to prescribed fire and wild ungulate herbivory

www.nrfirescience.org/resource/12104

Land management agencies in northwest Wyoming have implemented an active prescribed fire program to address historically altered fire regimes, regenerate aspen, and improve overall watershed functions. Treated clones are susceptible to extensive browsing from elk concentrated on supplemental feedgrounds and from wintering moose....

Author(s): Steve Kilpatrick, Diane Abendroth

Year Published: 2001

Type: Document

Conference Proceedings

Associated riparian communities

www.nrfirescience.org/resource/10962

Some 100 years of fire exclusion in the Interior Northwest has resulted in riparian areas dominated by dense thickets of shade-tolerant trees. If former, more open conditions could be restored, these habitats could once more support a more diverse bird community. Efforts toward this at two study sites are

described.

Author(s): Colin C. Hardy, Robert E. Keane, Michael G. Harrington

Year Published: 2000

Type: Document

Conference Proceedings

Long-term effects of fire on sage grouse habitat

www.nrfirescience.org/resource/11456

This study documented the long-term (>10 years) impact of fire on sage grouse (*Centrocercus urophasianus* Bonaparte) nesting and brood-rearing habitats on the Upper Snake River Plain in southeastern Idaho.

Author(s): Pamela J. Nelle, Kerry P. Reese, John W. Connelly

Year Published: 2000

Type: Document

Book or Chapter or Journal Article

Wildland fire in ecosystems: effects of fire on fauna

www.nrfirescience.org/resource/12584

Fires affect animals mainly through effects on their habitat. Fires often cause short-term increases in wildlife foods that contribute to increases in populations of some animals. These increases are moderated by the animals' ability to thrive in the altered, often simplified, structure of the postfire environment. The extent of...

Year Published: 2000

Type: Document

Technical Report or White Paper

Wildlife habitat considerations

www.nrfirescience.org/resource/11034

Fire, insects, disease, harvesting, and precommercial thinning all create mosaics on Northern Rocky Mountain landscapes. These mosaics are important for faunal habitat. Consequently, changes such as created openings or an increase in heavily stocked areas affect the water, cover, and food of forest habitats. The 'no action'...

Author(s): Helen Y. Smith

Year Published: 2000

Type: Document

Conference Proceedings

Chapter 1: Introduction to wildland fire in ecosystems: effects of fire on fauna

www.nrfirescience.org/resource/12603

Fires affect animals mainly through effects on their habitat. Fires often cause short-term increases in wildlife foods that contribute to increases in populations of some animals. These increases are moderated by the animals' ability to thrive in the altered, often simplified, structure of the postfire environment. The extent of...

Author(s): Jack L. Lyon, James K. Brown, Mark H. Huff, Jane Kapler Smith

Year Published: 2000

Type: Document

Technical Report or White Paper

Guidelines to manage sage grouse populations and their habitats

www.nrfirescience.org/resource/15385

The status of sage grouse populations and habitats has been a concern to sportsmen and biologists for >80 years. Despite management and research efforts that date to the 1930s, breeding populations of this species have declined throughout much of its range. In May 1999, the western sage grouse (*C. urophasianus phaios*) in...

Author(s): John W. Connelly, Michael A. Schroeder, Alan R. Sands, Clait E. Braun

Year Published: 2000

Type: Document

Management or Planning Document

Prescribed fire effects on biological control of leafy spurge

www.nrfirescience.org/resource/8282

The flea beetle, *Aphthona nigriscutis* Foudras, is a potentially useful agent for biological control of leafy spurge (*Euphorbia esula* L.) in grasslands devoted to wildlife conservation. However, effects of other grassland management practices on the persistence and dynamics of flea beetle populations are not well understood. We...

Author(s): David P. Fellows, Wesley E. Newton

Year Published: 1999

Type: Document

Book or Chapter or Journal Article

Birds in a sagebrush sea: Managing sagebrush habitat for bird communities

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

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

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

Appendix A - Biological assessment, TCEF research project for Lewis and Clark National Forest

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

Ambystoma macrodactylum (long-toed salamander)

www.nrfirescience.org/resource/10732

This FEIS species review synthesizes information on the relationship of *Ambystoma macrodactylum* (long-toed salamander) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Janet L. Howard

Year Published: 1997

Type: Document

Synthesis

Wildfire and native fish: issues of forest health and conservation of sensitive species

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

An investigation on fire effects within xeric sage grouse brood habitat

www.nrfirescience.org/resource/11457

We investigated the short-term influence of fire on xeric sage grouse (*Centrocercus urophasianus* Bonaparte) brood habitat in southeastern Idaho from 1990-92.

Author(s): Richard A. Fischer, Kerry P. Reese, John W. Connelly

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

Urocyon cinereoargenteus (common gray fox)

www.nrfirescience.org/resource/10506

This FEIS species review synthesizes information on the relationship of *Urocyon cinereoargenteus* (common gray fox) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review...

Author(s): Janet Sullivan

Year Published: 1996

Type: Document

Synthesis

Microtus pennsylvanicus (meadow vole)

www.nrfirescience.org/resource/10514

This FEIS species review synthesizes information on the relationship of *Microtus pennsylvanicus* (meadow vole) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general

management. This species review can...

Author(s): Janet Sullivan

Year Published: 1996

Type: Document

Synthesis

Scophiopus intermontanus (Great Basin spadefoot)

www.nrfirescience.org/resource/10713

This FEIS species review synthesizes information on the relationship of *Scophiopus intermontanus* (Great Basin spadefoot) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Janet L. Howard

Year Published: 1996

Type: Document

Synthesis

Spermophilus townsendii (Townsend's ground squirrel)

www.nrfirescience.org/resource/10711

This FEIS species review synthesizes information on the relationship of *Spermophilus townsendii* (Townsend's ground squirrel) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This...

Author(s): Janet L. Howard

Year Published: 1996

Type: Document

Synthesis

Whitebark pine ecosystem restoration in western Montana

www.nrfirescience.org/resource/11251

Whitebark pine (*Pinus albicaulis*) is a major tree species of upper subalpine forests of the northern Rocky Mountains (Schmidt and McDonald 1990). It is an important nutritional and structural component of wildlife habitat (Arno and Hoff 1990; Schmidt and McDonald 1990). Its large, nutlike seeds are a major food source for many birds...

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

Year Published: 1996

Type: Document

Technical Report or White Paper

Comparative effects of elk herbivory and 1988 fires on northern Yellowstone National Park grasslands

www.nrfirescience.org/resource/8265

The drought, frequent lightning strikes, and resultant large fires of 1988 in Yellowstone National Park were considered a several-century event for the area. They presented an unparalleled opportunity to document the effects of large fires on forage production, forage quality, and herbivory for the largest elk (*Cervus elaphus*)...

Author(s): Francis J. Singer, M. K. Harter

Year Published: 1996

Type: Document

Book or Chapter or Journal Article

Taxidea taxus (American badger)

www.nrfirescience.org/resource/10507

This FEIS species review synthesizes information on the relationship of *Taxidea taxus* (American badger) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Janet Sullivan

Year Published: 1996

Type: Document

Synthesis

Mustela vison (American mink)

www.nrfirescience.org/resource/10513

This FEIS species review synthesizes information on the relationship of *Mustela vison* (American mink) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Janet Sullivan

Year Published: 1996

Type: Document

Synthesis

Perognathus parvus (Great Basin pocket mouse)

www.nrfirescience.org/resource/10719

This FEIS species review synthesizes information on the relationship of *Perognathus parvus* (Great Basin pocket mouse) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Janet L. Howard

Year Published: 1996

Type: Document

Synthesis

Athene cunicularia (burrowing owl)

www.nrfirescience.org/resource/10726

This FEIS species review synthesizes information on the relationship of *Athene cunicularia* (burrowing owl) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet L. Howard

Year Published: 1996

Type: Document

Synthesis

Buteo lagopus (rough-legged hawk)

www.nrfirescience.org/resource/10517

This FEIS species review synthesizes information on the relationship of *Buteo lagopus* (rough-legged hawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Procyon lotor (northern raccoon)

www.nrfirescience.org/resource/10533

This FEIS species review synthesizes information on the relationship of *Procyon lotor* (northern raccoon) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky
Year Published: 1995
Type: Document
Synthesis

The composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests

www.nrfirescience.org/resource/12934

During the two breeding seasons immediately following the numerous and widespread fires of 1988, I estimated bird community composition in each of 34 burned-forest sites in western Montana and northern Wyoming. I detected an average of 45 species per site and a total of 87 species in the sites combined. A compilation of these data...

Author(s): Richard L. Hutto
Year Published: 1995
Type: Document
Book or Chapter or Journal Article

Peromyscus maniculatus (deer mouse)

www.nrfirescience.org/resource/10512

This FEIS species review synthesizes information on the relationship of *Peromyscus maniculatus* (deer mouse) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Molothrus ater (brown-headed cowbird)

www.nrfirescience.org/resource/10444

This FEIS species review synthesizes information on the relationship of *Molothrus ater* (brown-headed cowbird) to fire--how fire affects the species and its habitat, invasiveness of the species, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Bos bison (American bison)

www.nrfirescience.org/resource/10549

This FEIS species review synthesizes information on the relationship of *Bos bison* (American bison) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): Julie L. Tesky

Year Published: 1995

Type: Document

Synthesis

Sialia mexicana (western bluebird)

www.nrfirescience.org/resource/10505

This FEIS species review synthesizes information on the relationship of *Sialia mexicana* (western bluebird) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet Sullivan

Year Published: 1995

Type: Document

Synthesis

Trophic generalists vs. trophic specialists: implications for food web dynamics in post-fire streams

www.nrfirescience.org/resource/8260

The trophic ecology of 11 benthic macroinvertebrate taxa found in Cache Creek, Yellowstone National Park (YNP) was studied to determine if burned organic matter is an important resource and how resource utilization patterns may be altered in post-fire streams. Laboratory food quality experiments were conducted to determine the...

Author(s): Timothy B. Mihuc, G. Wayne Minshall

Year Published: 1995

Type: Document

Book or Chapter or Journal Article

Poecile atricapillus (black-capped chickadee)

www.nrfirescience.org/resource/10511

This FEIS species review synthesizes information on the relationship of *Poecile atricapillus* (black-capped chickadee) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Janet Sullivan

Year Published: 1995

Type: Document

Synthesis

Tamiasciurus hudsonicus (red squirrel)

www.nrfirescience.org/resource/10509

This FEIS species review synthesizes information on the relationship of *Tamiasciurus hudsonicus* (red squirrel) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Bubo virginianus (great horned owl)

www.nrfirescience.org/resource/10518

This FEIS species review synthesizes information on the relationship of *Bubo virginianus* (great horned owl) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Sylvilagus floridanus (eastern cottontail)

www.nrfirescience.org/resource/10508

This FEIS species review synthesizes information on the relationship of *Sylvilagus floridanus* (eastern cottontail) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review...

Author(s): Janet Sullivan
Year Published: 1995
Type: Document
Synthesis

Lepus californicus (black-tailed jackrabbit)

www.nrfirescience.org/resource/10721

This FEIS species review synthesizes information on the relationship of *Lepus californicus* (black-tailed jackrabbit) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Janet L. Howard
Year Published: 1995
Type: Document
Synthesis

Phasianus colchicus (ring-necked pheasant)

www.nrfirescience.org/resource/10535

This FEIS species review synthesizes information on the relationship of *Phasianus colchicus* (ring-necked pheasant) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review...

Author(s): Julie L. Tesky
Year Published: 1995
Type: Document
Synthesis

Antilocapra americana (pronghorn)

www.nrfirescience.org/resource/10731

This FEIS species review synthesizes information on the relationship of *Antilocapra americana* (pronghorn) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet L. Howard

Year Published: 1995

Type: Document

Synthesis

Winter habitat use by large ungulates following fire in northern Yellowstone National Park

www.nrfirescience.org/resource/8266

The effect of fire and habitat heterogeneity on winter foraging by ungulates was studied in northern Yellowstone National Park (YNP). Grazing was monitored at 15 study sites for 14 wk during the winters of 1991 and 1992. The location and intensity of grazing activity within each site were recorded on topographic maps and digitized...

Author(s): Scott M. Pearson, Monica G. Turner, Linda L. Wallace, William H. Romme

Year Published: 1995

Type: Document

Book or Chapter or Journal Article

Lepus americanus (snowshoe hare)

www.nrfirescience.org/resource/10515

This FEIS species review synthesizes information on the relationship of *Lepus americanus* (snowshoe hare) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Janet Sullivan

Year Published: 1995

Type: Document

Synthesis

Aspen, elk, and fire in northern Yellowstone Park

www.nrfirescience.org/resource/8261

Most stands of trembling aspen (*Populus tremuloides*) in northern Yellowstone National Park appear to have become established between 1870 and 1890, with little regeneration since 1900. There has been controversy throughout this century regarding the relative roles of browsing by elk (*Cervus elaphus*) and fire suppression in...

Author(s): William H. Romme, Monica G. Turner, Linda L. Wallace, Jennifer S. Walker

Year Published: 1995

Type: Document

Book or Chapter or Journal Article

Sialia currucoides (mountain bluebird)

www.nrfirescience.org/resource/10510

This FEIS species review synthesizes information on the relationship of *Sialia currucoides* (mountain bluebird) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Janet Sullivan

Year Published: 1995

Type: Document
Synthesis

Lynx rufus (bobcat)

www.nrfirescience.org/resource/10526

This FEIS species review synthesizes information on the relationship of Lynx rufus (bobcat) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for fire...

Author(s): Julie L. Tesky
Year Published: 1995
Type: Document
Synthesis

Canis latrans (coyote)

www.nrfirescience.org/resource/10548

This FEIS species review synthesizes information on the relationship of Canis latrans (coyote) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for fire...

Author(s): Julie L. Tesky
Year Published: 1995
Type: Document
Synthesis

Puma concolor (mountain lion)

www.nrfirescience.org/resource/10534

This FEIS species review synthesizes information on the relationship of Puma concolor (mountain lion) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky
Year Published: 1995
Type: Document
Synthesis

Brachylagus idahoensis (pygmy rabbit)

www.nrfirescience.org/resource/10550

This FEIS species review synthesizes information on the relationship of Brachylagus idahoensis (pygmy rabbit) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Julie L. Tesky
Year Published: 1994
Type: Document
Synthesis

Alectoris chukar (chukar)

www.nrfirescience.org/resource/10860

This FEIS species review synthesizes information on the relationship of Alectoris chukar (chukar) to

fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): Janet Sullivan

Year Published: 1994

Type: Document

Synthesis

Buteo jamaicensis (red-tailed hawk)

www.nrfirescience.org/resource/10551

This FEIS species review synthesizes information on the relationship of *Buteo jamaicensis* (red-tailed hawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Aquila chrysaetos (golden eagle)

www.nrfirescience.org/resource/10554

This FEIS species review synthesizes information on the relationship of *Aquila chrysaetos* (golden eagle) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Simulating winter interactions among ungulates, vegetation, and fire in northern Yellowstone Park

www.nrfirescience.org/resource/8267

The interaction of large-scale fire, vegetation, and ungulates is an important management issue in Yellowstone National Park. A spatially explicit individual-based simulation model was developed to explore the effects of fire scale and pattern on the winter foraging dynamics and survival of free-ranging elk (*Cervus elaphus*) and...

Author(s): Monica G. Turner, Yegang Wu, Linda L. Wallace, William H. Romme, Antoinette Brenkert

Year Published: 1994

Type: Document

Book or Chapter or Journal Article

Asio flammeus (short-eared owl)

www.nrfirescience.org/resource/10725

This FEIS species review synthesizes information on the relationship of *Asio flammeus* (short-eared owl) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Janet L. Howard

Year Published: 1994

Type: Document

Synthesis

Falco sparverius (American kestrel)

www.nrfirescience.org/resource/10542

This FEIS species review synthesizes information on the relationship of *Falco sparverius* (American kestrel) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Buteo regalis (ferruginous hawk)

www.nrfirescience.org/resource/10545

This FEIS species review synthesizes information on the relationship of *Buteo regalis* (ferruginous hawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Bufo boreas (western toad)

www.nrfirescience.org/resource/10859

This FEIS species review synthesizes information on the relationship of *Bufo boreas* (western toad) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): Janet Sullivan

Year Published: 1994

Type: Document

Synthesis

Buteo swainsoni (Swainson's hawk)

www.nrfirescience.org/resource/10546

This FEIS species review synthesizes information on the relationship of *Buteo swainsoni* (Swainson's hawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Falco mexicanus (prairie falcon)

www.nrfirescience.org/resource/10541

This FEIS species review synthesizes information on the relationship of *Falco mexicanus* (prairie falcon) to fire--how fire affects the species and its habitat, and fire management considerations.

Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Accipiter striatus (sharp-shinned hawk)

www.nrfirescience.org/resource/10519

This FEIS species review synthesizes information on the relationship of *Accipiter striatus* (sharp-shinned hawk) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Janet Sullivan

Year Published: 1994

Type: Document

Synthesis

Tympanuchus phasianellus (sharp-tailed grouse)

www.nrfirescience.org/resource/10532

This FEIS species review synthesizes information on the relationship of *Tympanuchus phasianellus* (sharp-tailed grouse) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Julie L. Tesky

Year Published: 1994

Type: Document

Synthesis

Dumetella carolinensis (gray catbird)

www.nrfirescience.org/resource/10516

This FEIS species review synthesizes information on the relationship of *Dumetella carolinensis* (gray catbird) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Janet Sullivan

Year Published: 1994

Type: Document

Synthesis

Lutra canadensis (northern river otter)

www.nrfirescience.org/resource/10538

This FEIS species review synthesizes information on the relationship of *Lutra canadensis* (northern river otter) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Branta canadensis (Canada goose)

www.nrfirescience.org/resource/10847

This FEIS species review synthesizes information on the relationship of *Branta canadensis* (Canada goose) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): S. A. Snyder

Year Published: 1993

Type: Document

Synthesis

Pandion haliaetus (osprey)

www.nrfirescience.org/resource/10537

This FEIS species review synthesizes information on the relationship of *Pandion haliaetus* (osprey) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Chen caerulescens (snow goose)

www.nrfirescience.org/resource/10844

This FEIS species review synthesizes information on the relationship of *Chen caerulescens* (snow goose) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): S. A. Snyder

Year Published: 1993

Type: Document

Synthesis

Anas strepera (gadwall)

www.nrfirescience.org/resource/10553

This FEIS species review synthesizes information on the relationship of *Anas strepera* (gadwall) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Grus americana (whooping crane)

www.nrfirescience.org/resource/10540

This FEIS species review synthesizes information on the relationship of *Grus americana* (whooping crane) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Aythya valisineria (canvasback)

www.nrfirescience.org/resource/10552

This FEIS species review synthesizes information on the relationship of *Aythya valisineria* (canvasback) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Haliaeetus leucocephalus (bald eagle)

www.nrfirescience.org/resource/10843

This FEIS species review synthesizes information on the relationship of *Haliaeetus leucocephalus* (bald eagle) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): S. A. Snyder
Year Published: 1993
Type: Document
Synthesis

Rapid decline of whitebark pine in western Montana: evidence from 20-year re-measurements

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

Ovis canadensis (bighorn sheep)

www.nrfirescience.org/resource/10536

This FEIS species review synthesizes information on the relationship of *Ovis canadensis* (bighorn sheep) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Castor canadensis (American beaver)

www.nrfirescience.org/resource/10547

This FEIS species review synthesizes information on the relationship of *Castor canadensis* (American beaver) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Zenaida macroura (mourning dove)

www.nrfirescience.org/resource/10531

This FEIS species review synthesizes information on the relationship of *Zenaida macroura* (mourning dove) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Circus cyaneus (northern harrier)

www.nrfirescience.org/resource/10845

This FEIS species review synthesizes information on the relationship of *Circus cyaneus* (northern harrier) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): S. A. Snyder

Year Published: 1993

Type: Document

Synthesis

Anas discors (blue-winged teal)

www.nrfirescience.org/resource/10557

This FEIS species review synthesizes information on the relationship of *Anas discors* (blue-winged teal) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Aix sponsa (wood duck)

www.nrfirescience.org/resource/10849

This FEIS species review synthesizes information on the relationship of *Aix sponsa* (wood duck) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for fire...

Author(s): S. A. Snyder

Year Published: 1993

Type: Document
Synthesis

Cygnus buccinator (trumpeter swan)

www.nrfirescience.org/resource/10543

This FEIS species review synthesizes information on the relationship of *Cygnus buccinator* (trumpeter swan) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Anas crecca (green-winged teal)

www.nrfirescience.org/resource/10556

This FEIS species review synthesizes information on the relationship of *Anas crecca* (green-winged teal) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Cygnus columbianus (tundra swan)

www.nrfirescience.org/resource/10544

This FEIS species review synthesizes information on the relationship of *Cygnus columbianus* (tundra swan) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Anser albifrons (greater white-fronted goose)

www.nrfirescience.org/resource/10555

This FEIS species review synthesizes information on the relationship of *Anser albifrons* (greater white-fronted goose) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species...

Author(s): Julie L. Tesky
Year Published: 1993
Type: Document
Synthesis

Anas acuta (northern pintail)

www.nrfirescience.org/resource/10527

This FEIS species review synthesizes information on the relationship of *Anas acuta* (northern pintail) to

fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): Julie L. Tesky

Year Published: 1993

Type: Document

Synthesis

Anas platyrhynchos (mallard)

www.nrfirescience.org/resource/10848

This FEIS species review synthesizes information on the relationship of *Anas platyrhynchos* (mallard) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used...

Author(s): S. A. Snyder

Year Published: 1993

Type: Document

Synthesis

Deterioration of fire-killed and fire-damaged timber in the Western United States

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

Meleagris gallopavo (wild turkey)

www.nrfirescience.org/resource/10841

This FEIS species review synthesizes information on the relationship of *Meleagris gallopavo* (wild turkey) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be...

Author(s): S. A. Snyder

Year Published: 1992

Type: Document

Synthesis

Odocoileus virginianus (white-tailed deer)

www.nrfirescience.org/resource/10840

This FEIS species review synthesizes information on the relationship of *Odocoileus virginianus* (white-tailed deer) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review...

Author(s): S. A. Snyder

Year Published: 1991

Type: Document

Synthesis

Lodgepole pine arthropod litter community structure one year after the 1988 Yellowstone fires

www.nrfirescience.org/resource/12034

Litter arthropod data was collected every 10 days from nine intensively burned forest stands, five lightly burned stands, and nine unburned forest stands. For burned forest stands (n=540 samples, there were decreases in insect density (87 percent), noninsect density (67 Percent), noninsect taxa (63 percent), and noninsect diversity...

Author(s): Tim A. Christiansen, Robert J. Lavigne, Jeffrey A. Lockwood

Year Published: 1991

Type: Document

Technical Report or White Paper

Canis lupus (gray wolf)

www.nrfirescience.org/resource/10846

This FEIS species review synthesizes information on the relationship of Canis lupus (gray wolf) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can be used for...

Author(s): S. A. Snyder

Year Published: 1991

Type: Document

Synthesis

Ursus arctos horribilis (grizzly bear)

www.nrfirescience.org/resource/10837

This FEIS species review synthesizes information on the relationship of Ursus arctos horribilis (grizzly bear) to fire--how fire affects the species and its habitat, and fire management considerations. Information is also provided on the species' taxonomy, distribution, basic biology, and general management. This species review can...

Author(s): S. A. Snyder

Year Published: 1991

Type: Document

Synthesis

Effects of fire in the northern Great Plains

www.nrfirescience.org/resource/11184

Fire has been used inconsistently to manage native and tame grasslands in the Northern Great Plains (NGP) of the north-central U.S. and south-central Canada, particularly the grasslands found in prairies, plains, agricultural land retirement programs, and moist soil sites. This has happened for three primary reasons: (1) the...

Author(s): Kenneth F. Higgins, Arnold D. Kruse, James L. Piehl

Year Published: 1989

Type: Document

Synthesis, Technical Report or White Paper

Bighorn sheep and fire: seven case histories

www.nrfirescience.org/resource/11057

Responses of seven bighorn sheep populations and habitats to prescribed fire and wildfire in southern British Columbia, Idaho, and Glacier National Park ranged from no influence to increase; interacting factors such as lungworm infection, livestock grazing, and reduction in forage overrode potential

benefits of subsequent increases...

Author(s): James M. Peek, Raymond A. Demarchi, Dennis A. Demarchi

Year Published: 1985

Type: Document

Conference Proceedings, Technical Report or White Paper

Fire, logging, and white-tailed deer interrelationships in the Swan Valley, northwestern Montana

www.nrfirescience.org/resource/11056

The historical importance of fire was investigated on the upper Swan Valley winter white-tailed deer range in northwestern Montana. The relatively recent impacts of logging on winter range quality were also included in these studies. Fire exclusion has led to successional development of once open-canopied mature seral forests, and...

Author(s): June D. Freedman, James R. Habeck

Year Published: 1985

Type: Document

Conference Proceedings, Technical Report or White Paper

Managing wildlife habitat with fire in the Aspen ecosystem

www.nrfirescience.org/resource/11482

Much of the nearly 7 million acres (2.86 million ha) of aspen in the western United States is seral to conifers. Also, most aspen stands are old, in excess of 60 years. Proper treatment of these aspen forests will retain the aspen and can produce optimum wildlife habitat. Optimally, all age and size classes of aspen should be...

Author(s): Norbert V. DeByle

Year Published: 1985

Type: Document

Conference Proceedings

Fire's effects on a small bird population

www.nrfirescience.org/resource/11188

Changes in bird populations as a result of a 122 ha forest fire are evaluated. There is little evidence of any drastic effect on numbers of birds, species, or species diversity in the year of the fire or 2 years later.

Author(s): L. Jack Lyon, John M. Marzluff

Year Published: 1985

Type: Document

Technical Report or White Paper

Clearcutting and fire in the larch/Douglas-fir forests of western Montana: a multifaceted research summary

www.nrfirescience.org/resource/11180

Logging slash on 73 clearcuts was broadcast burned over a wide range of conditions, achieving a broad array of fire intensities and effects. An intense wildfire was also evaluated. Fire effectiveness was measured and related to preburn conditions and fire intensity. Treatment effects on air quality, forest regeneration, vegetation...

Author(s): Norbert V. DeByle

Year Published: 1981

Type: Document

Technical Report or White Paper

Fire's influence on wildlife habitat on the Bridger-Teton National Forest, Wyoming - Volume I: photographic record and analysis

www.nrfirescience.org/resource/12151

The Bridger-Teton National Forest in the Jackson Hole Region of Wyoming has long been recognized for its wildlife resource. Management efforts have emphasized the measurement of forage utilization by elk (*Cervus canadensis nelsoni*) and their effect on summer and winter ranges. Less consideration has been given to other biotic and...

Author(s): George E. Gruell

Year Published: 1980

Type: Document

Technical Report or White Paper

Fire's influence on wildlife habitat on the Bridger-Teton National Forest, Wyoming - Volume II: changes and causes, management implications

www.nrfirescience.org/resource/12126

Provides information on wildlife habitat condition and trend on the Bridger-Teton National Forest in the Jackson Hole Region of Wyoming by analysis of broad plant communities. Visual evidence of condition and trend are provided in Volume I, The Photo Record. Management implications are included.

Author(s): George E. Gruell

Year Published: 1980

Type: Document

Technical Report or White Paper

Elk-aspen relationships on a prescribed burn

www.nrfirescience.org/resource/11924

Elk use of aspen alones was deterred only one winter following prescribed fire. Numbers of aspen suckers on the nine burned clones increased 178 percent in 3 years, but the response varied greatly among clones. Elk browsing the third winter after burning averaged 44 percent of current annual growth, and eliminated incremental height...

Author(s): Joseph V. Basile

Year Published: 1979

Type: Document

Research Brief or Fact Sheet

Fire effects on marten habitat in the Selway-Bitterroot Wilderness

www.nrfirescience.org/resource/7955

In an area of 21 km² where fires have produced a mosaic of forest communities, including subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*) and lodgepole pine, results from 255 track observations, 80 captures of 13 live-trapped martens, and scat analysis, over a 13 month period in 1973-1974, suggest that the...

Author(s): Gary M. Koehler, Maurice G. Hornocker

Year Published: 1977

Type: Document

Book or Chapter or Journal Article

Spring burning in an aspen-conifer stand for maintenance of moose habitat, West Boulder River, Montana

www.nrfirescience.org/resource/8441

Description not entered

Author(s): Floyd A. Gordon

Year Published: 1976

Type: Document
Conference Proceedings

Sage-grouse & Sagebrush Steppe

www.nrfirescience.org/resource/16962

USGS has been a leader in sagebrush steppe ecosystem research and continues to meet the priority science needs of management agencies. We bring a diversity of expertise and capabilities to address a wide variety of science needs at multiple spatial scales and are committed to provide high quality science to our management partners.

Type: Website

Website

Positive effects of fire on birds may appear only under narrow combinations of fire severity and time-since-fire

www.nrfirescience.org/resource/14589

We conducted bird surveys in 10 of the first 11 years following a mixed-severity fire in a dry, low-elevation mixed-conifer forest in western Montana, United States. By defining fire in terms of fire severity and time-since-fire, and then comparing detection rates for species inside 15 combinations of fire severity and time-since-...

Author(s): Richard L. Hutto, David A. Patterson

Type: Document

Book or Chapter or Journal Article

A Three-Step Decision Support Framework for Taking Climate Adaptation Actions

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

Projecting Climate Change Impacts on Wetland-Dependent Birds in the Prairie Pothole Region

www.nrfirescience.org/resource/17217

Projections of climate and land use change can help inform the allocation of resources across space and among species. North Central CSC supported work in the Prairie Pothole Region highlighted a framework for projecting climate change impacts, and developed methods for assessing surrogate species relationships. Join this webinar to...

Type: Media

Webinar

Meet Dr. Victoria Saab, Research Wildlife Biologist

www.nrfirescience.org/resource/17473

Nesting woodpeckers, including the white-backed woodpecker, rely on snags for nest building. Dr. Saab talks about her work in the mid-1990s on snag management and a new GIS tool that helps map the suitability of the landscape for nesting woodpeckers of concern.

Type: Media

Video