



United States
Department
of Agriculture

Forest Service

Rocky Mountain
Research Station

Proceedings
RMRS-P-29

June 2003



Fire, Fuel Treatments, and Ecological Restoration: Conference Proceedings

April 16-18, 2002
Fort Collins, CO



Omi, Philip N.; Joyce, Linda A., technical editors. 2003. **Fire, fuel treatments, and ecological restoration: Conference proceedings, 2002 16-18 April; Fort Collins, CO.** Proceedings RMRS-P-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 475 p.

Recent fires have spawned intense interest in fuel treatment and ecological restoration activities. Scientists and land managers have been advocating these activities for years, and the recent fires have provided incentives for federal, state, and local entities to move ahead with ambitious hazard reduction and restoration projects. Recent fires also have increased public awareness about the risks and hazards of living in wild areas. The scientific basis for ecological restoration and fuel treatment activities is growing, but remains largely unsubstantiated, with isolated exceptions. Over 300 participants from all over the United States convened in Ft. Collins, Colorado, to learn from 90 oral and poster presentations.

Sponsors

- USDA Forest Service
- Colorado State Forest Service
- Colorado State University
- Joint Fire Sciences Program
- Society of American Foresters
- Western Forest Fire Research Center (WESTFIRE)

Conference Coordinators

- Dr. Phil Omi, Professor, Department of Forest Sciences, Colorado State University
- Dr. Linda Joyce, Research Project Leader, Rocky Mountain Research Station, USDA Forest Service

Editors' Note

Papers presented from the conference were subjected to peer technical review. The views expressed are those of the presenters.

Cover photo: Biscuit Fire, Siskiyou National Forest, 2002. Photo by Thomas Iraci, USDA Forest Service. Courtesy of *Fire Management Today* magazine.

You may order additional copies by sending your mailing information in label form through one of the following media. Please specify the publication title and number.

Telephone	(970) 498-1392
FAX	(970) 498-1396
E-mail	rschneider@fs.fed.us
Web site	http://www.fs.fed.us/rm
Mailing Address	Publications Distribution Rocky Mountain Research Station 240 West Prospect Road Fort Collins, CO 80526

Rocky Mountain Research Station
Natural Resources Research Center
2150 Centre Avenue, Building A
Fort Collins, CO 80526

Fire, Fuel Treatments, and Ecological Restoration: Conference Proceedings

April 16-18, 2002
Fort Collins, Colorado

Contents

Foreword: Conference on Fire, Fuel Treatments, and Ecological Restoration:
Proper Place, Appropriate Time 1
Philip N. Omi and Linda A. Joyce, Conference Co-Coordinator

Fuel Treatment Performance and Fire Hazard Reduction

Fuel Treatments: Opening Remarks 5
*Wayne D. Shepperd, Research Forester, Rocky Mountain Research Station;
and Sarah Gallup, Fuels/Fire Planner, Arapaho-Roosevelt National Forest*

Performance of Fuel Treatments Subjected to Wildfires 7
*Erik J. Martinson and Philip N. Omi, Western Forest Fire Research Center,
Department of Forest Sciences, Colorado State University*

Prescribed Burning and Wildfire Risk in the 1998 Fire Season in Florida 15
*John M. Pye, Jeffrey P. Prestemon, David T. Butry, and Karen Lee Abt,
Southern Research Station, USDA Forest Service*

Fire Hazard and Silvicultural Systems: 25 Years of Experience
From the Sierra Nevada 27
*Scott Stephens and Jason Moghaddas, Division of Forest Science,
Department of Environmental Science, Policy, and Management,
University of California*

Canopy Fuel Treatment Standards for the Wildland-Urban Interface 29
Joe H. Scott, Systems for Environmental Management

Reducing Crown Fire Hazard in Fire-Adapted Forests of New Mexico 39
*Carl E. Fiedler, School of Forestry, University of Montana; and Charles E.
Keegan, Bureau of Business and Economic Research, University of Montana*

Definition of a Fire Behavior Model Evaluation Protocol:
A Case Study Application to Crown Fire Behavior Models 49
*Miguel G. Cruz, Associação para o Desenvolvimento da Aerodinâmica
Industrial and School of Forestry, University of Montana; Martin E.
Alexander, Canadian Forest Service, Northern Forestry Centre, Edmonton,
Alberta, Canada; and Ronald H. Wakimoto, School of Forestry, University of
Montana*

In Situ Soil Temperature and Heat Flux Measurements During Controlled Surface Burns at a Southern Colorado Forest Site	69
<i>W.J. Massman, J.M. Frank, and W.D. Shepperd, USDA Forest Service, Rocky Mountain Research Station; and M.J. Platten, USDA Forest Service, Manitou Experimental Forest</i>	

Restoration Case Studies and Ecosystem Effects

Ecological Restoration Thinning of Ponderosa Pine Ecosystems: Alternative Treatment Outcomes Vary Widely	91
<i>W. Wallace Covington, Ecological Restoration Institute, Northern Arizona University</i>	
Aspen Response to Prescribed Fire, Mechanical Treatments, and Ungulate Herbivory	93
<i>Steve Kilpatrick and Dean Clause, Wyoming Game & Fish Department; and Dave Scott, USDA Forest Service, Bridger-Teton National Forest</i>	
Experimental Thinning and Burning of Ponderosa Pine Forests in Southwestern Colorado: Effects on Canopy Structure, Understory Composition, and Fuels	103
<i>W.H. Romme, Department of Forest Sciences, Colorado State University; M.L. Floyd-Hanna and D.D. Hanna, Environmental Studies Program, Prescott College; and Phil Kemp, USDA Forest Service, San Juan National Forest</i>	
Effects of Fire Interval Restoration on Carbon and Nitrogen in Sedimentary- and Volcanic-Derived Soils of the Mogollon Rim, Arizona	105
<i>Daniel G. Neary and Steven T. Overby, USDA Forest Service, Rocky Mountain Research Station; and Sally M. Haase, USDA Forest Service, Pacific Southwest Research Station</i>	
Mt. Trumbull Ponderosa Pine Ecosystem Restoration Project	117
<i>Ken Moore, Bob Davis, and Timothy Duck, Parashant National Monument</i>	
Wildlife Responses to Alternative Fire Management Treatments: The National Fire/Fire Surrogate Study Approach	133
<i>Steve Zack and Kerry Farris, Wildlife Conservation Society</i>	
Comparing Two Methods of Identifying Ecological Restoration Opportunities	135
<i>Jimmie D. Chew, USDA Forest Service, Rocky Mountain Research Station</i>	
The Post-Burning Response of Bark Beetles to Prescribed Burning Treatments	143
<i>David J. Ganz and Donald L. Dahlsten, Department of Environmental Science, Policy and Management, University of California; and Patrick J. Shea, USDA Forest Service, Pacific Southwest Research Station</i>	
Root Pathogens and Fire: Silvicultural Interactions in “Exotic” Ecosystems	159
<i>William J. Otrosina, Susana S. Sung, Charles H. Walkinshaw, and Brian T. Sullivan, USDA Forest Service, Institute for Tree-Root Biology</i>	

Treatment—Economic

- Social Sciences and the Economics of Moderation in Fuels Treatment 163
Douglas B. Rideout, Forest Economics, Colorado State University
- Costs for Reducing Fuels in Colorado Forest Restoration Projects 167
Dennis L. Lynch and Kurt Mackes, Department of Forest, Rangeland, and Watershed Stewardship, Colorado State University
- The Effects of Fire on Hiking Demand: A Travel Cost Study of Colorado and Montana 177
Hayley Hessel, School of Forestry, University of Montana; John B. Loomis, Department of Agricultural and Resource Economics, Colorado State University; and Armando González-Cabán, USDA Forest Service, Forest Fire Lab, Pacific Southwest Research Station
- Linking GIS and Recreation Demand Models to Estimate the Economic Value of Using Fire to Improve Deer Habitat 187
John Loomis, Department of Agricultural and Resource Economics, Colorado State University; Armando González-Cabán, Forest Fire Lab, USDA Forest Service, Pacific Southwest Station; and Dana Griffin and Ellen Wu, Department of Agricultural and Resource Economics, Colorado State University
- Co-Firing Wood Biomass With Coal at the Cañon City Power Plant 203
Daniel Prokupets, Colorado State Forest Service; and Kurt Mackes and Skip Smith, Department of Forest, Rangeland, and Watershed Stewardship, Colorado State University

Treatment—Social Issues

- Fire Social Science Research: Opening Remarks 209
Antony S. Cheng, Department of Forest Sciences, Colorado State University
- People and Fire in Western Colorado: Methods of Engaging Stakeholders 213
Sam Burns, Office of Community Services, Fort Lewis College; Chuck Sperry, The Rocky Mountain Center for Economic Democracy; and Ron Hodgson, Fire & Aviation Management, Bureau of Land Management
- From Analysis Paralysis to Agency-Community Collaboration in Fuels Reduction for Fire Restoration: A Success Story 225
Timothy Ingalsbee, Western Fire Ecology Center, American Lands Alliance
- Hazardous Fuel Reduction in the Blue Mountains: Public Attitudes and Opinions 241
Eric Toman, Department of Forest Resources, Oregon State University; and Bruce Shindler, Department of Forest Resources, Oregon State University
- Fire, Fuel, and Restoration Priorities of the Forest Conservation Community 255
Gregory H. Aplet, The Wilderness Society

Fire Regime Considerations

Key Issues in Fire Regime Research for Fuels Management and Ecological Restoration	259
<i>Thomas T. Veblen, Department of Geography, University of Colorado</i>	
Lessons From the Fires of 2000: Post-Fire Heterogeneity in Ponderosa Pine Forests	277
<i>Natasha B. Kotliar and Sandra L. Haire, US Geological Survey, Fort Collins Science Center; and Carl H. Key, US Geological Survey, USGS - Glacier Field Station Science Center, Glacier National Park</i>	
Mapping the Cheatgrass-Caused Departure From Historical Natural Fire Regimes in the Great Basin, USA	281
<i>James P. Menakis, Fire Effects Unit, Fire Science Laboratory, USDA Forest Service, Rocky Mountain Research Station; Dianne Osborne, National Science and Technology Center, Bureau of Land Management; and Melanie Miller, Bureau of Land Management</i>	
Determining the Spatial Extent of Historical Fires With Geostatistics in Northern Lower Michigan	289
<i>Ann L. Maclean, School of Forest Resources and Environmental Sciences, Michigan Technological University; and David T. Cleland, USDA Forest Service, North Central Research Station</i>	
Scaling Rules and Probability Models for Surface Fire Regimes in Ponderosa Pine Forests	301
<i>Donald A. Falk and Thomas W. Swetnam, Laboratory of Tree Ring Research, University of Arizona</i>	
Uncertainty in Fire History and Restoration of Ponderosa Pine Forests in the Western United States	319
<i>William L. Baker and Donna S. Ehle, Department of Geography and Recreation, University of Wyoming</i>	
Ancient Piñon-Juniper Forests of Mesa Verde and the West: A Cautionary Note for Forest Restoration Programs	335
<i>William H. Romme, Department of Forest Sciences, Colorado State University; and Lisa Floyd-Hanna and David D. Hanna, Prescott College</i>	

Landscape Planning

Expectation and Evaluation of Fuel Management Objectives	353
<i>Mark A. Finney and Jack D. Cohen, USDA Forest Service Fire Sciences Laboratory, Rocky Mountain Research Station</i>	
Scheduling Removals for Fuels Management	367
<i>John Hof, USDA Forest Service, Rocky Mountain Research Station; and Philip Omi, Department of Forest Sciences, Colorado State University</i>	
Wildland Fire Use: A Wilderness Perspective on Fuel Management	379
<i>Carol Miller, Aldo Leopold Wilderness Research Institute, USDA Forest Service, Rocky Mountain Research Station</i>	

Modeling the Effects of Fuel Treatments for the Southern Utah
Fuel Management Demonstration Project 387
*Donald Long, Kevin Ryan, Rick Stratton, Ed Mathews, Joe Scott,
Maureen Mislivets, Melanie Miller, and Sharon Hood, Fire
Sciences Lab, USDA Forest Service, Rocky Mountain Research Station*

Fire Regime Condition Class and Associated Data for Fire and
Fuels Planning: Methods and Applications 397
*Wendel J. Hann, USDA Forest Service Fire Management; and
Diane J. Strohm, Pike-San Isabel and Comanche-Cimarron National
Forests and Grasslands*

Closing Comments

Fire, Fuel Treatments, and Ecological Restoration—Proper Place,
Appropriate Time 435
*G. Thomas Zimmerman, National Park Service, National Interagency
Fire Center*

Poster Abstracts 445

Author Contact List..... 471



Fuel Treatment Performance
and Fire Hazard Reduction

Restoration Case Studies
and Ecosystem Effects

Treatment—Economic

Treatment—Social Issues

Fire Regime Considerations

Landscape Planning

Poster Abstracts