# *Additional Presentation Abstracts*

# ABSTRACTS FOR THE 2010 HUMAN DIMENSIONS OF WILDLAND FIRE CONFERENCE PROCEEDINGS

## 1.0 PLENARY SESSIONS

### 1.1 Australian Response to the Black Saturday Fires: What is and isn't Changing?

**Presenters**

Naomi Brown, Australasian Fire Authorities Council
Alan Rhodes, Country Fire Authority

**Abstract**

The wildfires of 7 February 2009 in Victoria, Australia, that killed 173 people and destroyed more than 2,000 homes shocked the world. The government quickly established a Royal Commission, the highest form of inquiry possible in Australia, to investigate all aspects of the disaster. Both the fires and the proceedings of the Royal Commission have significantly altered public perceptions of the wildfire risk and how agencies need to respond. Key issues such as the "stay or go" approach, warning systems, and incident management have been under intense scrutiny and have been the focus of public debate. The presentation will provide an overview of the fires, the Royal Commission findings, and the implications that flow from these events. The presentation will also include reflection on some fundamental issues that have arisen, such as the community's role in responding to the risk of wildfire and whether agencies and the community can share responsibility for dealing with the risk.

## 1.2 When the Incident doesn't End: Life in the Grinder (The Experiences of a State Agency Tasked with Managing Multiple Long-Duration Incidents and the Impact on its Personnel)

**Presenter**

Mark D. Stanford, Fire Operations Chief,
Texas Forest Service

**Abstract**

From 2005 through 2009, Texas Forest Service (TFS) personnel spent more than 1,000 days leading the State's response to three extended fire seasons and providing incident management teams and support personnel for multiple all-hazard incidents: six hurricanes, two tropical storms, eight floods, and two tornados. This effort equates to TFS personnel being actively engaged in emergency response operations for more than 65 percent of the 5-year period. Agency leadership was concerned about the cumulative effect of physical and mental fatigue, and the impact on employees, their families, and the ability to maintain a safe working environment. Topics covered in this presentation will include actions taken by TFS leadership to identify and mitigate these impacts.

## 1.3 Closing the Science-Practice Gap: Lessons Learned from Collaboration Between Research and Practice in Community Wildfire-Protection Planning


### Presenters

Daniel R. Williams, U.S. Forest Service, Rocky Mountain Research Station
Pamela J. Jakes, U.S. Forest Service, Northern Research Station
Judy Serby, Colorado State Forest Service



### Abstract

This plenary session will examine the research-practice nexus by presenting lessons and reflections from a Joint Fire Science Program-sponsored project investigating collaborative capacity in community wildfire protection planning. The session will contrast a standard agency model of knowledge transfer (based on management's needs) with an approach used in this project, in which a collaborative team of researchers and practitioners guided knowledge transfer. In addition, as this project unfolded, a key lesson for the researchers was that the planned knowledge-transfer activities needed to focus less on delivering specific knowledge and lessons (which themselves were highly contextual) and more on supporting the development and strengthening of formal and informal networks of intermediary practitioners. This plenary session will engage the audience in a discussion of how to narrow the research-practice gap.

# 2.0 PUBLIC ACCEPTANCE OF FIRE MANAGEMENT

## 2.1 Community Attachment as a Mediating Factor of Firewise Actions in Wildland-Urban Interface Settings

James D. Absher, Research Social Scientist,
U.S. Forest Service, Pacific Southwest
Research Station
Gerard T. Kyle, Associate Professor,
Texas A&M University
Gene L. Theodori, Associate Professor,
Sam Houston State University

**Abstract**

Responsibility for wildland fire hazard mitigation in the wildland-urban interface (WUI) falls largely on the landowner or homeowner. Agencies at all levels have programs to educate and assist in this process. Codes and standards are constantly being developed and enforced. Nonetheless, from a scientific standpoint, there is still much we do not know about what creates the greatest level of preparedness or how best to motivate homeowners to act on agency firewise requests. Social science has focused our attention on the psychological and setting attributes as particularly important in understanding the underlying processes. Various measures of homeowner concern and action are available and have been reported.

Another aspect that seems especially important is the cohesiveness of the community and how it affects homeowner involvement in wildland fire mitigation. Some research has shown that, in general, residents do not participate broadly at this level. Yet, work in similar settings shows that high levels of community attachment are associated with increased levels of community action. Such research suggests that attention to this factor may improve WUI fire-preparedness efforts.

This paper furthers our understanding by employing a community attachment scale and comparing it across three southern California National Forest WUI settings. Respondents come from a WUI-focused survey of 1,659 residents living close to fire-prone wildlands. These respondents vary in their psychological, situational, and past firewise actions and are grouped according to these aspects with community attachment as an intermediate, or mediating, variable. From this model we better understand the forces that improve residential defensible-space actions and the particular role of community attachment.

Results suggest that we can improve homeowners' wildland-fire preparedness (firewise actions) by attending to the community as a unit, and by focusing efforts on particular action sequences, especially as they relate separately to structure and landscape modifications. Community cohesion is an important factor in this process. The results place attention on the community context of achieving hazard mitigation, assist managers' and educators' understanding of the particular setting within which they seek to encourage mitigation activities, and offer possible improvements to focused education efforts as well.

## 2.2 Public Perceptions of Fire Management Strategies in Banff National Park of Canada

Bonita L. McFarlane, Fire Social Science Researcher,
Natural Resources Canada, Canadian Forest Service
David O.T. Watson, Human Dimensions Researcher,
Natural Resources Canada, Canadian Forest Service
Tara K. McGee, Associate Professor,
Department of Earth and Atmospheric Sciences,
University of Alberta

**Abstract**

Fire management in Banff National Park, Canada, uses a combination of mechanical vegetation removal, prescribed fire, and fire suppression. Fire is used to restore ecosystems to more natural levels of variation, and to reduce the risk of wildfire to local communities and adjacent industrial forest lands. To be successful, however, fire management in national parks must have a broad base of public support. In particular, it requires understanding and collaboration among local citizens and other jurisdictions, such as municipalities and provincial land management agencies. This cooperation requires the acceptance of Parks Canada's fire management activities and the participation of nearby communities and residents in wildland fire risk-reduction measures.

In 2008, we conducted a mail survey of a random sample of residents of Banff National Park and nearby communities (n = 1,204). The purpose of this study was to examine the perceptions of wildfire risk associated with residing in or near the park, acceptability of risk, and knowledge and acceptance of the park's fire-management strategy and wildfire risk-mitigation measures. This paper will present results from the survey focusing on the public's acceptance of fire management options and the factors that influence support for the use of prescribed fire. We found that about an equal number of respondents chose protecting communities and restoring ecosystems as the most important vegetation management goal. More than 90 percent of respondents supported some use of thinning or prescribed fire in the park. Although residents appear to have a moderate level of trust in Parks Canada, respondents agreed only slightly that Parks Canada is open to input and is doing a good job at providing information. About half of respondents indicated they had little or no knowledge of the park's vegetation management strategy, but they were quite knowledgeable about basic fire ecology and most had considerable experience with wildfire. Management implications include improving citizen engagement and agency interaction with local residents. Regarding public education, information on the park's fire management strategy, causes of wildfire in the park, and differences in the ecological outcomes of fire and thinning were identified as potential areas for improvement.

## 2.3 Examining the Complexities of Factors Affecting Community-Agency Trust Before, During and After a Wildfire in Victoria, Australia

Emily Sharp, Institute for Land, Water and Society, Charles Sturt University
Rik Thwaites, Institute for Land, Water and Society, Charles Sturt University
Allan Curtis, Institute for Land, Water and Society, Charles Sturt University
Joanne Millar, Institute for Land, Water and Society, Charles Sturt University

### Abstract

Wildfire management is a complex and often contentious issue in fire-prone communities in Victoria, Australia. Significant fires in 2002-03 and 2006-07 resulted in approximately 2.5 million acres of land burned in each fire season. One hundred and seventy-three lives were lost and more than 2,000 homes destroyed in wildfires in February 2009. The challenge of managing increasingly frequent and severe fires has prompted fire-management agencies to recognize the importance of community-agency trust in working with communities to prepare for, respond to, and recover from wildfire. Previous research has identified components of trust important to wildfire management in general or for a specific management stage (e.g., preparation for fire). However, we have limited understanding of how factors affecting community-agency trust may be similar or different at each stage of fire management (i.e., before, during, and after).

In this presentation, we draw upon a mail survey (n = 329) and 26 semi-structured interviews with 38 residents of a fire-affected community in rural Victoria, Australia. We describe how community-agency trust was built, lost, or maintained before, during, and after a wildfire event. Study findings suggest that communication, cooperation, institutional policies and procedures, shared values and trustworthiness were common factors affecting trust before, during, and after a wildfire. We discuss the relative importance of these factors to community-agency trust at each management stage and demonstrate how they differ among the stages of a wildfire event. The discussion is aimed at showing managers how they can target community engagement strategies to build or maintain trust in each management stage but still retain the "big picture" of community-agency trust across the management stages of a wildfire event.

## 2.4 Longitudinal Analysis of Public Response to Wildland Fire and Fuel Management

Bruce Shindler, Department of Forest Ecosystems and Society, Oregon State University
Eric Toman, School of Environment and Natural Resources, Ohio State University
Sarah McCaffrey, Research Forester, U.S. Forest Service, Northern Research Station

### Abstract

In this presentation we discuss findings from longitudinal research in fire-prone communities adjacent to federal lands in seven states. The research replicates previous studies to measure change in public responses to wildland fuel programs and the federal agencies that implement them. In 2002, two separate studies surveyed residents from selected communities in the western states of Arizona, Colorado, Oregon, and Utah and the Great Lakes region of Michigan, Wisconsin, and Minnesota. In 2008, questions replicated measures from the original project and included additional items to address current issues. Overall, 546 questionnaires were completed for a 55-percent adjusted response rate. Questions focused on public acceptance of a range of fuel-reduction treatments with a specific focus on prescribed fire, examination of citizen-agency interactions, usefulness of agency communication and outreach programs, and trust in agency personnel to conduct management activities. The study design enables comparisons between responses over time and across geographic locations.

In brief, findings show that respondents demonstrate strong, stable support over the study period for the use of prescribed fire and thinning practices to reduce forest fuels. Overall, public concerns for treatment use decreased across the study period. However, the federal agencies received relatively low scores for providing information about their management activities, giving citizens an opportunity to participate in planning processes, and building trust with local citizens. Findings also demonstrated geographic variability, particularly between responses in the western and Lake states. We conclude by examining the influence of relevant variables on participant acceptance of agency treatments and discuss resulting implications for fire-management programs.

# 3.0 SOCIAL ACCEPTANCE – DEFENSIBLE SPACE

## 3.1 Understanding Risk Mitigation in the Western United States

Wade Martin, California State University, Long Beach

**Abstract**

An important policy question receiving considerable attention concerns the risk perception-risk mitigation process that guides how individuals choose to address natural-hazard risks. We consider the issue in the context of wildfire. The relationship between direct experience with wildfire, knowledge of wildfire risks, perceptions of responsibility to protect oneself and one's property, full-time/seasonal status, and self-efficacy and their direct and indirect impact on risk-mitigation activities by homeowners living in the wildland-urban interface (WUI) in the western United States is analyzed. Our data are from four communities in two western states. Results demonstrate that the effects of knowledge and locus of responsibility are mediated by homeowners' risk perceptions. We also find that beliefs of self-efficacy and full-time/seasonal status have a direct influence on risk-reduction behaviors. Finally, we find, surprisingly, that direct experience with wildfire does not directly influence the risk perception-risk mitigation process.

## 3.2 Living with Wildfire in Colorado: A Survey of Two Front Range Counties

Hannah Brenkert-Smith, Institute of Behavioral Science, University of Colorado
Patricia Champ, U.S. Forest Service, Rocky Mountain Research Station
Nicholas Flores, Department of Economics, University of Colorado

### Abstract

Wildfire and its associated impacts on residents living in fire-prone areas make a common story in the media during the wildfire season. Wildfire risk in areas such as the Rocky Mountain West is exacerbated by the influx of individuals choosing to live in the areas most susceptible to wildfires. Although extensive efforts have been made to inform new and existing residents in these fire-prone areas of the risk, it is not clear how the message has resonated with the target population. In this study we measured the extent to which homeowners have implemented 12 wildfire risk-mitigation measures in two Colorado Front Range counties. While the counties are situated next to each other, they have different wildfire risk-reduction programs and different landscapes, and the residents have different demographic characteristics. Initial analyses comparing cumulative mitigation behavior indicated significant differences between counties. When the individual mitigation measures are assessed separately, it is apparent that despite all these significant differences, homeowner decisions about taking wildfire risk-reduction actions are influenced by similar factors across the two counties. In examining factors that affect homeowners' decisions to undertake each of the 12 measures, we found that firsthand experience with wildfire, attitudes about sources of wildfire risk, and interactions among neighbors were related to implementation of mitigation measures in a significant manner. Furthermore, we found that decisions about implementing fuels-reduction measures were related to different factors from those influencing decisions about implementing structural mitigation measures.

## 3.3 Homeowners and Defensible Space: Motivation to Maintain and the Role of Local Programs

Sarah McCaffrey, Research Forester,
U.S. Forest Service, Northern Research Station
Melanie Stidham, Research Associate,
Oregon State University
Eric Toman, Assistant Professor, Ohio State University
Bruce Shindler, Professor, Oregon State University

### Abstract

A key strategy in reducing the wildfire threat to communities is engaging private landowners in mitigating fire hazard on their land. Over the last several years, an array of federal, state, and local education and financial assistance programs have developed to encourage home protection activities. These efforts have led to growing interest in understanding what makes landowners in the wildland-urban interface more or less willing to create defensible space on their property. To date, most of these studies have been mail surveys that are snapshots in time. Yet to be successful, defensible space must be a continuous effort as vegetation grows back and thus requires long-term maintenance by the homeowner. This study used structured interviews of homeowners in communities in three states in the western United States with different types of programs supporting defensible-space practices. Homeowners were interviewed on their property to identify what fire mitigation means to them, the specific challenges they faced, and how local programs did or did not influence their mitigation decisions and actions. A short written questionnaire was also gathered to assess homeowner views of fire management on neighboring public lands. The study is designed to assess maintenance over time by returning to the same properties after 3 years to examine whether defensible space was maintained and why. This presentation will report on findings from the first half of the study, identifying the activities homeowners are taking to mitigate fire risk, the factors—including local programs—that first motivated them to undertake the actions, and their expectations and efforts regarding long-term maintenance.

## 3.4 Defensible Space Features: Impact of Voluntary Versus Mandatory Programs on a Homeowner's Attitudes and Actions

See full paper on page 71.

## 3.5 Changes in Southern California Landowner Attitudes and Behaviors About Forest Health and Fire Safety After Participation in a Fuels-Reduction Cost-Share Program

Allison Roth, San Bernardino National Forest Association

**Abstract**

Forest Care is a fuels-reduction cost-share program for private landowners living in San Bernardino National Forest, the most heavily populated National Forest in fire-prone southern California. The Forest Care program is made possible through an innovative state-federal-private partnership among a local non-profit, the National Forest Association; the California Department of Forestry and Fire Protection; and the U.S. Forest Service State and Private Forestry Program. The successful implementation of the Forest Care program has been contingent upon public acceptance and understanding of forest health and fire safety. This study examines landowner perceptions and behaviors regarding the creation and maintenance of defensible space on private lands in and around the San Bernardino National Forest. A mail survey was sent to 1,500 program participants to determine trends in landowners' perceptions of forest management for forest health and fire safety on their properties, as well as their continuing roles in maintaining thinned conditions. We examine how public attitudes and behaviors influence metrics of stewardship behavior and how these metrics have changed as a result of hands-on forest management through Forest Care.

# 4.0 EVACUATION AND ALTERNATIVES

## 4.1 Improving an Inherently Stressful Situation: The Role of Communication During Wildfire Evacuations

See full paper on page 96.

## 4.2 Development of Alternatives to Evacuation in the Wildland-Urban Interface: Does Emerging Practice Reflect Community Diversity?

Travis B. Paveglio, Doctoral Candidate,
Department of Natural Resource Sciences,
Washington State University
Matthew S. Carroll, Professor, Department of Natural
Resource Sciences, Washington State University
Pamela J. Jakes, Research Forester,
U.S. Forest Service, Northern Research Station

**Abstract**

The Black Saturday Bushfires of 2009 in Victoria, Australia, served as a focusing event in the debate over the development of alternatives to evacuation during wildfires. Prevailing responses from officials in the United States have shifted away from increasing support of alternatives in favor of early evacuation. This case-study research of Wilderness Ranch, a mountain community outside Boise, Idaho, demonstrates how the development of alternatives may be necessary or desired in areas with decreased ability to evacuate effectively. We conducted approximately 50 interviews with local residents and professionals to explore the characteristics that allowed this community to build capacity for dealing with possible wildfire impacts. These characteristics include the continual improvement and funding of their volunteer fire protection district, fuel reduction programs, and plans for some residents to remain at home during wildfire events. We found that recognition of poor ingress/egress, local knowledge and experience with wildfire risk, and the residents' independent nature all contributed to support for alternatives. Key individuals in the community have helped build capacity through a focus on Firewise standards and the dissemination of information. Local residents' awareness and ability to carry out alternatives to evacuation varied among smaller "micro-communities" due to the presence of knowledgeable residents (often volunteer firefighters) and diverse fuel types. In response, community leaders began developing plans for "sheltering points" at homes with excellent fire protections. Our discussion provides recommendations that would aid further development of alternatives to evacuation in communities that may not be able or willing to evacuate. We also question whether national policy advocating early evacuation or alternatives as a primary response to fire risk reflects the wide variety of capabilities, fuel types, and infrastructure among wildland-urban interface communities.

## 4.3 Research Results from the 2009 "Black Saturday" Bushfires: Human Behavior and Community Safety Issues

Joshua Whittaker, RMIT University and Bushfire Cooperative Research Centre, Victoria, Australia

**Abstract**

On 7 February 2009, Victoria experienced the worst bushfires in Australia's recorded history. One hundred seventy-three people lost their lives and more than 2,000 homes were destroyed, in addition to other substantial economic and environmental impacts. In response to these events, the Bushfire Cooperative Research Centre established a Research Task Force to undertake research for the Fire and Land Management sector and the fire research community in Australia and internationally. The Research Task Force covers three key areas: fire behavior; human behavior and community safety issues; and building (infrastructure) and planning issues.

This paper presents key findings from the "Human behavior and community safety issues" research. The "human behavior" team consisted of social science researchers from a number of universities and community safety personnel from fire- and land-management agencies. The primary aim of the research was to investigate the human behavioral factors that influenced patterns of life and property loss/survival during the February 7 fires. Teams were deployed into the field in the days and weeks immediately following the fires, interviewing more than 600 affected residents. Qualitative analysis of the interview data provided insights into a range of human behavior and community safety issues arising from the fires, including: levels of household planning and preparedness; the provision of, and responses to, information and warnings; how individuals and households responded to the fires; and the differences between people's intended and actual responses. These issues were quantified in a survey of approximately 1,350 households affected by the fires.

The paper presents key qualitative and quantitative findings relating to behavior and community safety issues during the February 7 bushfires, with a discussion of the implications for the "Prepare, stay and defend or leave early" policy.

## 4.4 Public Response to the Threat of Wildfire: Evacuation or….?

Alan Rhodes, Country Fire Authority
Sarah McCaffrey, Research Forester,
U.S. Forest Service, Northern Research Station

**Abstract**

With a growing number of people exposed to wildfire risk and predicted increases in fire frequency and severity, the way individuals and communities respond during a fire will be critical in influencing the impact of wildfire. Although the traditional approach in the United States has focused on large-scale evacuation as the most appropriate option, both local communities and some fire agencies have recently shown increasing interest in alternative approaches, such as the Australian "stay and defend or leave early" policy. The large, deadly fires in 2009 in Victoria, Australia, however, have raised questions about this approach even in jurisdictions where it has been widely promoted.

This paper presents findings from a 2008 study focused on understanding public response to alternatives to wildfire evacuation in the United States. The research used a case study approach in four communities in Montana, California, and New Mexico, where issues in fire management and concerns about the effectiveness of evacuation had prompted consideration of alternative approaches. Each community had adopted a different approach and the study interviewed community and agency representatives about their views on the nature of the alternatives, the rationale for the approach, the perceived benefits and risks, and the conditions in each community that facilitated or hindered the change process.

The findings highlight the different perspectives on the pros and cons of various approaches and a range of factors that influence both the nature of the alternative being considered and the degree of success in implementing it. A key aspect to emerge from the study has been the changing role of agencies and the changing relationship between agencies and communities in light of the alternative approaches.

The presentation will end with implications arising from the alternative approaches being considered and highlights of similarities between what is emerging in both Australia and the United States.

## 4.5 Clarifying Evacuation Options Through Fire Behavior and Traffic Modeling

See full paper on page 104.

## 4.6 Understanding Homeowner Preparation and Intended Actions When Threatened by a Wildfire

See full paper on page 88.

## 4.7 Understanding "Ready, Set, Go" Outreach - The Orange County Experience

Laura Blaul, Orange County (California) Fire Authority

**Abstract**

The cost of fighting wildfire continues to escalate and, despite an increase in resource dedication and training, so do the number of homes lost to these fires. For years, the Orange County Fire Authority (OCFA) in California has conducted inspections and enforced defensible-space regulations. The governing bodies of the communities served by the OCFA have been at the forefront of adopting new construction codes and standards that "harden" homes against wildfire. The losses nevertheless have not been notably reduced, particularly in older communities. In 2009, the OCFA revised the prevention strategy to employ education rather than enforcement and attempt to motivate homeowners to take corrective action to protect their homes and community. The effort focused on 15 high-risk communities in Orange County and included town hall style meetings, distribution of materials, and door-to-door home assessments by firefighters. The questions of efficiency and effectiveness, as well as impact, of this new strategy were at the forefront of post-action analysis. This presentation will focus on the evaluation of program results, which were four-pronged: 1) Data collected by more than 70 fire crews throughout the 3-month program; 2) Subjective assessment by 50 participating firefighters during an after-action debriefing session; 3) A survey of residents in each of the 14 communities; and 4) An analysis of building permits issued by the County and cities with authority in each community (ongoing). Results of the evaluation of the 2009 program are being used to develop 2010 efforts.

# 5.0 COMMUNITY RESILIENCE

## 5.1 Citizen Acceptance of Post-Fire Management Strategies: Community Responses After Two Large Fires in Oregon

Christine Olsen, Oregon State University

**Abstract**

Recovery and restoration after large wildfires on public lands have become increasingly important topics in recent years as the number and size of fires have increased. Citizen acceptance of management strategies is central to successful planning and decisionmaking in these settings. This research examines citizen opinions of common post-fire management practices, as well as factors that may influence these opinions. Interviews with agency personnel and forest community members were followed by surveys among the public in communities near two recent fires in Oregon: the 2003 Bear and Booth Complex Fires and the 2002 Biscuit Fire. Results indicate an agency's commitment to long-term interactions with citizens influences acceptance of post-fire management strategies. Though there is broad public support for several post-fire management strategies (e.g., erosion control, replanting, reseeding), acceptance is highly dependent on trustworthy relations. Further, results suggest it is not enough for agencies to simply offer opportunities for public engagement; citizens need to feel that these opportunities are meaningful activities in which to participate. Citizen respondent perspectives on different communication practices are discussed, as well as factors that contribute to successful communication in post-fire environments. Overall, the majority of respondents did not agree with how the local U.S. Forest Service and Bureau of Land Management handled forest planning after recent fires. This research indicates that managers need to develop positive citizen-agency relations well before a fire occurs if communities are to support post-fire actions.

## 5.2 Incorporating Adaptive Capacity into Existing Concepts of Hazard Vulnerability and Resilience: What Social Characteristics Lead to Fire-Adapted Human Communities?

Matthew S. Carroll, Professor, Department of Natural Resource Sciences, Washington State University
Pamela J. Jakes, Research Forester, U.S. Forest Service, Northern Research Station
Travis B. Paveglio, Doctoral Candidate, Department of Natural Resource Sciences, Washington State University
Daniel R. Williams, U.S. Forest Service, Rocky Mountain Research Station

**Abstract**

The increasing threat and damages caused by wildfire in the United States have spurred the development of many policies and programs that encourage communities in the wildland-urban interface (WUI) to reduce their vulnerability and increase their resilience. Efforts have been made to delineate and define WUI vulnerability using primarily bio-physical variables, but there has been little or no analysis of the interactions among demographic, structural, and emergent elements of social context and their impact on community ability to adjust to the risk and reality of wildfire. We argue that current assessments of social vulnerability or resilience to hazards do not fully take into account communities' adaptive capacity. For instance, they rarely recognize the impact of place-based knowledge/experience, interactions/relationships between local community members, and local ability to access/adapt scientific/technical information. Existing assessments are based largely on structural/demographic characteristics and macro-scale assessments of resources, not strong indicators of the emergent community characteristics or social context that affect adaptive capacity.

Our proposed research agenda would address this conundrum while contributing to theoretical discussions of hazard-resistant communities and the long-term sustainability of social-ecological systems. More specifically, we argue that emerging fire and hazard literature should further adapt and expand the concepts of adaptive capacity, resilience, and vulnerability to the study of wildfire. It will help make sense of results derived from the wealth of recent case studies on efforts to reduce wildfire risk to human settlements. It will also provide new insights into the theoretical relationships among adaptive capacity, resilience, and vulnerability by integrating critical elements of community social theory. We also argue that researchers need to better identify, quantify, and describe the social characteristics of human communities important for such adaptive capacity relative to wildfire. We build from established theory and research in an effort to further define adaptive capacity as a critical element in the performance of hazard-resilient actions and the reduction of vulnerability to wildfire or other hazard events.

## 5.3 Trial by Fire - Putting Community Wildfire Protection Plans to the Test

Pamela J. Jakes, U.S. Forest Service,
Northern Research Station
Victoria Sturtevant, Southern Oregon University

### Abstract

Our recent research on collaborative Community Wildfire Protection Plans (CWPP, as directed by the Healthy Forest Restoration Act of 2003) found the process allowed communities to access resources, build organizational networks and relationships, develop leadership, enhance understanding of wildfire risk, and engage local people in mitigation. These planning and learning activities reduce a community's vulnerability to wildland fire by building resilience and adaptive capacity; in short, they contribute to the development and support of fire-adapted human communities. Natural hazards researchers have called mitigation activities such as those identified in a CWPP the most critical activity of the four phases of emergency management (mitigation, preparedness, response, and recovery). They have suggested that by moderating the magnitude of future disasters, effective mitigation can substantially reduce the cost of disaster response and recovery. Does it? Our current research, based on four case studies of communities experiencing a recent wildland fire event, explores how the capacity built during their CWPP collaborative planning process enabled communities to better mitigate, prepare, and respond. We discuss how the CWPP and other fire preparedness activities and programs such as Firewise helped engage local organizations and residents in wildland fire management and recovery, facilitate integration of various levels of agency response, and promote revision of community planning in response to the wildfire experience. Drawing on a model derived from our earlier research and incorporating resiliency literature, we suggest the possible contributions of CWPP for achieving what the U.S. Department of Agriculture and Department of Interior's Quadrennial Fire Review (2009) calls "fire-adapted communities."

## 5.4 Lessons Learned from Wildfire-Affected Rural Communities in New Zealand

E.R. (Lisa) Langer, Scion, Christchurch, New Zealand
Pamela J. Jakes, U.S. Forest Service,
Northern Research Station

### Abstract

New Zealand is vulnerable to natural disasters. Strong winds, often associated with high temperatures, and low humidities and seasonal drought combine to produce dangerous fire conditions in some regions. Although New Zealand does not have wildfires on the scale of those experienced in the United States or Australia, an average of 3,033 wildland fires and nearly 14,500 acres burned have been recorded annually since 1991. The majority were vegetation fires in nonpopulated areas, and hence relatively infrequent fire events of limited extent have affected rural communities. Few residents have experienced major wildfire impacts or have taken the steps necessary for wildfire preparedness or mitigation. The predicted increase in severe fire weather and fire danger through future climate change could find an increasing number of local communities and individuals largely unprepared, and hence vulnerable to potentially devastating impacts.

Several recent wildfires have impinged on rural communities in New Zealand. These fires have caused loss of houses, farm buildings, and other assets (such as fencing, stock, and forests), and have necessitated evacuation of residents from threatened properties. Detailed case studies interviewing residents, fire managers, firefighters, and providers of relief services have highlighted some major issues in three fire-affected communities. These case studies feature different settings—pastoral farmers on Wither Hills surrounding the provincial town of Blenheim in Marlborough in December 2000; old and new "lifestylers" with different perceptions of wildfire risk on small properties of West Melton in the wildland-urban interface close to Christchurch (largest city in the South Island) in December 2003; and close-knit, resilient residents of the remote rural township of Mt. Somers and adjoining farm properties in mid Canterbury in January 2004. Major lessons learned have been identified which will assist Rural Fire Authorities in working with rural communities to improve firefighting and community recovery processes following wildfires in New Zealand. Comparisons are made with case studies of communities affected by wildfires in the United States, and lessons learned are highlighted in the broader international context.

## 5.5 Community Resiliency as a Response to Wildfires: Canadian Case Examples

Judith C. Kulig, Professor and University Scholar, University of Lethbridge
Ainslee Kimmel, Graduate Student, Faculty of Education, University of Lethbridge
Dana Edge, Associate Professor, Queen's University
Nancy Lightfoot, Director and Associate Professor, Laurentian University
Bill Reimer, Professor, Concordia University
Ivan Townshend, Associate Professor, University of Lethbridge

### Abstract

Wildfires have always been a natural feature of rural and remote areas, but climate change, insect infestations (e.g., pine beetle), and the relocation of individuals into wildland areas are exacerbating fires' effects on lives and personal property. An ongoing study is being completed in two rural Canadian communities (Barriere, British Columbia, and La Ronge, Saskatchewan, both of which are home to First Nations populations) that experienced wildfires, required evacuation, and resulted in property loss. This mixed-method study includes qualitative interviews, household surveys, and community profiles to identify processes associated with community resiliency. In this study, community resiliency refers to communities' ability to deal with adversity and subsequently become collectively stronger. Fifty-seven qualitative interviews have been completed with a variety of individuals in each affected community. The interviews emphasize personal (e.g., mental health stress) and community challenges (e.g., loss of economic sustainability), in addition to lessons learned (e.g., communication between fire management and local community members) from experiencing such a disaster. In each participating site, the wildfire experience enhanced community resiliency. Household surveys were concurrently collected in both affected communities (n = 201 in Barriere; n = 111 in La Ronge) and in a comparison community (n = 189) that did not experience a wildfire. The quantitative survey data will enhance the qualitative findings and provide additional information about the disasters' effects on personal health and community resiliency. Community resiliency will be described at both an individual and community level. The aspects of local governments, forestry services, and provincial emergency planning services that contribute to, or hamper, resiliency will be highlighted. Finally, the ongoing work of the international study advisory group will be highlighted in relation to its knowledge translation plans (i.e., the creation of fact sheets and digital stories) that will inform disaster management at various governmental levels and provide specific information for other rural communities, including those where First Nations peoples reside.

# 6.0 EDUCATION AND INFORMATION DISSEMINATION

## 6.1 Firewise Forever? Voluntary Community Participation and Retention in Firewise Programs

See full paper on page 79.

## 6.2 Following Black Saturday - A Systems Approach to Bushfire Safety

Gwynne Brennan, Manager of Community Development, Country Fire Authority, Victoria, Australia
Lisa Sturzenegger, Directorof Community Safety, Country Fire Authority, Victoria, Australia
Alan Rhodes, Country Fire Authority

### Abstract

The bushfires which occurred in Victoria, Australia, during February 2009 have been described as the worst in Australia's recorded history: 173 people died, 2,029 properties and 61 businesses were destroyed and more than 1 million acres of land were burned. The majority of the fatalities and damage occurred on Black Saturday (7 February 2009).

On 16 February 2009 the government of Victoria established the Victorian Bushfires Royal Commission to examine all aspects of the fires, such as causes, preparation for wildfire, and responses. The Commission was provided broad terms of reference to investigate and report on the fires. On 17 August the Commission handed down its interim report to the Victorian government in order that recommendations be implemented prior to the 2009-2010 bushfire season.

Primacy of life was the overarching premise of the interim report with a number of themes identified, such as community education and responsibility, warning messages (content, timing and delivery), and relocation. The Victorian Government accepted all recommendations of the interim report.

This paper outlines how, in response to the recommendations, the Country Fire Authority (responsible for prevention and suppression of fires in Victoria) created a systems model entitled the Bushfire Safety System to address the complexity of issues identified in the interim report. These issues are in most cases interdependent and interact not only with each other but also with others yet to be identified. A systems approach to bushfire safety was deemed an apt concept for analyzing and responding to these issues, which in turn led to the development of a set of key initiatives designed to mitigate risk across many different segments. The Victorian Government endorsed these initiatives, which became known as the Bushfire Preparedness Program 2009/10. The projects in this program will be described in more detail in this paper.

## 6.3 Youth Wildfire Education Programs: Ingredients for Fire-Adapted Human Communities

Martha Monroe, Professor, University of Florida
Pamela J. Jakes, Research Forester,
U.S. Forest Service, Northern Research Station
Victoria Sturtevant, Professor Emeritus,
Southern Oregon University
Heidi Ballard, Assistant Professor,
University of California—Davis

**Abstract**

The Quadrennial Fire Review has identified as a societal goal the achievement of fire-adapted human communities, defined as knowledgeable, engaged, and aware of fire as part of the surrounding landscape. Fire managers and fire plan coordinators, however, report that developing and implementing the public education and outreach necessary to achieve this goal is one of their greatest challenges. The combined literatures from science education, environmental education, service learning, disaster education, and community development offer some clues about what effective youth education should include to promote fire-adapted human communities:

1) Engaging parents in assignments or projects can increase the potential for information to travel beyond the classroom
2) Place-based service learning or community projects can make learning relevant and meaningful while significantly affecting the community

In addition, our recent study reviewed 68 youth education programs on wildfire across the nation and identified two critical concepts that affect what the programs convey:

1) The degree to which information about fire and ecosystems is localized and specific
2) The attitudes that are expressed by the implementing organization or agency about fire as a destructive force or natural process

We hypothesize that these pedagogical and conceptual components—locally relevant information, parental involvement, community-based action projects, agency or organizational support—are necessary for effective youth wildfire education programs that help support community understanding of and preparedness for wildfires. The successful implementation of these programs will likely depend on the willingness of educators and agencies to support the program, knowledgeable leadership, and the resources available for action projects. The crucial question is: What are the links between youth wildfire education programs and fire-adapted human communities? We propose to introduce these themes with examples of programs that include the above components, and engage session participants in a discussion of their examples and additional components that could be essential to successful youth education programs.

## 6.4 Regaining Community Trust after the Big Meadow Fire at Yosemite National Park: Fire Information, Community Relations, Social Media, and Transparency

Gary Wuchner, Fire Communication and Education Specialist, Yosemite National Park
Deb Schweizer, Fire Education Specialist, Sequoia and Kings Canyon National Parks
Rudy Evenson, Fire Communication and Education Specialist, Southeast Regional Office, National Park Service

**Abstract**

On August 26, 2009, Yosemite National Park started a prescribed fire at Big Meadow near Foresta. The fire crossed containment lines and suppression efforts were initiated immediately. After 2 weeks of road closures and evacuations, the Big Meadow Fire was declared 100-percent contained. No lives or structures were lost and no one was seriously injured. At 7,425 acres, it was the third-largest escaped prescribed fire in Park Service history.

Park Service information officers assigned to this incident will discuss three factors in the Big Meadow information effort: community relations, social media, and transparency. The paper combines a chronological narrative of the fire with analysis of successes and failures in each factor.

In the area of community relations, the Park was successful in establishing a community liaison with evacuated communities. Community meetings were generally successful in meeting residents' and neighbors' demands for information. However, communities that felt the heaviest economic impacts of the road closures remained hostile to the Park throughout the event, and the road closures themselves hampered outreach to these communities.

In the area of social media, the Park took advantage of its experimental Twitter account to draw traffic to the Inciweb fire home page. Visitors reported receiving electronic updates in a timely fashion. However, the incident also demonstrated that the speed of social media frequently exceeds that of management decisionmaking, showing that units need to establish social media strategies as part of their crisis communication plans.

Finally, a variety of audiences, including Congressional representatives, neighbors, and visitors, indicated their approval of the park's policy of complete transparency. Top management's commitment to transparency helped re-establish the trust of neighbors, visitors, and employees. By committing to transparency early in the incident, the Park was able to take advantage of a negative situation to educate various audiences about the importance of prescribed fire in reducing hazardous fuels and maintaining fire-dependent ecosystems, and ultimately strengthen the legitimacy of the Yosemite fire-management program.

The talk will conclude with an update from the Park on the generally positive long-term impacts of the fire information effort.

## 6.5 The U.S. Fire Learning Network: Springing a Rigidity Trap through Multi-scalar Collaborative Networks

William Butler, Florida State University
Bruce Goldstein, University of Colorado

### Abstract

Wildland fire management in the United States is caught in a rigidity trap. Despite wide recognition that public agencies should engage in ecological fire restoration and public policies that support restoration planning and management, fire suppression continues to dominate fire-management practice on the ground. The U.S. Fire Learning Network (FLN), a multi-scalar collaborative endeavor between federal land management agencies and The Nature Conservancy, offers the potential to spring the trap. By circulating people and planning products among landscape- and regional-scale collaboratives, the network develops and disseminates innovative approaches to ecological fire restoration planning and management. Through experimentation and innovation generated in the network, the FLN catalyzes change at multiple scales in the social-ecological systems associated with fire management. This network action has informed land- and resource-management plans and organizational procedures, as well as federal policy to support ecological fire restoration on the ground. We suggest that multi-scalar collaborative planning networks could enable resource-management agencies to overcome rigidity traps that prevent them from responding to complex cross-scalar problems and applying more ecologically informed practices.

# 7.0 KNOWLEDGE UTILIZATION AND EVALUATION

## 7.1 Wildland Fire Lessons Learned Center 2002 to Present

David Christenson, Acting Center Manager,
Wildland Fire Lessons Learned Center

**Abstract**

The national, interagency Wildland Fire Lessons Learned Center (LLC) is now in its eighth year. It has become for many a resource center that is a regular part of the way they do their work. Others are only beginning to become aware that the LLC exists at all!

The mission of the Center has always been to "actively promote a learning culture to enhance and sustain safe and effective work practices in the wildland fire community. The Center provides opportunities and resources to foster collaboration among all fire professionals, facilitates their networks, provides access to state-of-the-art learning tools, and links learning to training."

What have LLC staff members learned? What lessons and effective practices have they found especially helpful regarding the human dimensions of the wildland firefighting community? What challenges do they face in the years ahead and how do they intend to meet them? What impact have they had in the areas where they intended to make a difference and where are the gaps that they have identified for future emphasis? The LLC has declared that it plans to help the wildland fire community become a learning organization. Are staff members walking the talk themselves? Is it overly ambitious for them to seek to build a healthy safety culture? What does that term mean?

A great deal has been learned and of course in many ways lessons learned have only identified the need for more effective learning. This presentation will bring several ideas and a few answers to questions that will be tailored to this audience.

## 7.2 Research to Utilization: An Australian Experience

Noreen Krusel, Bushfire Cooperative Research Centre, Victoria, Australia

**Abstract**

Australia's national innovation system includes Cooperative Research Centres (CRC), which are organizations formed through collaborative partnerships between publicly funded researchers and end users. They have typically been funded for periods of 7 years. Many CRCs support product development for commercial gain, and research for "public good" is less common. The Bushfire CRC was established in response to demand from industry (fire and land management agency) and the community in the context of a series of significant bushfire losses and hence is for the public good. It brought together researchers and industry users with limited experience or culture in research and its adoption. Unfortunately, the CRC community provided little guidance about how to manage research for the "public good." The Bushfire CRC is now in the final months of its initial 7-year program and much has been learned about how to conduct and utilize research. Two key elements of the successful adoption of the Bushfire CRC research have been building and nurturing relationships between the researcher and user communities. The strategic alignment of the fire industry's national approach to knowledge management and the Bushfire CRC's research adoption program has also been critical. Deliberately including an "industry assessment" process has enabled end users to engage with the research in their own problem context and thus better define the most suitable products to aid adoption. Finally, incorporating the research into industry practice is planned through utilization of an industry Knowledge Web and by modification of training and learning materials. Recent public debate following the Black Saturday fires of February 2009 has highlighted that the level of fire literacy is alarmingly low beyond the core agencies. The Bushfire CRC will be working on a program of partnering with universities to integrate new research into existing courses and to create new courses where there is a demand.

## 7.3 Individual and Organizational Influences on Research Use in Fire Management

Vita Wright, Science Application Specialist/
Social Science Analyst, U.S. Forest Service,
Rocky Mountain Research Station/National Park
Service – Fire Management Program Center

### Abstract

Drawing on theories about human behavior, communication, and organizations, I surveyed federal fire/fuels managers and decisionmakers about their individual innovativeness, beliefs about research usefulness and ease of use, attitudes toward using research, relationship history with scientists, beliefs about scientists, organizational learning culture and processes, supervisor and agency support of science, and self-reported research use. Survey results indicated the fire-management community comprises subgroups with varying levels of receptivity to research. Respondents working as fire ecologists and/or long-term fire analysts, at higher grade levels and/or in centralized positions, in the National Park Service, and those with graduate degrees were more likely to be innovative, have positive beliefs and attitudes about research, and use research than respondents in other categories. Science communicators can use these results to shorten the time to diffusion by identifying early versus late adopters and tailoring science delivery strategies to different audiences.

Organizationally, respondents working at higher pay-grade levels had more positive perceptions of psychological safety, openness to new ideas, appreciation of differences, analysis, and information transfer than lower grade levels. Across grade levels, respondents slightly agreed that they felt psychologically safe to introduce new ideas; however, respondents were neutral about whether different ideas were appreciated or likely to be analyzed. Of nine organizational learning measures, respondents clearly disagreed with statements regarding time for reflection. Organizational leaders can use these results to identify strengths and weaknesses in their programs and to improve the organizational environment for innovation.

When asked about 16 potential barriers to using research, 70 percent of respondents agreed lack of time was a barrier. Barriers related to politics and public acceptance of science had the next highest agreement. Next, respondents agreed with organizational barriers such as lack of appreciation and rewards. Finally, respondents had the lowest mean agreement with research-related barriers; of all barriers, they disagreed most that lack of relevant research, knowledge of how to find research, and knowledge about who to contact were barriers.

This study is the first comprehensive attempt to use social science theory and methods to understand and improve fire science application.

## 7.4 Creating Firesafe Communities: Building Partnerships within the Wildland-Urban Interface

Ryan Gordon, Oregon State University
Bruce Shindler, Oregon State University
Eric Toman, Ohio State University
Sarah McCaffrey, U.S. Forest Service,
Northern Research Station

### Abstract

Forest health and wildfire conditions currently dominate management decisions on public lands across much of the United States. Recent wildfires, or the threat of wildfire, as well as new government initiatives, have significantly motivated management agencies and local citizens to work together for creating sustainable, fire-safe communities at the wildland-urban interface. While citizens, businesses, and government agencies may have different ideas and priorities, there is growing evidence they can find agreement through collaborative action.

This project includes a video program that explores important elements of successful collaborative partnerships. Designed with the agency audience in mind, the production showcases five locations around the country where local, state, and federal agencies are working together along with citizen groups and homeowners. Through targeted interviews with community leaders, property owners, and agency officials, the program examines how partnerships develop, the contributions necessary to make them successful, and how to maintain them over the long term. Using these interviews as a backdrop, the production identifies key strategies and demonstrates practical examples of their successful implementation on the ground.

Our intent is to create a training tool for agency use—a product that communicates important research concepts in a practical, hands-on context, especially for sites that have had limited public outreach thus far. In contrast to journal publications, this video may be useful across all levels of an organization. Video is an engaging format that can provide real-life examples of successful interaction among participants.

This presentation gives an overview of the production, including a synthesis of the key points discussed in the video program, as well as a brief explanation of our motivation and approach for the project.

# 8.0 FIREFIGHTER DECISIONMAKING AND RISK PERCEPTION

## 8.1 Risk Perception: The Firefighters' Last Line of Defense

David Clancy, Managing Director,
Human Safety Systems

**Abstract**

Firefighting is a potentially dangerous activity that requires the exercise of skilled individual and team judgment to be executed efficiently and safely. Personnel at all levels within the incident-management structure are required to identify and act on risks. Accurate risk perception provides the ability to anticipate future behavior in a wildfire situation and forms a key component of the risk-management process. When risks are identified, the expectation is that they are managed accordingly. There have been many documented cases where these expectations either are not managed or following investigations, gaps in risk perception are identified as contributing factors. Perception of elements in the environment is considered to be the first action in forming accurate situation awareness. That is not to say that the individual is a poor decisionmaker, but rather the information available at the time was incomplete or the individual was overloaded, leading to errors. Developing accurate risk perception will aid the firefighter and fire manager in gaining a stronger understanding of future fire behavior and assist the management of risk. The common denominator that is often present in incident investigations is the individual's failure to anticipate future fire behaviors or activity. Humans are prone to errors; hence the common saying "To err is human." Gaining an understanding of where these errors may occur and why, will aid in developing strategies and training regimes Adoption of these strategies and training programs will help fire departments and firefighters to become more "risk aware" and increase the effectiveness of the risk-decision process. The manner in which information is provided also plays a key role in determining the level of anticipation of risk. When briefings are incomplete or the seriousness of the situation is downplayed, personnel can be lulled into a false sense of security, which can contribute to a failure to identify the seriousness of the situation. This paper provides practical strategies for firefighters and fire managers to understand and therefore improve the perception of risk in the firefighting environment.

## 8.2 Responding to Wildfire Events: Risk-Based Decisionmaking Among a Group of Experienced Fire Managers

Robyn S. Wilson, Assistant Professor,
Ohio State University
Patricia L. Winter, Research Social Scientist, U.S.
Forest Service, Pacific Southwest Research Station
Lynn A. Maguire, Professor, Duke University
Timothy Ascher, Graduate Research Assistant,
Ohio State University

**Abstract**

Understanding the behavioral decision patterns that underlie fire management is essential to improving decisionmaking. While many factors can influence decisionmaking in the wildland fire environment (e.g., safety concerns), what is less certain is how various heuristics and biases influence how a fire manager responds to a wildfire event (Williamson 2007). Maguire and Albright (2005) have suggested that fire managers may use mental shortcuts for decisions involving risk, resulting in outcomes contrary to the managing agency's objectives. These shortcuts cause systematic biases, including excessive aversion to losses (Kahenman and Tversky 1979), a desire to maintain the status quo (Samuelson and Zeckhauser 1988), and inordinate attention to short-term risk (Camerer and Kunreuther 1989). To explore possible biases in fire-management decisionmaking, we conducted a Web-based experiment among line officers and incident personnel in a federal land management agency. Participants (n = 206) were randomly assigned to one of four instruments. Descriptive analyses indicate that the majority of managers (88 percent) avoid risk and behave cautiously when managing a wildfire event. Experimental analyses indicate that individuals 1) exhibited loss aversion, taking greater risks when primed to think about the potential losses (houses lost) resulting from a decision as opposed to the gains (houses saved), 2) discounted future risk when thinking about tradeoffs between short- and long-term risk reduction for multiple management objectives, and 3) exhibited a status quo bias, choosing suppression more often than fire use for new decisions when their status quo was to choose suppression in the past. Our findings indicate that fire managers are subject to biases in judgment that might result from how information is framed or presented. Although greater years of experience seemed linked to more comfort in risky decisionmaking contexts, findings also suggested a reliance on past experiences. This reliance may result in a less than ideal consideration of new approaches to management of fire and fire risk. These findings point to a need for decision support tools that fire managers can use to avoid an over-reliance on past personal experience and unconscious decision heuristics. They also highlight the need to frame information in a way that helps counteract the decision biases identified.

## 8.2 Responding to Wildfire Events: Risk-Based Decisionmaking Among a Group of Experienced Fire Managers (continued)

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## 8.3 Anticipating the Worst: The Challenges of Preparing for Worst-Case Scenarios in Wildfire Incident Management

Claire Johnson, La Trobe University,
Victoria, Australia

### Abstract

Examinations into major Australian wildfires have highlighted the failure to anticipate worst-case scenarios (WCSs) as a critical influence on effectiveness of incident control and organizational performance. A semi-structured interview study was conducted to explore this important topic, which has had little previous research attention. Thirty Australian fire agency personnel with extensive experience in wildfire management were interviewed about a past critical incident, selected for its challenging nature, which required the interviewee's expert skills. Findings suggested that interviewees considered anticipation of WCSs during an incident as vitally important for effective incident management. Interviewees reported that anticipation of WCSs helped to maintain an overall perspective of the fire. However, it was clear that keeping the "big picture" in mind was difficult in the dynamic and complex situations of wildfire fighting, even for these highly experienced incident managers. Particularly during periods of fire escalation, interviewees reported that it was easy to get tunnel vision, be unduly optimistic, or forget to develop back-up plans with associated trigger points in case the situation deteriorated. However, many of the experts interviewed were aware of these threats to effective decisionmaking and had several strategies to manage these challenges. These strategies included: having a timeout to see the incident with fresh eyes, ensuring a working environment where others are encouraged to critique plans, and establishing an independent planning group to focus on long-term fall-back plans. If anticipating the worst is difficult for experts in fire management, it is no surprise that community members might find planning ahead and developing back-up plans for extreme events a psychologically challenging task. This hypothesis seems to be supported by reports from community members interviewed as part of a large research project conducted by the Bushfire Cooperative Research Centre after the tragic Black Saturday fires on 7 February 2009, when 173 people were killed in a series of fires in southeast Australia. With further development, the strategies used by expert wildfire managers may provide the foundation for methods and tools to improve skills of anticipating WCSs in both firefighter and community populations.

## 8.4 Leadership Skills and Knowledge Transfer: A Mixed-Methods Study of Training Efficacy

Michael DeGrosky, Guidance Group, Inc.

### Abstract

The L-380 (Fireline Leadership) training exists as one of six courses in the National Wildfire Coordinating Group (NWCG) leadership curriculum. The Leadership Subcommittee of the NWCG Operations and Workforce Development Committee estimates that more than 10,000 wildland firefighters have attended the L-380 course since 2001, a commitment of substantial scale, expense, and strategic importance. Given the scope of participation, the costs to participating agencies, the ever-present vulnerability of agency training funds, and the importance of the L-380 training, the sponsor organizations have strong incentive to evaluate the training to maximize the return on their substantial investment in this training. In addition, when the NWCG established its Leadership Committee, now the Leadership Subcommittee, the group charged the committee with establishing a mechanism to evaluate the effectiveness of its leadership training, with the intent of accurately assessing how the training affects job performance. The author developed a comprehensive strategy for collecting and analyzing training-related data to support the NWCG leadership initiative, with the intent of verifying that the L-380 training is on track. The resulting strategy employed a mixed-methods approach with both quantitative and qualitative approaches to data collection and analysis. The author twice implemented the quantitative elements of the method, finding that the L-380 training is indeed proving effective. In this paper, the author describes his ongoing research into training evaluation, specifically his efforts that could ultimately validate the results of previous L-380 evaluations qualitatively by documenting stakeholder perspectives not captured by survey instruments and questionnaires. His research has the potential to expand efforts to evaluate how well L-380 addresses identified problems associated with the practice of leadership in wildland firefighters' work environment.

## 8.5 Just Culture: From Retributive Justice to Restorative Justice

James Saveland, U.S. Forest Service
Rocky Mountain Research Station

### Abstract

James Reason outlined four subcultures that make up an informed culture: a reporting culture, a flexible culture, a learning culture, and a just culture. Reason concluded that an informed culture results in a culture of safety. For Reason, a just culture is how people apportion blame when something goes wrong. Just culture is foundational as it will affect what gets reported and thus impacts individual and organizational learning. Some fire managers look to justculture.org for a process designed to draw a line between acceptable and unacceptable behavior. They make distinctions among human error, where the response is to console; at-risk behavior, where the response is to coach; and reckless behavior, where the response is to punish. While superficially and intuitively appealing, this approach has several problems, not the least of which is the ever-present problem of hindsight bias. Other fire managers are looking to Sidney Dekker's inquiry into the balance between learning and accountability. For Dekker, the critical question is not where the line is drawn, but who gets to draw the line between acceptable and unacceptable behavior. Dekker's challenge provides us with a goal but limited direction or guidance.

Lady Justice is usually depicted with three symbols: a sword representing a court's coercive power, scales to represent the weighing of competing claims, and a blindfold to signify impartiality. Historically, many organizations have considered any difference between work as designed by management and work as performed in the field to be "human error" and the simple answer has been to describe this deviance as "failure to follow policy/procedure" (e.g., Vaughan's "normalization of deviance" or Snook's less judgmental label, "practical drift"). Any departure from work as designed is a function of Hollnagel's "efficiency-thoroughness trade-off." This paper will synthesize the work of Reason, Dekker, Vaughn, Snook, Hollnagel, and justculture.org to show how wildland fire management can evolve from retributive justice (focus on punishment) to restorative justice (making victims whole). The development and maintenance of a restorative just culture is a cornerstone to improving safety and morale at all levels of the organization.

# 9.0 FIREFIGHTER DECISIONMAKING

## 9.1 Identifying Risk Factors for Injury in Wildland Fire

Carla Britton, University of Iowa

**Abstract**

Wildland fire is an important ecologic and economic force on federal lands within the United States. Fire management on federal lands requires diverse skills and involves personnel from within traditional land-management organizations, state and local agencies, and contractors. Fire suppression is generally acknowledged as an inherently risky occupation. Although fatalities are painstakingly investigated, little is known about the types, causes, and risk factors for injury among wildland firefighters.

Using readily available data sources, we examined rates of injury and associated risk factors over a 5-year period on large wildfires within federal jurisdiction. We also describe types and causes of injuries reported among a large group of federal employees involved in fire suppression during the same 5 years.

After adjusting for year of occurrence, region, and cause of fire, we found that both type of incident management team assigned at the fire's peak and peak reported fire-growth potential increased the odds that at least one injury would be reported. Sprains and strains were the most commonly reported injuries. Fractures and dislocations were the least commonly reported injury but were most likely to lead to temporary or permanent disability. The lower extremity was the most frequently reported injured body part. The largest proportion of injuries was caused by equipment, tools, and machinery.

To more adequately assess the impact of individual and fire-level risk factors for injury, the wildland fire community needs to be actively engaged in injury surveillance. This effort should encompass the entire wildland fire community and be supported at a national level. Improved injury surveillance among wildland firefighters can better quantify the true costs of non-fatal injuries, identify promising points of intervention, and provide important baseline information from which to gauge the effects of future prevention efforts.

## 9.2 Decisionmaking Processes, Decision Support Systems, and Standard Operating Guidelines

Patrick Withen, University of Virginia's
College at Wise

### Abstract

Because decisionmaking is perhaps the critical component when one is considering human factors on the fireline, it is explored in many wildland firefighting courses and firefighting aids, a.k.a. decision support systems (DSSs), such as the Incident Response Pocket Guide. The author proposes that the "building blocks," the very decisions and actions that constitute the firefighting effort, are not the DSS's themselves nor the decisions; rather, they are the standard procedures that make up the routine, and in some cases non-routine, action on the fireline—i.e., the standard operating procedures. To a large extent, while the DSS's and training about decisionmaking guide us toward making standard decisions and taking standardized actions, the truth of the matter is that we have few standard operating guidelines. The present analysis examines the DSSs and extracts those rules, guidelines, caveats, and examples and divides them into categories such as safety rules, operations guidelines, and rules of thumb. The final task of this analysis is to take these operations guidelines and begin to establish a set of standard operation guidelines (SOGs) that are safe, and yet are not safety rules. These SOGs would be used in tactical operations which complement the DSSs and clearly delineate where planning is to be done, where decisions are to be made, and where guidelines are to be followed.

## 9.3 Combining Social Science and Economics: The Effect of Newspaper Coverage and Political Pressure on Wildland Fire-Suppression Costs

Krista Gebert, Economist, U.S. Forest Service, Rocky Mountain Research Station
Geoffrey Donovan, Research Forester, U.S. Forest Service, Pacific Northwest Research Station
Jeffrey Prestemon, Research Forester, U.S. Forest Service, Southern Research Station

### Abstract

With wildfire-suppression costs in the United States increasing since the mid-1980s, land management agencies and policy-makers are struggling to find ways to contain costs. However, most policy discussions seem to focus on biophysical determinants of suppression costs: fuel loads and weather, for example. Although weather, topology, and vegetation undoubtedly influence fire activity and, hence, suppression costs, this view neglects the human dimensions of suppression decisions. It is managers who make all suppression decisions, and non-biophysical factors may play an important role in this decisionmaking process. In 2004 and 2005, two of the researchers involved in our current study were also involved in a study that conducted in-depth interviews with Incident Management Team members (command and general staff) regarding the factors that influence suppression expenditures. According to interviewees, two important non-biophysical influences on suppression expenditures are fire managers' concern about the personal consequences of adverse fire outcomes, which causes risk aversion, and the social-political pressure sometimes put on fire managers to use resources, strategies, or tactics that they might not ordinarily use. In this study we combine qualitative sociology and economics by attempting to quantify two nonbiophysical or human factors and then to quantitatively analyze their effect on suppression expenditures. We show these two variables—newspaper coverage and political pressure—have a significant effect on wildfire-suppression costs. In a follow-up to this study, we hope to delve further into this issue by using content analysis to see whether the tone of the article (favorable, neutral, or unfavorable) has a differential effect on expenditures, as well as to determine who is being influenced (Incident Management teams or Agency Administrators). By providing information concerning the effect of non-biophysical factors on suppression expenditures, policy-makers may be able to come up with more avenues for reducing costs than by solely focusing on changing or reacting to the physical environment.

## 9.4 Can you Define Acceptable Risk in Wildland Firefighting?

See full paper on page 1.

## 9.5 Change as a Factor in Advancing Fire Management Decisionmaking and Program Effectiveness

See full paper on page 14.

# 10.0 FIRE POLICY/MANAGEMENT

## 10.1 Examining Changes in Wildfire Policy and Governance in the United States Through Three Analytical Lenses

See full paper on page 24.

## 10.2 Opportunities for Wildfire Risk Mitigation and Forest Restoration Among Private Landowners: Combining Quantitative and Qualitative Analyses to Identify Policy Target Groups

A. Paige Fischer, Research Social Scientist, U.S. Forest Service, Pacific Northwest Research Station

**Abstract**

The success of any policy effort depends on an accurate understanding of the target group. Different policy tools may be appropriate for different groups of people depending on their values, motivations, and circumstances. In areas such as the fire-prone ponderosa pine forests of eastern Oregon, where fire risk, forest health, and productivity are all salient concerns, private landowners can be driven by a multitude of sometimes competing interests. Understanding the management intentions and constraints of different groupings of landowners can help decisionmakers tailor policies and programs to their unique contexts. A policy strategy that recognizes the unique motivations of different groupings of owners and pairs tools (e.g., incentives, education) appropriately may have greater chances of success at encouraging wildfire mitigation and restoration behavior.

This research follows a multi-method design to describe and explain how private forest owners perceive and address wildland fire risk. Findings from qualitative analysis of interviews and factor and cluster analysis of survey data identified four main management approaches used by private forest owners to address wildland fire risks, and four groupings of owners with different likelihoods for working to reduce fire risk in the future. These groupings comprise owners that use different practices, perceive different levels of risk associated with fire, hold properties of different sizes, and manage their properties from different proximities (i.e., on-site residences, absentee ownership). These groupings of owners may constitute unique target groups for policies and programs. One group of owners may be a particular opportunity for policy; these owners have experience and skills with fuels reduction yet are uncertain about continuing work in the future.

## 10.3 Highly Underestimated Risks of Wildland Fire in Rural–Urban Interface Areas in The Netherlands and Recent Agenda-setting in the National Risk Assessment

Alette Getz-Smeenk, VNOG Regional Organization for Public Safety, Apeldoorn, Netherlands

**Abstract**

The general public, researchers, and policy- and decisionmakers in public and private organizations still underestimate the risk of wildland fires in the Netherlands despite (recent) incidents. Research has shown, however, that it is quite probable that uncontrollable wildland fires will occur in any given year: a 4-percent annual likelihood on average, and up to 50 percent in years with drought in the country's largest forest and nature area, the Veluwe area. These probability rates are much higher than those considered to be socially acceptable for other environmental risks, such as floods or the transport, storage, and use of hazardous substances. Additionally, the latest National Risk Assessment shows a rapidly expanding wildland fire incident scenario having a considerable disruptive impact that transcends the regional capacity of disaster management in various ways. National involvement is required to reduce risks to a socially acceptable level.

Recently an initiative was launched to start developing a national program of intergovernmental cooperation in wildland fire risk management. The aim is to develop a strategy of public-private cooperation that eliminates wildland fire risk and improves performance of the multi-disciplinary crisis organization in situations of large wildland fires. Additional measures are needed, including research on:

- Issues of access, escape routes, traffic measures, and evacuation strategies in natural areas visited by large numbers of tourists, especially during dry seasons
- Situational factors that increase the capacity of self-reliance in crisis situations of large wildland fires, such as do's and don'ts and visibility of escape routes
- Effective strategies of risk and crisis communication that allow civilians and public and private organizations to be prepared for crisis situations.

The Netherlands urgently needs to learn from experiences and research abroad in order to develop effective evacuation strategies, or alternatives, in cases of wildland fire incidents in the rural-urban interface.

## 10.4 Wildfire in the UK: Status and Key Issues

See full paper on page 44.

# 11.0 FIRE MANAGEMENT

## 11.1 Exploring the Meanings and Significance of Living with Wildfire in the Rural West: The "Lived Experience" of Everyday Interactions Between Firefighters and Wildland-Urban Interface Community Members

Tanner Hartman, Department of Conservation Social Sciences, College of Natural Resources, University of Idaho
Chuck Harris, Department of Conservation Social Sciences, College of Natural Resources, University of Idaho

**Abstract**

Agencies such as the U.S. Forest Service and Bureau of Land Management manage wildfire according to agency policies and local fire management plans, and they communicate with rural western communities living with wildfire through a variety of formal channels and media. However, frontline agency employees such as seasonal firefighters working and living in these communities also represent these agencies, communicating on-the-ground with residents about fire-management activities, direction, and assumed responsibilities. Moreover, as risks from managing wildfires in the wildland-urban interface (WUI) continue to grow—especially given increasing pressures to provide structural fireprotection—so do risks and presumed job responsibilities for these frontline employees. In this context, dialogue between firefighters and community members, which represents direct interactions of agency personnel with local stakeholders, can be significant for a number of reasons. For example, these employees can quickly communicate fire-related information (e.g., current wildfire activity, planned prescribed burns, and fire restrictions), as well as information about other local agency management activities, such as forest health or recreation planning. We have initiated exploratory research into the "lived experiences" of locally-based firefighters as community members: What is the nature of direct interactions between on-the-ground agency fire personnel and residents, and what are the implications for fire-management planning, communication and education, and community well-being? In what ways do these frontline employees represent their agency, its mission, and fire-management activities through daily communications, and how? What is the perceived (and expected) role of these employees in accepting new-found risks in the WUI, such as medical emergencies, structure fires, and other hazardous situations in communities? To what extent can these on-the-ground working relationships and communications of firefighters with residents be harnessed to positively influence fire management and the social well-being and quality of life of fire-affected communities, and how? Our research has begun to explore the impacts of these relationships for local fire employees, seasonal firefighters, and residents, as well as their significance and ramifications for future fire management, stakeholder involvement, and agency impacts in rural communities in the western United States.

## 11.2 Choice Matters: Bureaucratic Discretion in Hazardous Fuels Reduction on National Forests

Ellen Donoghue, U.S. Forest Service,
Northwest Research Station

### Abstract

Discretionary choice is an intrinsic aspect of public agencies' delivery of service. Many public servants work in an environment that is too complicated to be reduced to programmatic prescriptions for fulfilling agency missions. Discretion becomes critical to taking action and administering public programs. Discretionary choice implies that public servants use judgment in weighing a complex set of pressures, rules, cultural norms, and opportunities when selecting courses of action or inaction. Hazardous fuels reduction provides a good case for exploring bureaucratic discretion in a natural resource management context because fire is perhaps the biggest land management problem that U.S. Forest Service managers have faced in recent years.

Since the early 2000s, the Forest Service has sought to reduce fire hazard and restore fire-adapted ecosystems on public lands. Managers make choices about what treatments will be conducted (e.g., burning and mechanical/manual) and what work agent will be used to implement the treatments (e.g., stewardship contracts, timber sales, Forest Service workforce, service contracts). Forest managers weigh a number of contextual factors when making choices, such as budgets, targets, staffing, forest size, ecological conditions, wildland-urban interface, history and familiarity with work agents, and local business capacity. With consideration of the social, economic, and ecological implications for local communities, this research project tries to better understand the factors that influence choices about hazardous fuels reduction on national forests. The research uses corporate data on 91 national forests and survey results from forest managers on 30 national forests.

## 11.3 Securing the Human Perimeter: Beyond Operational Approaches to Managing Community Fire Safety. Two Examples from Victoria, Australia

See full paper on page 36.

## 11.4 Using Stewardship Contracting to Reduce Hazardous Fuels: Choices in the Field

Cassandra Moseley, Senior Research Associate, University of Oregon
Ellen Donoghue, Social Research Scientist, U.S. Forest Service, Pacific Northwest Research Station
Susan Charnley, Social Research Scientist, U.S. Forest Service, Pacific Northwest Research Station

### Abstract

Stewardship contracting allows national forests to combine timber sale and service contracting provisions in a single contract. Stewardship contracting was designed to foster comprehensive forest restoration and create local community benefit. It promises to address some of the challenges of hazardous-fuels reduction by allowing end-results contracting, the removal of both commercial and noncommercial trees, and the mixture of appropriated funds and timber sale revenue. In some cases, stewardship contracting could lower net treatment costs. Some national forests use stewardship contracting extensively, making it a core part of their hazardous-fuels reduction strategy. Other national forests have shied away from stewardship contracting and use other mechanisms (timber sales, service contracts, and in-house staff) to conduct hazardous-fuels reduction. This paper seeks to understand the circumstances under which national forests chose to use stewardship contracting to implement hazardous-fuels reduction. Our model suggests that when local land managers are deciding whether to use stewardship contracting, they are influenced by competing and supporting pressures from "above" (i.e., direction, budgets, targets), local business capacity (i.e., contracting and utilization capacity), local political support (i.e., positions of elected officials, interest groups, and collaborative partners), local biophysical conditions,and local internal agency dynamics (i.e., culture and leadership). This paper will illuminate how these factors are playing out in the West, using data from in-depth case studies on four national forests and survey results from 30 national forests.

# 12.0 MITIGATION AND FIRE MANAGEMENT

## 12. 1 The Sociology of Landowner Interest in Restoring Fire-Adapted, Biodiverse Habitats in the Wildland-Urban Interface of Oregon's Willamette Valley Ecoregion

See full paper on page 58.

## 12.2 A Unique Wildfire Risk Reduction Program in an Aboriginal Community: Peavine FireSmart Projects

Amy Christianson, Ph.D. candidate,
Department of Earth and Atmospheric Sciences,
University of Alberta
Tara K. McGee, Associate Professor,
Department of Earth and Atmospheric Sciences,
University of Alberta
Lorne L'Hirondelle, Forestry Coordinator,
Peavine Métis Settlement

### Abstract

Peavine Métis Settlement is an Aboriginal community of approximately 1,000 located in northwestern Alberta in the boreal forest. Wildfires are a common occurrence in this region, and the risk is increasing due to population growth, increased fuels resulting from fire suppression, climate change, and mountain pine beetle-killed trees. There has been an increasing call in Canada at both the federal and provincial levels for research to be conducted in Aboriginal communities that are at high risk to wildfire as little is known about how these communities currently perceive wildfire. It is also unknown if unique approaches to wildfire risk reduction are needed for Aboriginal communities.

This presentation includes initial findings from Ph.D. research that aims to examine wildfire risk reduction in the community. Qualitative research methods (interviews, focus groups, and participant observation) were used for this research. The development and implementation of Peavine's wildfire risk reduction program, Peavine FireSmart Projects, have been influenced by social and cultural factors in the community, such as the high regard for community Elders, the need to provide employment for community members, and traditional burning practices. The high number of wildland firefighters in the community has also affected the development and acceptance of the program. However, economic constraints in the community are currently threatening the continuation of this program, which has been funded almost solely by the settlement.

## 12.3 Natural Resource Students' Understanding of the Social Construction of Trust and Its Implications for the Practice of Fire Management

Margarida Washburn, University of Missouri
Bruce Cutter, University of Missouri

**Abstract**

The U.S. Forest Service's 2000 National Fire Plan introduced a new strategic research and practical focus: the social science of fire management. The implication of this focus is a recognition that the social relationships among the public and fire-management professionals affect their efforts to collaborate in developing and deploying fire-management plans. This recognition is not unique to fire management as other fields such as organizational studies, education, sociology, and psychology have also noted that the social relationships that people form affect how well they work together and the quality of their work—especially under stressful, risky conditions. Trust has been identified as a key factor in mediating such social relationships and the outcomes of collaborative work. Research on trust in the context of wildland fire management supports the notion that the public's trust in fire management professionals and their institutions affects whether it will support fire management plans. This emphasis on the social science of fire management has implications for the education of natural resource professionals. Specifically, when natural resource students graduate, they need to be knowledgeable about both the technical and social dimensions of fire management. They need to be aware of the social issues surrounding fire management, especially the issue of trust among all stakeholders involved in making decisions about fire management. Toward this end, we present the findings from an initial study that explores students' understanding of trust and how it may influence collaboration and the practice of fire management. The context of our study includes computer-mediated communication, and therefore we also explore how electronic communication technologies may mediate trust among these students and, potentially, their constituents.

## 12.4 Public Views and Attitudes Concerning Managed Fire and Fuels Reduction Strategies in the Valles Caldera National Preserve, New Mexico

Carol Raish, Research Social Scientist, U.S. Forest Service, Rocky Mountain Research Station
Kurt Anschuetz, Consulting Anthropologist/ Archaeologist

**Abstract**

As land management agencies move away from an emphasis on fire suppression toward greater use of fire for resource benefits, the complex issue of the public's attitudes toward managed fire and wildland fire use comes to the fore. Although many residents of adjacent communities are increasingly knowledgeable concerning the role and importance of fire in forested ecosystems, managers still interact with people who find that changing fire-management policies contradict powerful images and values learned as children. Consequently, the process of understanding the public's perceptions of and experiences with wildland fire continues.

In this paper, we explore the views, preferences, and suggestions concerning fire and fuels management among user groups and adjacent communities on the Valles Caldera National Preserve (VCNP), New Mexico. We conducted in-depth, expert interviews with 19 knowledgable individuals who use the Preserve for grazing their cattle or for recreational activities, such as hiking, fishing, hunting, and providing tours. Environmental educators and a climate scientist studying fire effects in the region were also among the interviewees. Among the topics of discussion were perceptions of (1) wildfire, (2) wildfire management and use, (3) prescribed fire, and (4) fuels management. Because Los Alamos, which was seriously impacted by the Cerro Grande Fire of 2000 (an escaped prescribed burn), is one of the communities close to the VCNP, we were especially interested in learning our informants' beliefs concerning wildfire suppression and prescribed fire use.

The study's participants showed considerable interest and sophistication in their discussions of the role of managed fire in maintaining forest health and reducing high fuel loads following many decades of fire suppression. They talked about problems with aggressive suppression, the role of both mechanical thinning and prescribed burning in the wildland-urban interface and the back country, the importance of community fire education, and responsible media coverage. Many expressed concerns over the possibility of escaped prescribed fires but argued for the importance of returning fire to the ecosystem. We discuss these views in light of changing fire policies in land management agencies, offering suggestions for public outreach and involvement concerning managed fire programs.

# 13.0 PRESCRIBED FIRE

## 13.1 Facilitating Prescribed Fire Through Communication with Air Quality Regulators: Sequoia and Kings Canyon National Parks

Deb Schweizer, Sequoia and Kings Canyon National Parks

**Abstract**

Summary: Air quality regulation represents a significant challenge to many fire management programs nationwide, especially in achieving prescribed fire treatment goals. The lessons learned at Sequoia and Kings Canyon National Parks can help fire managers break down barriers to operational success by improving relationships with air quality regulators.

Background: Sequoia and Kings Canyon National Parks, located in the southern Sierra Nevada Mountains, have a robust prescribed fire and managed fire program. They are neighbor to the San Joaquin Valley Unified Air Pollution Control District ("the district"), one of the most compromised air basins in the nation. The district is responsible for Clean Air Act compliance.

In 2004, strained relationships between the district and the parks culminated in a Notice of Violation and fine issued by the district for a prescribed fire. The district expressed additional concern over recent revisions of the federal fire-management policy. Over the past 5 years, however, a concerted effort by the parks and the district has vastly improved this relationship and promoted understanding of each program's requirements and needs. This improved relationship has helped the parks accomplish their fuels-related projects.

Communication Strategies: The relationship is the investment of the fuels specialist, the fire management officer, and the fire education specialist for the parks and the compliance officer and meteorologists for the district. Strategies include:

- Identifying key representatives from the parks to communicate daily with the district when projects are underway or being planned
- Holding pre-season smoke management meetings to draft protocols for communication and operations for the upcoming year
- Expanding and sharing monitoring data

Presentations by the parks for the district, EPA, and California Air Resources Board have opened dialogue and are helping each agency understand the other's missions and directives.

Lessons Learned: Regular dialogue is integral to the success of the parks' fire management program and to the district's compliance with the Clean Air Act. As a result of this dialogue, both agencies are cooperating to help each other achieve their goals. The district is now actively identifying more prescription windows, while the parks are helping the district achieve compliance through strategic timing of projects.

## 13.2 Socio-Economics of Ranching and Ecological Prescribed Fire on Refugio-Goliad Prairie, Texas

Ray Guse, Prescribed Fire Specialist,
The Nature Conservancy

### Abstract

The Nature Conservancy (TNC) conducted its first prescribed fire in 1962, and in 1978 TNC began practicing fire management in Texas. From June 2008 to July 2009 TNC implemented ecological prescribed fire on 25,000 acres in Texas, and assisted federal and state agency partners with an additional 16,000 acres. Texas TNC fire crews also assist wildfire suppression throughout the state.

The Refugio-Goliad Prairie Conservation Area (660,000 acres) is a private-lands project that has created numerous partnerships among cooperating ranches, nongovernmental organizations, and state and federal agencies to further the goal of maintaining and restoring the largest remaining block of native prairie on the Texas Gulf Coast. Participation by ranchers is largely driven by socio-economics, whereas other partners have ecological goals. All too often economics and ecology conflict and are perceived as mutually exclusive. On this landscape, however, livestock production and fee hunting for wildlife game species, coupled with the restoration and maintenance of native prairie and repatriation of an endangered species through the application of prescribed fire, have proven to be mutually advantageous. Attwater's prairie chicken, one of the most endangered species in North America, was extirpated from this landscape in the late 1990s. Through Safe Harbor Agreements, it is noteworthy that ranchers have allowed this species to be reintroduced on their lands.

Restored prairie must be maintained with prescribed fire on a 3- to 4-year return interval. Within this landscape it is believed that 200,000 acres of native prairie are needed to support a viable population of the prairie chickens; currently there are 119,500 acres. Through remote sensing TNC quantified change in the spatial extent of prairie between 2004 and 2008, and this work also documented private ranchers' having burned 23,000 acres in 2008. TNC burned an additional 10,000 acres. To reach the 200,000-acre goal, we must achieve further reinvigoration of the vanishing fire culture among ranchers. TNC is working to train and empower ranchers such that once again managing land with fire is a normal activity little different from fixing fences, calving, branding, and the other annual chores that are taken for granted.

## 13.3 Learning and Training on the Use of Prescribed Burning Techniques in Southern Europe

Maria Colaco, Institute of Agronomy,
Lisbon, Portugal

**Abstract**

The traditional use of fire by many rural communities in Europe was, and continues to be, a very important tool in shaping the landscape. While in general, the northern and central European countries currently are neglecting traditional fire uses, fire continues to be used in the Mediterranean countries.

Although in some cases the traditional use of fire can be a cause of destructive wildfires, prescribed burning performed by experienced practitioners has been known for a long time to be beneficial to the reduction of forest wildfire hazard.

In recent decades the use of prescribed fire for the reduction of wildfire hazard in Portugal, Spain, and France has increased, and valuable efforts have focused on operational training for prescribed burning.

The first attempts to promote training in prescribed burning for fire prevention in European forests date from the 1980s in Portugal. In Spain, the first prescribed burning training course was conducted in 1995. In France, fire professionals created a Prescribed Burning Network and the first "Charter of prescribed burning" in the early 1990s. Many of these early efforts followed similar programs in the United States, Canada, and Australia, where the use and training of prescribed fire was more widely spread and developed than in Europe.

In all cases, many of the technicians who applied the technique of prescribed burning were forest and range managers, but they could also be firefighters, among other professions. We will use the term 'fire professional' for all of those trained in fire. In our point of view, fire professionals should have not only specific training on prescribed burning and practical experience in the field but also a good forest fire education through university courses.

Following this premise, we propose with this presentation to:

- Describe and assess the current context of prescribed burning training in Spain, Portugal, and France
- Describe and assess the current context of forest education at the university level in Spain and Portugal and compare it to forest education in the United States
- Propose new ways forward

## 13.4 What Do They Think of Burning In Texas?

Brian Hays, Extension Program Specialist,
Texas AgriLife Extension Service
Mark Moseley, Rangeland Management Specialist,
Natural Resources Conservation Service
Amy Hays, Extension Program Specialist,
Texas AgriLife Extension Service

**Abstract**

When it rains, we worry about flooding; when it is dry, we worry about fire. These concerns are justifiable because in the past 10 years, rangeland conditions have created greater potential for wildfire due to both natural and manmade causes. There have been many large wildfires with loss of life, property, livestock, and wildlife. Although very few of these were escaped prescribed burns, the perception of fire has played an important role in shaping management strategies for local communities as local county commissioners have the authority to invoke or lift burn bans. Various agencies, entities, and experts have written laws, guidelines, and recommendations on the use of prescribed fire, as well as on the implementation and removal of burn bans. With growing concerns of catastrophic wildfire, and severe drought conditions in part of the state, attitudes differ as to burn bans and prescribed fire. Courses of action lead to conflicting results—even in adjacent counties.

To understand local trends and needs, the Texas Grazing Lands Conservation Initiative has commissioned the Texas A&M Institute of Renewable Natural Resources to design and conduct a survey of county commissioners' courts. The survey is intended to capture attitudes and perceptions of burn-ban policy and prescribed fire management among county officials responsible for managing local community resources. The goal of the survey is to investigate how officials administer, use, and perceive fire-related policy in local communities. The outcome of the survey will help in identifying outreach and education opportunities, and policy shortfalls and benefits. Results also will help to understand how fire management at the local level is undertaken.

The survey was conducted in fall 2009; results were analyzed in January 2010. Results of the survey, as well as discussions and recommendations, will be presented.

# 14.0 SPECIAL SESSION: AN INTERDISCIPLINARY AND ORGANIZATIONAL PERFORMANCE APPROACH TO UNDERSTANDING THE INTERPLAY OF FIRE POLICY, INCIDENT STRATEGY, AND INCIDENT OUTCOMES

Anne Black, U.S. Forest Service,
Rocky Mountain Research Station
Krista Gebert, U.S. Forest Service,
Rocky Mountain Research Station
Toddi Steelman, North Carolina State University
Sarah McCaffrey, U.S. Forest Service,
Northern Research Station

The federal land management agencies of the United States are struggling to deal with a changing wildland fire environment. Increases in both area burned and suppression expenditures over the past two decades have led to greater scrutiny of federal fire management programs by the public, Congress, and government oversight agencies such as the Office of Management and Budget, the Government Accountability Office, and the Office of the Inspector General. In the past several years, reports and audits by these oversight agencies have recommended that the land management agencies look more closely at the way fires are being managed and find ways to increase the efficiency of fire-management efforts. These reports often recommend the use of less aggressive suppression strategies, where appropriate, as a way of containing the rising costs of suppression as well as enabling land managers to meet other land management objectives, such as reducing hazardous fuels and restoring ecosystems. However, the effect of fire management strategies and tactics on suppression costs is not well understood.

## 14.1 Are Less Aggressive Strategies Cheaper?

Krista Gebert

### Abstract

As part of a multi-disciplinary Joint Fire Science study, this study evaluated the effect of different fire-management strategies on the costs of suppression. Information was collected on the predominant management objective and strategy used on 1,330 U.S. Forest Service and Department of Interior fires from FYs 2006-2008. The effect of these objectives and strategies on suppression expenditures was assessed using regression and means analyses. Results indicate that management objectives and strategies do affect suppression costs, but the results vary both by agency and by the metric used to measure costs. For instance, although less aggressive strategies may result in a lower cost per acre or daily cost, increased acreages or longer duration associated with less aggressive strategies may lead to total fire costs at least as high as those of more aggressive strategies. These results suggest that evaluations of cost performance need to reflect the objectives of the management effort and take into consideration much more than the cost of an incident, using more of a "balanced score card" approach to assess performance in light of other management objectives.

## 14.2 What's Really Driving Suppression Response – Public or Agency Pressure?

Toddi Steelman

**Abstract**

Public pressures—both real and perceived—are an important factor shaping flexibility in fire management. Thus, a better understanding of external constraints on fire-management options is essential. Gaining understanding entails validating or refuting the existing perceptions of agency administrators and fire managers about the constraints that political and community pressure place on their ability to implement more flexible fire-management options. In summer 2008, our research team traveled to three fires—the Gap (California), Cascade (Montana), and Gunbarrel (Wyoming)—each of which used a different strategy for managing the fire. At each site, we interviewed key agency individuals and asked them about the internal and external factors that influenced how they managed their wildfires. Internal factors included Land and Resource Management Plans, Fire Management Plans, informal cultural practices, and existing practices. External factors included political and community pressures from citizens, who are often perceived to demand an aggressive suppression response. This paper details how the internal (Forest Service policy, planning, and attitudes) and external (community and political actions and expectations) factors influence flexibility in fire management. Conventional wisdom within the Forest Service suggests that external relationships are often key factors in driving up wildfire costs and circumscribing the ability to execute less aggressive fire-management strategies.

## 14.3 Costs from the Stakeholder's Perspective

Anne Black

**Abstract**

To address the rising cost of fire suppression activities, land management agencies, including the U.S. Forest Service, are exploring how selection of fire-management strategy might influence costs and conversely, how cost containment influences selection of strategy. The questions posed in this portion of the project were aimed at understanding how federal choice affects nonfederal partners, specifically, whether strategies and tactics aimed at less than full perimeter control reduce the costs or simply shift the cost burden to nonfederal entities.

During fall 2008 and winter 2009, our two-person interview team conducted 25 in-depth, unstructured interviews with 30 persons (agency administrators, incident commanders, state and local cooperators and county commissioners) whose jurisdictions were affected by one of five large wildland fires that burned in the western United States in 2008. We used a written interview guide to direct and focus conversations on topics pertinent to the flexible suppression responses and their interaction with wildland fire costs. Strategies and tactics used on each of the five focus fires run the gamut from greater emphasis on aggressive suppression to minimal aggressive suppression activity. Final fire size ranged from 3,280 to 67,147 acres. All were long-duration fires, ranging from 18 to 60 days in length.

Narrative analysis of these data provides information about why cost shifting is of concern and where the concern may have originated. Better understanding of why such perceptions exist among state and local cooperators and stakeholders can better equip the Forest Service, and other federal fire agencies, to address these concerns.

## 14.4 Key Decisions in Incident Management from the Incident Management Team's Perspective

Anne Black

### Abstract

For large fires, Incident Management Teams (IMT) are responsible for implementing the fire-management strategy determined by the land management unit's Agency administrator. They are often involved in assessing and recommending changes in strategy as well. IMTs are responsible for all aspects of incident management: from the directly operational issues (staffing, safety, tactics) to support functions (planning, logistics, finances) to managing social networks and interactions (public and media outreach, partner and stakeholder coordination), all the while supporting the unit's basic land-management mission. Understanding how this group frames its task is critical to understanding and potentially influencing the balance of, and trade-offs made among, the multiple competing objectives involved in any incident.

In 2009 we field-tested an incident documentation protocol—the Key Decision Log (KDL)—that sought to capture information about 'key' decisions—those incident management decisions, issues, or actions the incident decisionmakers (IMT and/or Unit staff) thought could significantly affect the trajectory and final outcomes of that incident. The concept was that at an incident level, KDLs capture the implementation story that links intentions (as articulated in guiding documentation) with outcomes. At an organizational level, KDLs capture the mental models in use, revealing the on-the-ground perception of what is a significant event, drivers for these perceptions, key markers of the decisionmakers' critical thought processes for determining most effective actions to take, and the impact of their decisions on incident objectives. KDLs also provide insight into the tone of the community dialogue and business processes.

This presentation will summarize findings of the 427 entries from 41 wildland fire incidents in 2009, our interpretation of these findings, and thoughts on what these data suggest about understanding current incident management and improving it in the future.

# 15.0 SPECIAL SESSION: BEYOND THE BASICS: EMERGING AND UN- OR UNDER-UTILIZED METHODOLOGIES AND WHAT THEY CAN REVEAL

## 15.1 Understanding Information Flows During Wildfires: Methodological Insights from Social Network Analysis

Branda Nowell and Toddi Steelman
North Carolina State University

### Abstract

A variety of theoretical and methodological perspectives can help inform fire management. In this presentation, we focus on framing information exchange during a wildfire as a problem of information asymmetry among those who supply information and those who demand it. Exchange mechanisms that link information suppliers with those who demand it are often unclear during wildfire events. Social networks provide a conceptual backbone to understand how such exchange could occur. Using data from a 2009 wildfire event, we demonstrate the theory, method, and practical applications of this approach. Our approach is important both practically and theoretically. Practically, information flows are imperative in understanding how to manage the fire, avoid injury or loss of life, protect personal property and community assets, restore vital services, and build relationships and trust. Theoretically, we can better understand the dynamics of information flows by documenting asymmetries, understanding their consequences, and providing insight into how asymmetries might be addressed for better wildfire management.

## 15.2 Theory of Human Performance: From Post-Traumatic Stress Disorder to Elite Athletes

James Saveland, U.S. Forest Service,
Rocky Mountain Research Station

**Abstract**

This paper investigates how theories and field methods from the field of human performance may have implications for firefighter training with respect to fitness, resiliency, and performance. At one end of the distribution of human performance lies the dysfunction of Post-Traumatic Stress Disorder (PTSD). I will examine literature on PTSD along with the psychological interventions—cognitive behavioral therapies and sensori-motor psychology. Elite athletics, at the other tail of the distribution of human performance, will be examined next. I will summarize the interventions of psychological skills training and the field of applied sports psychology. Current programs in the U.S. Army (comprehensive fitness) and Marines (mind fitness) will be reviewed. All of these facets will then be synthesized into a coherent theory that can inform the practice of wildland fire management.

## 15.3 Materiality and Communication in High-Reliability Organizations

Jody Jahn, University of California, Santa Barbara

**Abstract**

High-reliability organizations (HROs) operate in uncertain circumstances with thin margins of error, while consistently avoiding failure. A central tenet of Karl Weick's work is that small events do not stay small, but are amplified through processes and sequences of action within a system. To operate reliably, interdependent HRO members must navigate a complex social environment to communicate critical information with each other. Weick contends that reliability is accomplished through consistent awareness of potentially unstable situations and anomalies in the environment. He argues for the importance of communication in facilitating reliable operations, and acknowledges that such communication is difficult. Yet, his theorizing focuses on cognitions and action directed at the task-driven operating environment while failing to unpack complexities of the social environment. Communication is the crux of both theory and practice because it is through communication that crucial information is conveyed. Because HRO members coordinate in a social as well as an operational environment, there are costs, such as loss of crewmember trust, associated with being overly sensitive to—or overly cavalier about—hazards.

I argue that cues from the social environment importantly mediate whether and how people interpret the potential and severity of emerging errors. Weick's theorizing can be fruitfully extended by examining how the material bodies of HRO members offer important cues that shape members' interpretations within the social environment. Thus, situational awareness must involve attunement to both operational and social environments. Members must feel at least somewhat confident that the issue they are bringing up actually warrants others' attention. This is not simply an issue of the mind making a rational choice, but rather an embodied experience that is grounded in "brute facts" of one's material body and is confirmed and disconfirmed by cues from the material bodies of others within an unforgiving social context. This paper identifies ways the material body cues interpretations of emerging situations, shapes situational awareness, and ultimately enables and constrains the passage of crucial information.

## 15.4 Safety in Wildland Fire: Leadership, Employee Voice, and the Application of Mindfulness for Future Research

Alexis Lewis, Oregon State University

### Abstract

Firefighters and fire managers each have unique experiences fighting fires that are shaped by the individual's personality, personal background, training opportunities, affiliations with coworkers, and a host of other influences that help determine the capabilities a firefighter, or fire manager, will have to make good decisions, be an effective leader and communicator, and enhance safety on the fire line. Phenomenology allows the researcher to understand particular lived experiences of fire-line personnel, which can reveal many contextual factors that may not be apparent to the researcher otherwise; these factors are revealed through in-depth interviews. Hence, it allows for fuller descriptions of a phenomenon, and as researchers, we may be better able to understand important qualities and concepts in relation to the context in which they occur (e.g., effective leadership qualities in the lived experiences of high-stress fire situations).

This presentation will use results of a phenomenological study of firefighters who had gone through intense, life-threatening wildland firefighting situations (burnovers, entrapments, close calls, near misses) to understand what qualities make an effective, safe leader in fire. Thirty-six participants discussed aspects of safe leadership in semi-structured interviews ranging from 15 to 90 minutes, at which point theoretical saturation was reached. Through a qualitative grounded-theory approach, 24 leadership characteristics emerged, with nine essential characteristics reported frequently.

# 16.0 SPECIAL SESSION: ORGANIZATIONAL CHANGE, CONTINUOUS LEARNING, AND MANAGING ADAPTIVELY

## 16.1 Managing Adaptively to Improve Policy: Challenges and Opportunities for Integrating Science, Policy, and Decisionmaking

Toddi Steelman, North Carolina State University

**Abstract**

Policy-oriented research often is criticized for being untimely, poorly communicated, and irrelevant to the actual concerns of decision makers. Clearly science and research have important roles to play in informing policy. The challenge lies in creating a process that more constructively serves decision makers, while not forsaking the strengths of the research enterprise. This presentation explores the obstacles to and opportunities for generating, transmitting, and using science and other types of knowledge through adaptive decisionmaking structures to create more adaptive policy.

## 16.2 Continuous Improvement in Decisionmaking in Fire Management

Marc Rounsaville, U.S. Forest Service,
Fire & Aviation Management

### Abstract

The fire environment is a dynamic, continually changing system influenced by climate change, weather, fuels, vegetation, and humans. The intersection of these factors drives wildland fire impacts, responses, and reactions. Recent years have seen an emerging phenomenon referred to in a variety of ways, including "Mega Fire," "0.25% Fires," and "Fires of National Significance." Forest Service leadership at all levels, along with partners, stakeholders, and cooperators, has taken up the challenge of improving both decisions about and management of these colossal fires. This process should be viewed as a journey and not a destination. As with any journey, there are a number of steps. The first step in the process was to deconstruct and study fires to discover opportunities to change outcomes. It was recognized that decisions were driving outcomes, and with improved decisions leaders could expect better outcomes in safety, fire's impact on the land, and cost. Science-based decision support tools have been improved and will be deployed to assist leaders in making better and more informed decisions. These tools do not replace leadership or excellent judgment.

## 16.3 Research Results, Challenges, and Opportunities from the 2008 and 2009 Fire Seasons

Anne Black, U.S. Forest Service,
Rocky Mountain Research Station
Toddi Steelman, North Carolina State University

### Abstract

Black will review the process of developing, populating, and disseminating the Key Decision Log as a decision support tool for fire managers. Steelman will present findings from studies on community-agency interaction and social networking. Special attention is given to the challenges of researchers working with managers in a timely and relevant fashion.

# 17.0 POSTER PRESENTATIONS

## 17.1 PAWS-MED: Pedagogic Work in the Forest

Maria Colaco, Institute of Agronomy, Lisbon, Portugal

**Abstract**

The need for a sound understanding of the multiple dimensions of forests and forestry is increasing in the context of increased urbanization, climate and environmental change, and globalization. Forest pedagogy or "Waldpädagogik" is a priority area for developing a shared understanding of forests and their role in helping to solve the enormous challenges we face.

Most foresters in the Mediterranean countries, however, have either a limited education in pedogogy or none at all. Therefore, the product developed by the former Leonardo daVinci project PAWS will be adapted to the needs of the Mediterranean countries. Among several themes missing from the former PAWS project is the subject of fire education.

Partners from Italy, Slovenia, Spain, Portugal, Greece, Cyprus, Austria, and Germany will work on the project. Ultimately, the PAWS material will be available in 10 languages and be used in 11 countries of the European Union.

The three basic aims of the PAWS course are:

- To increase foresters' competence in the area of holistic pedagogy, psychology, and communication skills
- To enable foresters to improve the quality of their teaching
- To teach foresters how to plan and prepare pedagogically appropriate and efficient tours or seminars for individual target groups

## 17.2 Fire Communication and Education in the National Park Service

Rudy Evenson, National Park Service

### Abstract

The National Park Service builds support for fire and aviation management through an outreach program managed by approximately 12 specialists nationwide based at the park, region, and national levels. These specialists leverage their efforts by: developing interpretive programs with staff at individual parks; working with local media outlets; cooperating in the interagency prevention and education arena; and developing Web-based social media projects. As active fire practitioners, they have also brought innovations to the fire information function of the Incident Command System.

This poster summarizes best outreach practices developed by a land management agency widely recognized and trusted by the public as a leader in environmental education.

## 17.3 Changing Roles to Change the Nature of Future Natural Resource Professionals: Providing Tools to Students to Teach the Public about Fire

Brian P. Oswald, Stephen F. Austin State University
Pat Stephens Williams,
Stephen F. Austin State University
David Kulhavy, Stephen F. Austin State University
Karen Stafford, Texas Forest Service
Justice Jones, Texas Forest Service

### Abstract

A rapidly changing landscape of urban sprawl, expanding communities, and a resurgence of living "off the grid" have contributed to an increased potential for the loss of life and property to wildfires. The Arthur Temple College of Forestry and Agriculture at Stephen F. Austin State University is taking a proactive stance in preparing students to work closely with the public by using the program, "Changing Roles." The program was introduced in the 2009 Forestry Field Station experience with the Texas Forest Service at the Piney Woods Conservation Center on Powell Point, TX. This program was part of the Firewise program to reduce fuel loads at the wildland-urban interface (WUI). Forestry students were exposed to the program and interacted with practicing resource professionals and community members to learn how to partner and work with the public. The WUI Professional Development Program was created by the Southern Group of State Foresters; the U.S. Forest Service; Interface South; the University of Florida, School of Forest Resources and Conservation; and the U.S. Fish and Wildlife Service. Integrating this program into the classroom and the field station experience gives students the opportunity to develop skills preparing them for public involvement prior to professional employment. Forestry students responded well to the program.

## 17.4 Protecting San Augustine County Communities from the Impacts of Wildfire in East Texas

Brian P. Oswald, Stephen F. Austin State University

**Abstract**

The unprecedented growth and development occurring in east Texas are changing the historic role of fire in forested ecosystems, and are also creating a more volatile mix of fuels, threatening homes and lives. In addition, Hurricanes Rita and Ike added more heavy fuels to this already hazardous condition. During June 2006, concerned San Augustine County, TX, stakeholders, including individuals, county officials, the Texas Forest Service, the U.S. Forest Service, the U.S. Army Corps of Engineers, and local fire departments, met to discuss wildfire and wildland-urban interface (WUI) hazards in San Augustine County. The result of this meeting was the development of a county-wide Community Wildfire Protection Plan; San Augustine was only the fourth county in Texas to complete such a plan. This living document will be updated and maintained to reflect current and future WUI conditions in the county. The inclusion of all concerned individuals assured more active participation from all entities, resulted in more efficient buy-in by the same groups, and suggests that the momentum initiated by this program will continue.

## 17.5 Restoring the Role of Fire in the Longleaf Pine Ecosystem of Upland Island Wilderness, Texas

Brian P. Oswald, Stephen F. Austin State University

**Abstract**

Upland Island Wilderness in Texas, encompassing approximately 13,250 acres, was established in 1984 and historically consisted of open and diverse longleaf pine ecosystems, which depend on frequent, low-intensity surface fires. Like many other small wilderness areas, the vegetation and fuel conditions have undergone extensive changes since wilderness designation. Lightning-caused wildfires no longer burn with the frequency or intensity that characterized the natural fire regime, resulting in the increase of shade-tolerant trees and shrubs, heavy accumulations of duff and pine litter, and loss of suitable habitat for several rare species, including the red-cockaded woodpecker. In addition, the unnatural fuel accumulations have created a serious fire hazard that threatens the safety of firefighters, private citizens, adjacent properties, and the wilderness resource. In response, the National Forests and Grassland in Texas is developing a fire management plan for the wilderness in order to restore the ecological role of fire. The short-term goal is to utilize prescribed burning to reduce hazardous fuels that pose an unacceptable risk to lives and property and to restore the historic fuel and vegetation conditions. Long-term planning will consider the use of prescribed fire in conjunction with the management of lightning-caused wildfires in order to mimic the processes, patterns, and ecological effects of the natural fire regime. The inclusion of all stakeholders (including environmental organizations and private citizens) throughout the process has created a plan that addresses up-front the concerns of these entities prior to the official comment stage of the process, and should serve as a model on how to avoid lengthy legal battles since all involved agree on the general objective of the project in question.

## 17.6 Wildland Firefighters and Attention Deficit Hyperactivity Disorder (ADHD)

See full paper on page 9.

## 17.7 The East Amarillo (Texas) Complex Survivors: Telling their Stories

Sandra Rideout-Hanzak, Assistant Professor
of Fire Ecology, Texas Tech University
Tina A. Oswald, Research Librarian,
Stephen F. Austin State University

### Abstract

In March 2006, the East Amarillo (Texas) Complex burned over 900,000 acres in 4 days. More than 95 percent of the acreage burned was privately owned and much of it was ranchland. The fires were fought primarily by volunteer fire departments with limited air support from the Texas Forest Service. Twelve people were killed. More than 25 homes were destroyed. More than 4,000 head of livestock died. Thousands of miles of fencing had to be replaced. We interviewed survivors to compile a collection of their stories in their own words. This poster will discuss the methods for interviewing and collecting their oral histories, transcribing the interviews, and archiving them in the Southwest Collections Library at Texas Tech University.

## 17.8 Prescribed Burning Associations Empower and Equip Land Managers to Manage Rangelands

Charles Taylor, Texas A&M University

**Abstract**

Prescribed fire in the Edwards Plateau region of Texas faces an uncertain future. The rapid rise in population and increased "urbanization" of Edwards Plateau rangeland has resulted in increased concerns over issues such as air quality and liability when prescribed fire is used as a management tool. These concerns will increase in the future. However, these problems should not lessen our enthusiasm for prescribed fire as a rangeland management practice. One response to these environmental and safety concerns is to form prescribed burn associations. A prescribed burn association is a group of landowners and landmanagers that form a partnership to conduct prescribed burns. Forming a prescribed burn association deals directly with the reasons that most people do not use prescribed fire. Insurance has to be purchased for liability, but risk is managed with proper training, experienced help, and proper equipment provided by the association. Members can attend prescribed burn workshops, and also have the opportunity to help other association members conduct burns. This hands-on assistance allows membership to gain experience and confidence with prescribed fire. Members do not have to hire labor, because neighbors now are helping neighbors. Association members pool their equipment so that no one person has to buy all the equipment. With all of this equipment and labor, the membership can safely conduct prescribed burns. The Edwards Plateau Prescribed Burning Association, Inc., (EPPBA) is an example of a successful burn association operating in the Edwards Plateau region of Texas. EPPBA was started with 30 members in 1997 on the Texas AgriLife Research Station located between Sonora and Rocksprings. Current membership exceeds 500 in 10 different chapters spread over a 20-county area. EPPBA became a 501(c)(3) nonprofit organization in 2005, which has facilitated attempts to obtain grants and gifts. Another benefit of a prescribed burn association is its ability to have strength in numbers and influence politics.

## 17.9 Comparing Current Fire Records with Historical Fire Regimes for Fuel Mitigation Recommendations in the Wildland Urban Interface: A 10-year Case Study of the North Carolina Sandhills

Chris Ketchie, Graduate Student,
North Carolina State University

### Abstract

To make the most of the stretched resources of our land management agencies, North Carolina fire managers must target the wildland-urban interface (WUI) areas at highest risk by understanding how to best address both management objectives, such as prescribed burning and mechanical thinning, and the equally important social objectives of public outreach and education. This project integrates wildland and prescribed fire data with current remote sensing data in a geographic information system modeling environment to provide North Carolina fire managers with the tools to make these informed decisions.

A 10-year comprehensive burn history of the North Carolina Sandhills region was compiled from records provided by the North Carolina Division of Forest Resources, The Nature Conservancy, Fort Bragg Military Base, Sandhills Game Land, and the Weymouth Woods Sandhills Nature Preserve. These data are weighted against WUI maps from Radeloff et al. (2005) and LANDFIRE data to determine areas in greatest need of fuel-mitigation efforts. The final output will not only allow North Carolina fire managers to more effectively use their resources, but it will also present a model that can be applied to other areas of the state.