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Research Station

July–September 2004

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Third Quarter 2004

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- *Grassland ecosystems*
- *Roles of woody root-associated fungi*
- *Wood wastes—potential fuel source*
- *New fact sheets on fuels planning*

. . . and much more

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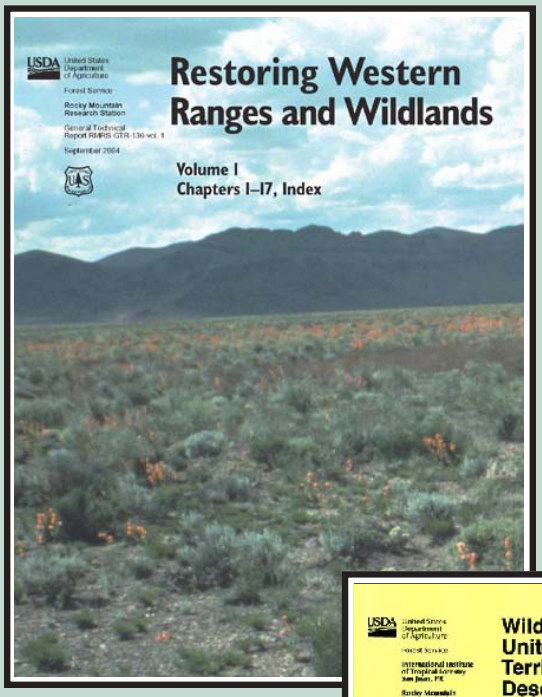

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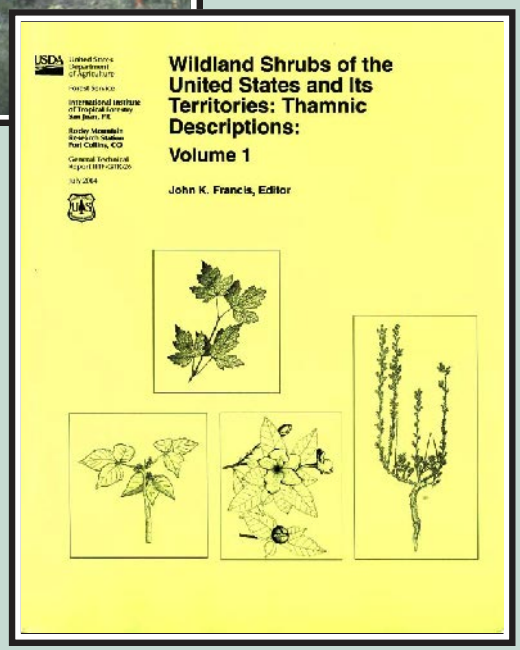

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	Order No.	
Sediment transport	27	**Sediment transport data and related information for selected coarse-bed streams and rivers in Idaho**. 2004. King, John G.; Emmett, William W.; Whiting, Peter J.; Kenworthy, Robert P.; Barry, Jeffrey J. Gen. Tech. Rep. RMRS-GTR-131. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 26 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_gtr131.html This report and associated Web site files provide sediment transport and related data for coarse-bed streams and rivers to potential users. Information on bedload and suspended sediment transport, streamflow, channel geometry, channel bed material, floodplain material, and large particle transport is provided for 33 study reaches in Idaho that represent a wide range of drainage areas, average annual streamflows, channel gradients, and substrate sizes. All the study reaches have a coarser layer of surface bed material overlaying finer subsurface material.
Fire	28	**Postfire mortality of ponderosa pine and Douglas-fir: a review of methods to predict tree death**. Fowler, James F.; Sieg, Carolyn Hull. 2004. Gen. Tech. Rep. RMRS-GTR-132. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 25 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_gtr132.html This review focused on the primary literature that described, modeled, or predicted the probability of postfire mortality in ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*). The methods and measurements that were used to predict postfire tree death tended to fall into two general categories: those focusing on measuring important aspects of fire behavior, the indirect but ultimate cause of mortality; and those focusing on tissue damage due to fire, the direct effect of fire on plant organs. Of the methods reviewed in this paper, crown scorch volume was the most effective, easiest to use, and most popular measurement in predicting postfire mortality in both conifer species. In addition to this direct measure of foliage damage, several studies showed the importance and utility of adding a measurement of stem (bole) damage. There is no clear method of choice for this, but direct assessment of cambium condition near the tree base is widely used in Douglas-fir. This review did not find clear postfire survivability differences between the two species. The literature also does not show a consistent use of terminology; we propose a standard set of terms and their definitions.

	Order No.	
***Picea* spp. variation**	29	**Interspecific and intraspecific variation in *Picea engelmannii* and its congeneric cohorts: biosystematics, genecology, and climate change.** Rehfeldt, Gerald E. 2004. Gen. Tech. Rep. RMRS-GTR-134. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station=. 18 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_gtr134.html A series of common garden studies of 336 populations representing *Picea engelmannii, P. pungens, P. glauca, P. mexicana*, and *P. chihuahuana* provided as many as 13 growth and morphologic characters pertinent to biosystematics and genecology. Canonical discriminant analyses discretely segregated populations of *P. pungens* and *P. chihuahuana* while positioning *P. engelmannii* populations along a continuum anchored by Southwestern United States populations at one extreme and those classified as hybrids of *P. engelmannii* with *P. glauca* on the other. A population of *P. mexicana* was closely aligned with Southwest populations of *P. engelmannii*, while populations of *P. glauca* were intermixed with and peripheral to those identified as hybrid.
Southwestern grasslands	30	**Assessment of grassland ecosystem conditions in the Southwestern United States. Volume 1**. Finch, Deborah M., ed. 2004. Gen. Tech. Rep. RMRS-GTR-135-vol.1. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 167 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_gtr135_vol1.html This report is volume 1 of a two-volume ecological assessment of grassland ecosystems in the Southwestern United States. Broadscale assessments are syntheses of current scientific knowledge, including a description of uncertainties and assumptions, to provide a characterization and comprehensive description of ecological, social, and economic components within an assessment area. Volume 1 of this assessment focuses on the ecology, types, conditions, and management practices of Southwestern grasslands. The second volume, due to be published in 2005, describes wildlife and fish species, their habitat requirements, and species-specific management concerns in Southwestern grasslands. A primary purpose of Volume 1 is to provide information to employees of the National Forest System for managing grassland ecosystems and landscapes, both at the Forest Plan level for Plan amendments and revisions, and at the project level to place site-specific activities within the larger framework. This volume should also be useful to State, municipal, and other Federal agencies, and to private landowners who manage grasslands in the Southwestern United States.
Range restoration	31	**Restoring western ranges and wildlands**. Monsen, Stephen B.; Stevens, Richard; Shaw, Nancy L., comps. 2004. Gen. Tech. Rep. RMRS-GTR-136-vol-1, RMRS-GTR-136-vol-2, and RMRS-GTR-136-vol-3. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pages 1–884 plus appendices and indexes. Also available: http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html This work, in three volumes, provides background on philosophy, processes, plant materials selection, site preparation, and seed and seeding equipment for revegetating disturbed rangelands, emphasizing use of native species. The 29 chapters include guidelines for planning, conducting, and managing, and contain a compilation of rangeland revegetation research conducted over the last several decades to aid practitioners in reestablishing healthy communities and curbing the spread of invasive species.

	Order No.	
Shrubs	32	**Wildland shrubs of the United States and its territories: thamnic descriptions: volume 1**. Francis, John K., ed. 2004. Gen. Tech. Rep. IITF-GTR-26. San Juan, PR: U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, and Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 830 p. A discussion of the general characteristics of shrubs as a life form and their distribution within the United States is followed by 311 short monographs containing general descriptions, ranges, ecology, reproductive habits, growth and management, and benefits to humans, animals, and the environment.
Silviculture proceedings	33	**Silviculture in special places: proceedings of the National Silviculture Workshop**; 2003 September 8–11; Granby, CO. Proceedings RMRS-P-34. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 255 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_p034.html This proceedings presents a compilation of 20 manuscripts and five posters summarizing results of research studies and management projects conducted throughout the United States in areas with special natural resource values. Topics include the restoration of various fire dependent forest ecosystems, studies of historical ecology, use of genetics in silviculture, development of old growth and late-successional prescriptions, documenting natural regeneration in burned areas, comparisons of cutting methods, coping with advancing blister rust, delineation of rare aspen forests, two-aged management in Appalachian hardwoods, forest soil productivity, managing a recreation river, and forest structure/burn severity relationships.
Plot sampling	34	**Sampling using a fixed number of trees per plot**. Schreuder, Hans T. 2004. Res. Note RMRS-RN-17. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 6 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rn017.html Density based sampling is often considered attractive. For example, variable radius plot (VRP) sampling is popular because it avoids the excessive sampling of small trees. We show here that the procedure of using plots in the field to obtain a fixed number of trees per plot is undesirable since it unnecessarily violates some key issues regarding probabilistic sampling. The fact that it may have small bias in some simulation studies does not prove that it is a satisfactory procedure since realistic situations can invariably be found or constructed where bias will be serious.
Mine spoil	35	**Salt content determination for bentonite mine spoil: saturation extracts versus 1:5 extracts**. Voorhees, Marguerite E.; Uresk, Daniel W. 2004. Res. Note RMRS-RN-18. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 5 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rn018.html The reliability of estimating salt content in saturated extracts from 1:5 (1spoil:5water) extract levels for bentonite mine spoil was examined by regression analyses. Nine chemical variables were examined. The significant relationships we found suggest that 1:5 extracts can be used to reliably estimate salinity of bentonite mine spoils with less effort and expense.

	Order No.	
Fungi	36	**Roles of woody root-associated fungi in forest ecosystem processes: recent advances in fungal identification**. Hoff, Jill A.; Klopfenstein, Ned B.; Tonn, Jonalea R.; McDonald, Geral I.; Zambino, Paul J.; Rogers, Jack D.; Peever, Tobin L.; Carris, Lori M. 2004. Res. Pap. RMRS-RP-47. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 6 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rp047.html Interactions between fungi and woody roots may be critical factors that influence diverse forest ecosystems processes, such as wood decay (nutrient recycling); root diseases and their biological control; and endophytic epiphytic, and mycorrhizal symbioses. However, few studies have characterized the diversity and the spatial and temporal distribution of woody root-associated fungi in forest ecosystems. Molecular genetic techniques that facilitate fungal identification are now available to help investigate complex and dynamic interactions of these fungi.
Emory oak	37	**Transpiration and multiple use management of thinned Emory oak coppice**. Shipek, D. Catlow; Ffolliott, Peter F.; Gottfried, Gerald J.; DeBano, Leonard F. 2004. Res. Pap. RMRS-RP-48. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 8 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rp048.html The effects of thinning Emory oak (*Quercus emoryi*) coppice on transpiration have been estimated by the heat-pulse velocity (HPV) method. Rootstocks of trees harvested for fuelwood were thinned to one, two, and three dominant stump-sprouts or left as unthinned controls. Differences in transpiration rates of the thinned coppice were found for each treatment and the control. Earlier research has also shown that thinning of Emory oak stump-sprouts influences the growth and volume of the residual coppice and its value for wildlife habitats. Therefore, a decision matrix is presented to help in the management of thinned Emory oak coppice for optimal combinations of water, wood, and wildlife benefits.
Road noise and the Mexican spotted owl	38	**Sound recordings of road maintenance equipment on the Lincoln National Forest, New Mexico**. Delaney, D. K.; Grubb, T. G. 2004. Res. Pap. RMRS-RP-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 56 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rp049.html The purpose of this pilot study was to record, characterize, and quantify road maintenance activity in Mexican spotted owl (*Strix occidentalis lucida*) habitat to gauge potential sound level exposure for owls during road maintenance activities. We measured sound levels from three different types of road maintenance equipment (rock crusher/loader, dozer/roller, and grader), from seven distances (30, 60, 120, 180, 240, 320, and 400 m), in two different habitat types (forested and meadow sites) on the Lincoln National Forest, New Mexico, on 22–23 October 2002 to determine how sound varied over distance, habitat type, topography, and stimulus type. Based on our previous sound research with this species, it appears that spotted owls are capable of hearing all the sound sources tested during this pilot study out to distances of at least 400 m.

	Order No.	
Wood wastes	39	**Wood wastes and residues generated along the Colorado Front Range as a potential fuel source**. Ward, Julie E.; Mackes, Kurt H.; Lynch, Dennis L. 2004. Res. Pap. RMRS-RP-50. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 9 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rp050.html This project was initiated to determine the availability of wood wastes and residues for use as fuel in cement kilns and power plants located along the Colorado Front Range. Research was conducted through literature searches, phone surveys, personal communications, and public meetings to determine the types of wood wastes and residues that are generated. Four main sources were identified: municipal solid waste, construction and demolition debris, primary and secondary wood processing residues, and forest residues. Quantities of wood wastes and residues generated were estimated, separated into components, and further evaluated to determine availability for recovery and utilization. Overall, the results of this project made it evident that substantial quantities of wood wastes and residues exist. However, the recovery costs currently present a significant barrier to utilizing this material as an alternative fuel.
Elk habitat	40	**Refinement of the Arc-Habcap model to predict habitat effectiveness for elk**. Benkobi, Lakhdar; Rumble, Mark A.; Brundige, Gary C.; Millspaugh, Joshua J. 2004. Res. Pap. RMRS-RP-51. Fort Collins, CO: U.S Department of Agriculture, Forest Service, Rocky Mountain Research Station. 18 p. Also available: http://www.fs.fed.us/rm/pubs/rmrs_rp051.html Wildlife habitat modeling is increasingly important for managers who need to assess the effects of land management activities. We evaluated the performance of a spatially explicit deterministic habitat model (Arc-Habcap) that predicts habitat effectiveness for elk. We used five years of radio-telemetry locations of elk from Custer State Park (CSP), South Dakota, to test predicted habitat effectiveness by the model. Arc-Habcap forage and cover-forage proximity components predicted elk distribution in CSP. However, the cover component failed to predict elk distribution in CSP. Habitat effectiveness calculated as the geometric mean of the model components failed to predict elk distribution and resulted in under-utilization of habitats predicted to be good and over-utilization of habitats predicted to be poor. We developed a new formula to calculate habitat effectiveness as an arithmetic average of the model components that weighted forage more than cover or cover-forage proximity. The new formula predicted actual elk distribution across categories of habitat effectiveness. Elk selected cover and forage areas £100 m from cover-forage edges. Arc-Habcap predicted that areas adjacent to roads were not usable by elk. Elk used areas adjacent to primary roads, but use was less than the proportional area comprised for primary roads, and about equal to proportional area adjacent to secondary roads and primitive roads. All sapling/pole and mature structural stages of ponderosa pine (*Pinus ponderosa*) were considered as both forage and cover by Arc-Habcap and consequently considered optimal in the cover-forage model component. We suggested revisions for both the cover-forage proximity component and areas adjacent to roads.

New to Our Web Site: Fuels Planning Fact Sheets

The geographic focus of the "Fuels Planning Science Synthesis and Integration" project (known as the Fuels Synthesis Project) is on the dry forests of the Western United States. Project goals include developing accessible analyses, protocols, and tools; writing peer-reviewed documents that synthesize and integrate the ecological and social science relevant to fuels treatments; and delivering these products in a user-friendly format. Target audiences include fuels management specialists, resource specialists, National Environmental Policy Act (NEPA) planning team leaders, line officers in the USDA Forest Service and the Department of the Interior; community leaders; and educators.

Teams of scientific experts from public agencies, their management counterparts, and university researchers across the country are working in the four key topic areas to develop a variety of information products for the target audiences. The fact sheets are part of the ongoing information program. Look for current and future fact sheets in the Rocky Mountain Research Station (RMRS) Research Note (RN) series:

RMRS-RN-19: Overview of the Project
RMRS-RN-20: Economic Uses
RMRS-RN-21: Social Issues
RMRS-RN-22: Forest Structure and Fire Hazards
RMRS-RN-23: Environmental Consequences

USDA
United States Department of Agriculture
Forest Service
Rocky Mountain Research Station
Research Note RMRS-RN-19-WWW
September 2004

Fuels Planning: Science Synthesis and Integration

Fact Sheet: The Fuels Synthesis Project Overview

Fuels treatment planners often find the challenge of integrating diverse scientific findings into the design of their projects a barrier to timely decisionmaking. With an increased emphasis on treating fuels to reduce wildfire impacts in the United States, the need for well-documented, accessible scientific information is becoming ever more crucial. In April 2003, the USDA Forest Service initiated a project to accelerate the delivery of research information to fuels specialists and others involved in project planning.

The Environmental Consequences Team is synthesizing information about the effects of fuels treatments on wildlife and other forest resources (photo credit: E. Bull).

The geographic focus of the "Fuels Planning: Science Synthesis and Integration" project (known as the Fuels Synthesis Project) is on the dry forests of the Western United States. Project goals include developing accessible analyses, protocols, and tools; writing peer-reviewed documents that synthesize and integrate the ecological and social science relevant to fuels treatments; and delivering these products in a user-friendly format. Target audiences include fuels management specialists, resource specialists, National Environmental Policy Act (NEPA) planning team leaders, line officers in the USDA Forest Service and the Department of the Interior; community leaders; and educators.

The Fuels Synthesis Project is organized around four key science topics:

- Forest structure and fire hazard
- Environmental consequences of fuels treatments
- Economic uses of material and costs of fuels treatments
- Public understanding of social issues, beliefs, attitudes, and behaviors related to fuels management

Synthesizing Scientific Information for Fire and Fuels Project Managers

Project Co-Leads
Russell T. Graham
Rocky Mountain Research Station
Sarah M. McCaffrey
North Central Research Station

Fuels planning: Science synthesis and integration, an interagency research/management partnership to support the Ten-Year Fire Plan.

Historical

Present

The Forest Structure and Fire Hazard Team is working on new visualization techniques to help fuel planners in decisionmaking.

The current Research Notes in this series are available only in PDF format on our Web site: http://www.fs.fed.us/rm/main/pubs/electronic/rmrs_fuels_plan.html; no hard copy will be published. Check the Web site frequently for more fact sheets in the next few months.

Project overview

Fuels planning: science synthesis and integration; fact sheet: the fuels synthesis project overview. 2004. Res. Note RMRS-RN-19-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn019.pdf

The geographic focus of the "Fuels Planning: Science Synthesis and Integration" project (known as the Fuels Synthesis Project) is on the dry forests of the Western United States. Target audiences include fuels management specialists, resource specialists, National Environmental Policy Act (NEPA) planning team leaders, line officers in the USDA Forest Service and the Department of the Interior; community leaders; and educators.

Economic uses

Fuels planning: science synthesis and integration; economic uses fact sheet 1: mastication treatments and costs. 2004. Res. Note RMRS-RN-20-1-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_01.pdf

Mastication, or mulching, is a mechanical fuel treatment that changes the structure and size of fuels in the stand. This fact sheet describes the kinds of equipment available, where mastication should be used, and treatment factors affecting cost.

Fuels planning: science synthesis and integration; economic uses fact sheet 2: log hauling cost. 2004. Res. Note RMRS-RN-20-2-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_02.pdf

Knowing the cost of fuel reduction treatments and associated activities, such as hauling cut trees, is essential for fire and fuels planning. This fact sheet explores the main factors that determine the cost of hauling cut trees and points the user to an interactive tool that can help plan for those and other expenses.

Fuels planning: science synthesis and integration; economic uses fact sheet 3: economic impacts of fuel treatments. 2004. Res. Note RMRS-RN-20-3-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_03.pdf

With increased interest in reducing hazardous fuels in dry inland forests of the American West, agencies and the public will want to know the economic impacts of fuel reduction treatments. This fact sheet discusses the economic impact tool, a component of *My Fuel Treatment Planner*, for evaluating economic impacts.

Fuels planning: science synthesis and integration; economic uses fact sheet 4: My Fuel Treatment Planner. 2004. Res. Note RMRS-RN-20-4-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_04.pdf

In the face of rapidly changing public and political attitudes toward fire and fuel planning, one thing remains constant: the fuel planner is ultimately responsible for making decisions on the land. This fact sheet discusses the options for fuel treatments, and the need, development, and use of the MS Excel-based tool, *My Fuel Treatment Planner*.

Fuels planning: science synthesis and integration; economic uses fact sheet 5: NEPA and economics. 2004. Res. Note RMRS-RN-20-5-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_05.pdf

The National Environmental Policy Act (NEPA) is the law that requires Federal agencies to consider the environmental impacts of their actions, involve the public in the decisionmaking process, and disclose information, starting at the initial stages of planning. This fact sheet discusses when you should consider economics in the NEPA process, when to do an analysis, whether or not to use an economist to conduct the analysis, and other statutes, such as the Clean Air Act, you should be aware of.

Fuels planning: science synthesis and integration; economic uses fact sheet 6: selection criteria analysis. 2004. Res. Note RMRS-RN-20-6-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_06.pdf

Confidence in decisionmaking can often come from knowing if others in similar circumstances would choose the same management strategy. Researchers at the USDA FS Pacific Northwest Research Station and the University of Saskatchewan have developed a Selection Criteria Analysis for answering this very question. This fact sheet discusses factors affecting the choice of treatment, such as site characteristics and management objectives; and how the Selection Criteria Analysis balances the factors in the decisionmaking process.

Fuels planning: science synthesis and integration; economic uses fact sheet 7: markets and log prices. 2004. Res. Note RMRS-RN-20-7-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn020_07.pdf

Markets and prices for logs vary widely across the West, fluctuating from place to place in response to regional variables and hauling costs. This fact sheet discusses those variables, locality of log markets, markets for low-value logs, and caveats to consider when using *My Fuel Treatment Planner*.

Social issues

Fuels planning: science synthesis and integration; social issues fact sheet 1: developing personal responsibility for fuels reduction: building a successful program to engage property owners. 2004. Res. Note RMRS-RN-21-1-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_01.pdf

In the course of work as a land manager, you will no doubt be involved in developing programs to achieve various objectives, including the improvement of fuels management on private lands. This fact sheet describes six steps that will help you plan and conduct a successful program.

Fuels planning: science synthesis and integration; social issues fact sheet 2: developing personal responsibility for fuels reduction: types of information to encourage proactive behavior. 2004. Res. Note RMRS-RN-21-2-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_02.pdf

Fuels management responsibilities may include providing local property owners with the information for taking responsibility for reducing fuels on their land. This fact sheet discusses three different types of information that may be useful in programs to engage property owners in fuel reduction activities.

Fuels planning: science synthesis and integration; social issues fact sheet 3: developing personal responsibility for fuels reduction: more ways to catch and hold people's attention. 2004. Res. Note RMRS-RN-21-3-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_03.pdf

Other fact sheets discuss the different types of information that are useful in explaining to property owners the importance of taking personal responsibility for fuels management on their land. However, for some property owners, new information is not enough—they may need more information in order to understand that change is necessary. This fact sheet discusses ways to catch and hold people's attention so that they become (and stay) engaged in fuels reduction activities.

Fuels planning: science synthesis and integration; social issues fact sheet 4: three critical topics to cover when talking about hazards. 2004. Res. Note RMRS-RN-21-4-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_04.pdf

The amount of science applicable to the management of wildfire hazards is increasing daily. In addition, the attitudes of landowners and policymakers about fire and fuels management are changing. This fact sheet discusses three critical keys to communicating about wildfire hazards.

Fuels planning: science synthesis and integration; social issues fact sheet 5: the importance of working locally. 2004. Res. Note RMRS-RN-21-5-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_05.pdf

People who evaluate their actions in terms of what others think are often said to be guided by community norms. With respect to fuels management, this means that when you are "selling" a property owner on taking steps to reduce fuels, you are not just "selling" to one person, but to a network of people. This fact sheet discusses three tools to help you focus wildfire hazard education and communication on the local area.

Fuels planning: science synthesis and integration; social issues fact sheet 6: important considerations for communicating about hazards. 2004. Res. Note RMRS-RN-21-6-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_06.pdf

Effective public education and communication campaigns about wildland fire and fuels management should have clear objectives, and use the right techniques to achieve these objectives. This fact sheet lists seven important considerations for planning or implementing a hazard communication effort.

Fuels planning: science synthesis and integration; social issues fact sheet 7: the "laws" of effective public education about fire hazards. 2004. Res. Note RMRS-RN-21-7-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_07.pdf

Within the past 10 years, breakthrough research has identified factors that are most important for effectively communicating about wildland fire hazards. This fact sheet discusses seven "Laws" of effective public communication that should be considered in any state-of-the-art education campaign.

Fuels planning: science synthesis and integration; social issues fact sheet 8: the "Golden Rule" and other lessons on communicating about hazards. 2004. Res. Note RMRS-RN-21-8-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn021_08.pdf

Other fact sheets identified considerations for communicating about hazards, talked about the importance of working locally, and discussed the seven laws of effective hazard communication. This fact sheet introduces the "Golden Rule" of hazard communication and shares some final lessons from hazard educators.

Forest structure and fire hazard

Fuels planning: science synthesis and integration; forest structure and fire hazard fact sheet 1: forest structure and fire hazard overview. 2004. Res. Note RMRS-RN-22-1-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn022_01.pdf

Many managers and policymakers guided by the National Environmental Policy Act process want to understand the scientific principles on which they can base fuel treatments for reducing the size and severity of wildfires. These Forest Structure and Fire Hazard fact sheets discuss how to estimate fire hazard, how to visualize fuel treatments, and how the role of silviculture can help in managing forests to reduce crown fires.

Fuels planning: science synthesis and integration; forest structure and fire hazard fact sheet 2: fire hazard. 2004. Res. Note RMRS-RN-22-2-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn022_02.pdf

Fire hazard reflects the potential fire behavior and magnitude of effects as a function of fuel conditions. This fact sheet discusses crown fuels, surface fuels, and ground fuels and their contribution and involvement in wildland fire.

Fuels planning: science synthesis and integration; forest structure and fire hazard fact sheet 3: visualizing forest structure and fuels. 2004. Res. Note RMRS-RN-22-3-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn022_03.pdf

The software described in this fact sheet provides managers with tools for visualizing forest and fuels information. Computer-based landscape simulations can help visualize stand and landscape conditions and the effects of different management treatments and fuel changes over time. These visualizations can assist forest planning by considering a range of management options, as well as facilitate communication with a variety of users including the general public.

Fuels planning: science synthesis and integration; forest structure and fire hazard fact sheet 4: role of silviculture in fuel treatments. 2004. Res. Note RMRS-RN-22-4-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn022_04.pdf

The principal goals of fuel treatments are to reduce fireline intensities, reduce the potential for crown fires, improve opportunities for successful fire suppression, and improve forest resilience to forest fires. This fact sheet discusses thinning, and surface fuel treatments, as well as challenges associated with those treatments.

Environmental consequences

Fuels planning: science synthesis and integration; environmental consequences fact sheet 1: Fire Effects Information System (FEIS). Sutherland, Steve. 2004. Res. Note RMRS-RN-23-1-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn023_01.pdf

The Fire Effects Information System (FEIS) provides accessible, up-to-date fire effects summaries, taken from current English-language literature, for almost 900 plant species, about 100 animal species, and 16 Kuchler plant communities found on the North American continent. This fact sheet discusses the development of FEIS and what is contained in the species summary.

Fuels planning: science synthesis and integration; environmental consequences fact sheet 2: First Order Fire Effects Model (FOFEM). Sutherland, Steve. 2004. Res. Note RMRS-RN-23-2-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn023_02.pdf

FOFEM 5.2 is a simple, yet versatile computer program that predicts first order fire effects using text and graphic outputs. It can be used in a variety of situations including: determining acceptable upper and lower fuel moistures for conducting prescribed burns, determining the number of acres that may be burned on a given day without exceeding particulate emission limits; comparing predicted fuels reduction for alternative prescribed burn scenarios; and predicting the effects of wildland fire. This fact sheet describes what inputs are needed to run FOFEM, the outputs that are produced, and how to download a copy from the internet.

Fuels planning: science synthesis and integration; environmental consequences fact sheet 3: structure fires in the wildland-urban interface. Sutherland, Steve. 2004. Res. Note RMRS-RN-23-3-WWW. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Research Station. 2 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_rn023_03.pdf

National Fire Protection Association (NFPA) data indicate that wildfires destroyed approximately 9,000 homes between 1985 and 1994 in the United States. The loss of homes to wildfire has had a significant impact on Federal fire policy. This fact sheet discusses the causes of home ignitions in the wildland-urban interface, home ignition zones, how to reduce home ignition potential, responsibility for reducing home ignition potential, and management consequences of the home ignition zone.

Publications Available From Other Sources

Obtain the following publications through university libraries, the publisher, or other outlets. Forest Service employees in RMRS, R-2, R-3, and R-4, and some selected WO-Detached units may request these items from the RMRS Library at cclay@fs.fed.us or telephone: (970) 498-1205.

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Available Through Special Order

This publication is available by calling USDI BLM Idaho State Office, (208) 373-4000.

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