International Association of Wildland Fire

1st Fire Behavior and Fuels Conference

Fuels Management – How to Measure Success

Photo by Bill Gabbert

Portland, Oregon USA
March 27-30, 2006

http://www.iawfonline.org

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Portland, Oregon

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International Association of Wildland Fire
PO Box 261
Hot Springs, SD 57747-0261
605-890-2348
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http://www.iawfonline.org

Welcome from President of IAWF

Welcome to the 1st Fire Behavior and Fuels Conference. If you were not already a member of the International Association of Wildland Fire, you are receiving a one year membership by registering for this conference. As an active IAWF member you can help to improve communication between firefighting organizations, enhance firefighter and public safety, increase our understanding of wildland fire science, and improve our ability to manage fire. Your membership in the IAWF provides you with a connection to other wildland fire professionals from across the world. IAWF membership is truly international and includes scientists, firefighters, managers, contractors, and policy makers from the fields of wildland fire ecology, suppression, planning, contracting, fire use, research, and prescribed fire. As an association, we are unique in that we represent all areas of wildland fire management.

Here are some of the member benefits you will enjoy:

WILDFIRE Magazine – Wildfire, an official publication of the IAWF, is published bi-monthly in partnership with Prism Business Media. We have editors sending news from all corners of the world, and topical editors covering all the important issues in wildland fire. We encourage you to submit articles, photographs, and letters to the editor for inclusion in the magazine.

INTERNATIONAL JOURNAL OF WILDLAND FIRE –The other official publication of the IAWF is dedicated to the advancement of basic and applied research covering wildland fire and is available as an additional membership option. A discounted rate of $115 for a 1-year subscription is offered to IAWF individual and student members.

www.iawfonline.org – your website with all the information you need. The site has recently been upgraded with an improved wildland fire event calendar, an IAWF Bulletin Board, and a Members Only area. Now you can participate in polls, update your address information, check your membership status, and renew your membership online. Visit the site and join FireNet, our e-mail ListServ keeping you informed of what is happening with wildland fire, and your place to find answers to your questions!

Recruit a new member –Tell your colleagues about the benefits you enjoy as an IAWF Member. Have them fill out the application on the back of the membership brochure or ask them to visit us at www.iawfonline.org to join online.

Upcoming Conferences:

9th Wildland Fire Safety Summit, April 25-28, 2006, Pasadena, California The IAWF has produced Wildland Fire Safety Summits since 1997. The 2006 Summit, will be held in the heart of one of the busiest wildland fire environments in the world and promises to meet the high standards firefighters have come to expect from the IAWF. The program will include reviews of the recent large fires in Southern California, aviation safety, firefighter liability, fire weather, firefighter health and fitness, and other topics. The conference is being held near site of the Loop Fire of 1966 in which 12 members of the El Cariso Hot Shots were entrapped and died. Register for an optional Staff Ride to visit the site, walk in their footsteps, and hear a first hand account from someone who was there in 1966. More information is at www.iawfonline.org

2st Fire Behavior and Fuels Conference: Fire Behavior Fundamentals and Applications. Planning is underway for the 2nd in a series of Fire Behavior and Fuels Conferences to be held at Destin, FL, **March 26-30, 2007**. Get updates at our web site: http://www.iawfonline.org

Ember Award

The IAWF is introducing a new award at this conference. It is title The Ember Award for Excellence in Wildland Fire Science. The purpose of the Ember Award is to acknowledge sustained achievement in wildland fire science. The name "ember" was chosen to reflect the fact that research and science often move slowly, and their benefits or impacts may not be apparent for years or more. This Award is given to a currently living, or recently deceased individual from any country or nation for:

- Sustained contributions to wildland fire science with the goal of increasing fire fighter and public safety or forest vitality;
- Working closely with the fire fighter and management communities and the public to ensure research relevant to their needs;
- Effectively and appropriately communicating wildland fire science to the people who need it.

The recipient of the Ember award this year is Dr. Frank Albini. Dr Albini, recently passed away, but his contributions to the field of wildland fire science continue to form the foundation for past, current and ongoing research programs that have direct application to wildland fire management. We have included a copy of the obituary dedicated to Dr. Albini that was published in the International Journal of Wildland fire.

On behalf of the Board of Directors of the IAWF, thank you for your support of our association.

Sincerely,

Dick Mangan,
President, Board of Directors

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International Association of Wildland Fire
2006

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http://www.iawfonline.org

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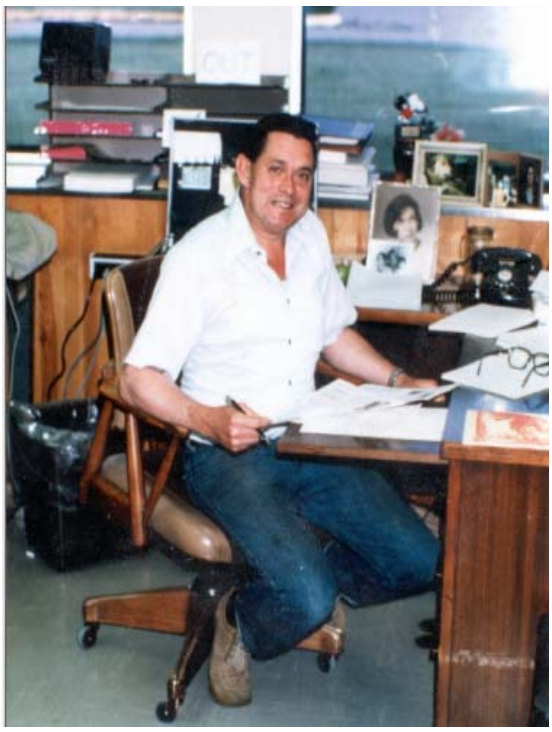
2006 Ember Award

Frank Albini
1936 – 2005



Dr. Frank Albini has been selected as the recipient of the 2006 Ember Award. The purpose of the Ember Award is to acknowledge sustained achievement in wildland fire science. The name "ember" was chosen to reflect the fact that research and science often move slowly, and their benefits or impacts may not be apparent for years or more.

Frank Albini, fire behavior research scientist from 1973 to 1985, died of cancer at the age of 69 on December 3, 2005. He was born in Madera, California where he graduated from high school. He attended the California Institute of Technology and earned a B.S. in Aeronautical Engineering in 1958, and a year later an M.S. in Mechanical Engineering. He was awarded a Ph.D. in Mechanical Engineering and Philosophy from Cal Tech in 1962.

The wildland fire community is fortunate that Frank felt the call to do fire behavior research. He was drawn to Missoula Fire Sciences Laboratory not only by the interesting subject matter and the opportunity to make a contribution, but also by outdoor opportunities offered by the State of Montana. Many friends, family, and colleagues have fond memories of hunting and fishing adventures shared with Frank.

In an invited paper for American Scientist titled Wildland Fires (1984) Dr. Albini focused on the current state of knowledge about the behavior of wildland fires. Following is the concluding statement in that paper:

> "The list of poorly understood phenomena can be expected to lengthen for some time to come because research in this field is still in its infancy. As the base of knowledge grows, new puzzles will emerge, and explanations that were once accepted will be challenged as their implications are explored. But useful results have been produced from the present level of understanding, and continued research should yield substantial rewards in terms of safer, more economical control and use of wildland fire."

Among Frank's early influential accomplishments was development of nomograms for calculating fire spread rate and intensity. Nomograms continue to be used as a training aid and as a field tool for estimating fire behavior. He also developed and documented FIREMOD, an early computer program for fire behavior and fire effects prediction.

Frank conducted analytical and experimental research studies on basic processes governing behavior of free-burning fires in forest and rangeland fuels. His research addressed flame structure, radiation driven mechanisms of fire spread, soil heating, and crown fire spread. He developed models for fire spotting distance, fire containment, and the consumption and intensity of the burning of large

woody fuels. He modeled wind flow into a forest, upslope convective winds, midflame wind speed, and the response of free-burning fires to nonsteady wind.

He was an internationally recognized authority on modeling the behavior of wildland fire, making presentations and doing cooperative research in Australia, Germany, Russia, Canada, Japan, China, and Portugal. He assisted with the planning and execution of the International Crown Fire Experiment with US and Canadian Forest Services, burning full scale crown fires for data to test a radiation-driven crown fire spread model, which was published in 2004.

Frank had a wide range of talents and interests. He had both a deep and a broad knowledge of many subjects. He was an editor and referee for several technical journals and the author of over 100 refereed papers (many classified). Many who knew Frank through his wildland fire research are not aware of his extensive contributions to other fields. He had 20 years experience in defense-related research and development activities on topics including weapons systems analysis, system component performance assessment and prediction, and ballistic missile defense. He worked for Hughes Aircraft, the Institute for Defense Analysis, General Research Corporation, and Science Applications International Corporation.

In his book, Young Men and Fire (1992), Norman Maclean wrote of Frank Albini "In addition to being a brilliant scientist, he turned out to have a quiet, persuasive literary style that helped to make him an effective half-concealed salesman for the extended uses of mathematical models in the woods."

He applied his exceptional knack for explaining complicated concepts in understandable terms to teaching and writing about wildland fire behavior. As a Research Professor of Mechanical Engineering at Montana State University from 1992-2001, in addition to teaching introductory thermodynamics and advising senior design teams, he taught first year calculus in provost's experiment to discover why students are so weak in math.

Frank has been described as an unassuming, down to earth, uncommonly brilliant, and interesting person. Ever the thinker, teacher, and communicator, the following is from a letter he wrote six weeks before his death: "I have known frustration and fulfillment, success and failure, deprivation and reward, rebuke and acclaim. Though each negative experience was painful to endure, it made the positive the more poignant. How much more gratifying is acknowledgement after having endured scorn for the effort to achieve. How much more enjoyable is good health after enduring the pains of injury and disease. How much more rewarding is the thrill of discovery after enduring the agony of the quest and the repeated disappointments that seem to accompany all exploration."

Patricia L. Andrews
Fire Behavior Research Work Unit
RMRS Missoula Fire Sciences Laboratory

Continuing Forestry Education

Contact Hour Notice

OREGON SOCIETY OF AMERICAN FORESTERS
4033 SW Canyon Road, Portland, OR 97221; (503) 224-8046

The program was reviewed and is approved for professional continuing forestry education credits by the Society of American Foresters. This program meets the SAF's continuing Forestry Education guidelines and standards.

Event Title: *Fuels Management – How to Measure Success*

Sponsor: International Association of Wildland Fire
City: Portland, Oregon
Date: March 28-30, 2006
State: Oregon SAF

17.5 CFE Contact Hours, Category 1

This CFE Contact Hour Notice is for information use only. It may not be considered an acceptable document for verifying individual attendance. Check with your state board of licensing/registration and/or the Certification Review Board f or the Certified Forester® program.

The Certified Forester® program and many state-level licensing and registration programs require ongoing continuing education; the CFE designation ensures that continuing education activities contribute to the advancement of forestry professionals.

To learn more about Certified Forester® program visit www.certifiedforester.org, or for additional CFE opportunities, visit the SAF online events calendar at www.safnet.org/events.

Society of American Foresters
5400 Grosvenor Lane
Bethesda, MD 20814-2198
www.safnet.org
301/ 897-8720
Fax: 301/ 897-3690

Society of American Foresters
Growing better all the time

Conference Sponsors

International Association of Wildland Fire

P.O. Box 261
Hot Springs, SC 577-0261
http://www.iawfonline.org/

The Association is a non-profit corporation formed to promote a better understanding of wildland fire, and built on the belief that an understanding of this dynamic natural force is vital for natural resource management, for firefighter safety, and for harmonious interaction between people and their environment. The Association is dedicated to communicating with the entire wildland fire community and providing global linkage for people with shared interest in wildfire and comprehensive fire management. The Association is recognized by the U.S. Internal Revenue Service (IRS) as a tax-exempt 501(c)3 organization.

National Interagency Fuels Coordination Group

3833 S. Development Avenue
Boise, ID 83705
http://www.nifc.gov/fuels/overview/nifcGroup.html

The National Interagency Fuels Coordination Group was established shortly after the National Fire Plan in October of 2001 under the direction and guidance of the Department of the Interior's Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS) as well as the Department of Agriculture's Forest Service (FS). The primary purpose of the group is to provide leadership and coordination in uniting the Departments' resources and fire management programs under a common purpose for reducing risks to communities while improving and maintaining ecosystem health. The primary goal is to provide assistance and guidance in the development and implementation of an effective interagency fuels management program including addressing risks from severe fires in WUI communities and restoring healthy ecological systems in other wildland areas.

The Nature Conservancy, Global Fire Initiative

13093 Henry Beadel Drive
Tallahassee, FL 32312
http://www.nature.org/initiatives/fire/
http://www.tncfire.org/

The Nature Conservancy is a leading international, nonprofit organization dedicated to preserving the diversity of life on Earth. The mission of The Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The Conservancy is a leader in promoting the natural role of fire, as demonstrated through forty years of prescribed fire to achieve ecological objectives. Nature Conservancy staff and volunteers burn more than 100,000 acres of our own lands each year to achieve ecosystem management goals, and assist in prescribed fires on hundreds of thousands of acres of partner lands. We have active burn programs in 38 states and Mexico.

The Global Fire Initiative, launched in 2002, is a group of approximately 20 fire professionals dedicated to combating the threats that too much, too little or the wrong kind of fire pose to biodiversity conservation. The Initiative is active in 11 countries.

The U.S. Fire Learning Network--a joint project of The Nature Conservancy, the U.S. Forest Service and the U.S. Department of the Interior--seeks to overcome barriers to implementing ecologically appropriate fuels reduction and restoration projects. The Network is engaging dozens of multi-agency, community-based projects in a process that accelerates the restoration of landscapes that depend on fire to sustain native plants and animals. Network projects cover more than 75 million acres.

Forest Service Research

USDA Forest Service
201 14th St., SW
Washington, DC 20250
http://www.fs.fed.us/research/
http://www.fs.fed.us/research/scientific.html#VegetationManagementandProtectionResearch

Vegetation Management and Protection Research provides the scientific and technical basis for wise natural resource policies and management decisions to protect the health, diversity, and productivity of the Nation's forest and rangeland resources--while meeting societal needs for recreation, economic stability, forest products, and protection from fire, insects, and diseases. Forest and rangeland vegetative cover and condition determine the health of riparian and aquatic systems, the habitat suitability for T&E species, and the ability of our forests to provide recreation opportunities, fiber, clean water, and other important products.

National Fire Plan

USDA Forest Service National Fire Plan
USDA Forest Service
National Fire Plan, S&PF
1400 Independence Ave. SW - 1109
Washington, D.C. 20250-0003
Department of the Interior Office of Wildland Fire Coordination
Mailstop 3060MIB
1849 C Street NW
Washington, D.C. 20240
http://www.fireplan.gov/

The National Fire Plan was developed in August 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. The NFP addresses five key points: Firefighting, Rehabilitation, Hazardous Fuels Reduction, Community Assistance, and Accountability.

Joint Fire Science Program

3833 S. Development Ave.
Boise, Idaho 83705
http://jfsp.nifc.gov/

The Joint Fire Science Program (JFSP), a partnership of six Federal wildland and fire and research organizations, was established in 1998 to provide scientific information and support for fuel and fire management programs. All JFSP projects require scientist-manager partnerships along with strong emphasis on transferring research findings to the field. Guidance for the program includes four original “principal purposes” all related to wildland fuels: Fuels inventory and mapping, Evaluation of fuels treatments, Scheduling of fuels treatments, and Development of protocols for monitoring and evaluation.

Canadian Forest Service

Natural Resources Canada
580 Booth Street, 8th Floor
Ottawa, Ontario K1A 0E4
http://www.nrcan-rncan.gc.ca/cfs-scf/science/resrch/forestfire_e.html

The Canadian Forest Service promotes the sustainable development of Canada's forests and competitiveness of the Canadian forest sector. The CFS plays a central role in addressing national and international forestry issues. It works in partnership with the provinces and territories and in consultation with Aboriginals, industry, non-governmental organizations and other forest community interests at home and abroad.

Forest fire research focuses on studying the fire environment, fire behavior, fire ecology, and fire as a natural disturbance; developing information and decision support systems for monitoring and predicting wildland fire activity and for enhancing fire management efficiency and effectiveness; and investigating the relationship between projected climate change and wildland fire in the boreal forest.

British Columbia Ministry of Forests and Range, Protection Program

PO Box 9502 Stn Prov Govt
Victoria, BC V8W9C1
Canada
http://www.for.gov.bc.ca/protect/
http://www.for.gov.bc.ca/PROTECT/FuelManagement/

Since its establishment in 1912, the British Columbia Forest Service has continued to protect the public's interest and provide leadership in the protection, management and use of the province's forest and rangelands. The Forest Service is responsible for the stewardship of 47 million hectares of provincial forest land. In addition, the ministry provides fire protection services for 84 million hectares. Managing these provincial forests presents a unique and complex set of challenges. More than 90 percent of British Columbia's forestlands are publicly owned, which means that the provincial government, on behalf of the public, plays a prominent role in the forest sector.

After the unprecedented 2003 forest fire season, an external evaluation of British Columbia's (BC) fire management was commissioned. The report recommended developing a fuel management strategy in the Wildland Urban Interface (WUI) areas of BC. Stemming from these recommendations, the Ministry of Forests initiated a Fuel Management Program in 2004. Its delivery is based upon a strategic partnership with the Union of BC Municipalities (UBCM), which represents the 182 Municipalities and Regional Districts in BC. One of the principles of the Fuel Management Program is to have Local Governments lead fuel management planning and treatments in the WUI. The four key components of the fuel management strategy are: i) provincial strategic threat analysis, ii) community wildfire protection plans, iii) pilot projects, and iv) operational treatments.

National Center for Landscape Fire Analysis

Science Complex 441
College of Forestry and Conservation
University of Montana
Missoula, MT 59812
http://firecenter.cfc.umt.edu/firecenter/

The National Center for Landscape Fire Analysis is a locus for research, learning, and technology development located within The College of Forestry and Conservation at The University of Montana – Missoula. Its work depends upon the collaborative relationships with federal, state, and local partners engaged in fire, fuels management, and research in the western United States.

Major Commercial Sponsor

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Tuesday, March 28

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Our "Standing Stem" harvest method pulls prepared stems out from where they are standing. Standing Stem harvesting can be adapted to hazard reduction missions requiring the surgical removal of dead and dying trees.

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Exhibitors and Commercial Vendors

BASF Corporation

2869 Bridgeport Ave. SE
Salem, OR 97306
(503) 391-5644
www.vmanswers.com

BASF is a leader in vegetation management applied in integrated pest management systems for fuels management and habitat restoration.

Department of Interior, Bureau of Land Management, NIFC

3833 S. Development Ave.
Boise, ID 83705
208-387-5845
http://www.nifc.gov/

The BLM's National Office of Fire and Aviation is headquartered at the National Fire Center (NIFC), in Boise, Idaho, where interagency fire experts develop policy, conduct wildland fire research, and coordinate with fire managers from other firefighting organizations.

The Remote Sensing / Fire Weather Support Unit (RSFWSU) is based at NIFC, and its mission is to service and support Remote Automatic Weather Stations (RAWS) according to interagency agreements and the National Danger Rating System (NFDRS).

The accomplishment of this mission helps provide accurate and reliable environmental data for wildland fire preparedness and fire operations, and contributes to fire fighter safety and the protection of life and property.

The RSFWSU also services and supports other special use and environmental monitoring stations, resource permitting, according to written agreement. This category includes but is not limited to; portable fire stations (FIRE RAWS), Burned Area Emergency Rehabilitation (BAER RAWS), as well as HAZMAT and other all-risk incidents.

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Box 1000
Winn, MI 48896
989-866-2381
www.morbark.com

Morbark manufactures a wide range of chippers, grinders and shredders designed to reduce and recycle low grade wood residues for a variety of markets. Forest cleanup contractors turn to Morbark for the tools they need.

Campbell Scientific, Inc.

815 W. 1800 N.
Logan, UT 84321-1784
(435) 753-2342
www.campbellsci.com

Campbell Scientific Inc. has manufactured thousands of automated weather stations. Our stations are known for their versatility and reliability, even in harsh environments. Several configurations are available, but all our fire weather stations record and transmit meteorological data relevant to fire danger prediction.

Quick Deployment Stations:

The **RAWS-B** and **RAWS-F** quick deployment stations are ideal for prescribed burns or other temporary installations. These light weight, pre-configured stations can be setup in as little as 10 minutes—without tools. An aluminum environmental enclosure is mounted to a 6 ft tripod. The outside of the enclosure has color-coded, keyed connectors for attaching the sensors. Communication options include satellite transmitter, telephone, cellular phone, and radio. The station components fit inside two carrying cases.

Permanent Stations:

Custom Stations: Campbell Scientific provides a wide selection of sensors and data transfer peripherals for configuring a custom station that matches the exact requirements of your application. Permanent fire weather stations typically use 20 ft towers. We also offer different tower and tripod heights.

RAWS_H Data Collection Platform: This station contains a CR1000 datalogger with a Handar sensor connector panel. It can replace a Handar Data Collection Platform while the existing Handar sensors, enclosure, power supply, and tower are used.

ESRI

380 New York St.
Redlands, CA 92373
(909) 793-2853
Fax (909) 307-3072
www.esri.com

Organizations around the world, as well as local, state, and federal government agencies, are using ESRI GIS software to make smart and timely decisions. GIS software from ESRI enables public safety and law enforcement personnel to capture and create an integrated picture of information in the form of interactive maps and reports on the desktop, laptop, handheld, or in the emergency vehicle. From deciding where to build new fire stations and in which stations to keep ladder trucks, to monitoring disasters as they happen, in real time, with only a PC and an Internet connection, from mapping wildfires tens of thousands of acres in size with GPS equipment and a helicopter, to picking up the pieces after a major earthquake, GIS is making emergency management a faster and more accurate means of helping people cope.

FTS FOREST TECHNOLOGY SYSTEMS

1065 Henry Eng
Victoria, BC V9B-6B2
(800) 548-4264
www.ftsinc.com

FTS is the leading supplier of equipment and services to address the challenging meteorological information requirements of the world's premier forest fire management agencies. FTS's market, where people's lives and property are often at risk, demands that the technology/equipment be reliable, simple to use, and easily serviceable. FTS develops, manufactures, markets and services turnkey solutions for remote applications.

Products include: environmental sensors, data loggers, satellite transmitters/receivers, power management systems and application software. In the FTS booth we will highlight our popular portable RAWS. The portable RAWS is ideal for monitoring weather prior to, and during project or prescribed fires.

Hale Products/Class 1

607 N.W. 27th Ave.
Ocala, Florida 34475
972-727-2266
www.class1.com/default2.asp
http://www.haleproducts.com/default.asp

Hale Products Inc. is expanding its position as the world's leading provider of emergency services equipment in applications such as defense, rescue, firefighting, and industry. With well-know trademarks such as Jaws of Life® , Hale® Pumps, Hurst®, FoamMaster and CAFSMaster® , products manufactured by Hale have a high recognition for dependability and quality.

Juniper Systems, Inc.

1132 W. 1700 N.
Logan, UT 84321
435-753-1881
www.junipersys.com

Headquartered in Logan, Utah, Juniper Systems, Inc. designs, manufactures, and sells ultra-rugged handheld field computers and mobile data acquisition systems for natural resources, agriculture, industrial, land survey, mobile GIS and other rugged applications. See their full product line at www.junipersys.com

Wildland Firefighter Foundation

2049 Airport Way
Boise, Idaho 83705
208-336-2996
www.wffoundation.org/

The mission of the WFF is to "honor past, present, and future members of the wildland firefighting family". The WFF also provides emergency support services to the families of injured and fallen firefighters.

Western Wildfire Impact Reduction Center

2166 N 15th Street
Laramie, WY 82072
(307) 760-5274
Fax (307)742-9932
www.westernwildfire.org

The Western Wildfire Impact Reduction Center is an organization that collects wildfire mitigation information about US rangelands. It communicates with a variety of organizations and the general public with a goal of encouraging proactive wildfire management efforts. The Center's mission is reduce the harmful ecological, economic and physical effects of rangeland wildfires by playing a role in returning western rangeland wildfires to historical healthy sizes. By opening a forum that discussessite-specific needs and landscape-scale, scientifically appropriate fuel treatments, the Center promotes effective wildfire prevention and control. We strive to bring together organizational experience, resources, and methodology without duplicating existing efforts. These actions are meant to protect urban interface and critical wildlife habitat.

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Lebanon, OH 45036
(800) 528-3113
www.fecon.com

FECON's product line includes: Bull Hog Mulchers, FTX Track Carriers, Tree Saws and Shears, Grapples and Stump Grinders for Firebreaks, Reforestation and Vegetation Management.

National Fire Fighter

1574 W. 6th Ave.
Box 21107
Eugene, OR 97402
800-423-8247 www.nationalfirefighter.com

National Fire Fighter offers a full range of wildland firefighting tools and gear including protective clothing and headgear, packs, headlamps, radios, fire shelters, gloves, footwear, hydration bags, weather meters, hand tools, hose, pumps, adapters, hose reels, nozzles, mobile attack units, camping gear and more!

Pacific Wildland Fire Sciences Laboratory

3200 SW Jefferson Way
Corvallis, OR 97331
(541) 750-7481
www.fs.fed.us/pnw/fera

The Pacific Wildland Fire Sciences Laboratory is one of 8 research labs operated by the Pacific Northwest Research Station of the USDA Forest Service. Research currently conducted at the lab includes the impact of fire on air quality and visibility, wildfire and ecology research, the effects of fire on air, the impacts of smoke on human health, and social research (rural and urban wildland interface).

The lab is the home of the Fire & Environmental Research Applications Team (FERA), the Rural Urban Wildland Interactions Team (RUWIT) led by Linda Kruger, the Silviculture & Forest Models Team led by Steve Reutebuch, and the Atmosphere & Fire Interactions Research Team (AirFIRE), led by Brian Potter.

The booth will showcase products based on scientific research conducted in the lab. This includes various publications on fire behavior, fuels, and fuel treatment effectiveness; and software demonstrations and consultations. The booth will be staffed by a member of the FERA team.

PHOS-CHEK

1512 London Circle
Benicia, CA 94510
(916) 425-6570 www.phos-chek.com

For over 40 years PHOS-CHEK has provided the world's leading chemical solutions for management of wildland and structural fires. PHOS-CHEK is a division of ICL Performance Products LP, North America's largest phosphorus chemical manufacturer.

Phos-Chek Long-Term Fire Retardants are the safest, most effective and environmentally friendly retardants available and are fully qualified by the USDA Forest Service. Phos-Chek brand fire retardants are the only qualified cyanide-free retardants available.

Phos-Chek recently introduced a powder-based gel to its line of fire fighting products. Called PHOS-CHEK AquaGel, the product matches the effectiveness of traditional gels, plus adds unique characteristics that represent a breakthrough in gel firefighting products.

The addition of a gel product to PHOS-CHEK's industry-leading line of long-term retardants and Class A foams means PHOS-CHEK now offers a complete portfolio of chemical solutions for management of wildland and structural fires.

AquaGel can be applied aerially for attack of wildland fires, or by engine to provide structure protection or to directly attack structural fires. AquaGel fills a number of voids in a fire fighter's current bag of tools. AquaGel contains no oils, solvents or other undesirable chemicals, which makes it safer for firefighters and homeowners than other gels on the market.

RedZone Software

3775 Iris Ave., Ste. 2C
Boulder, CO 80301
(303) 386-3955
www.redzonesoftware.com

Since 2001, RedZone Software, LLC, has provided emergency responders with the power of Geographic Information Systems (GIS) software tailored to their specific needs. Today hundreds of local, state and federal agencies use RedZone for their emergency planning needs.

RedZone Software's, RZ3™, provides an easy to use and comprehensive mapping tool for all hazard emergency response and planning. Incident response maps can be quickly generated with minimal training requirements for the user. Optionally available is Survey Studio, a field survey data collection tool that allows surveyors to pre-survey sites with a hand held devise such as a palm pilot or pocket PC and then download the data to RZ3™ for mapping and statistical reports. A Document Organizer provides for the creation and management of PDF documents so Incident Action Plans (IAPs) can be quickly generated and distributed.

RZ3™ fits well in the development of Community Wildfire Protection Plans (CWPP). Use the field software to survey, photograph and GPS features such as structures, water sources and other fire related sites. Back at the station, RZ3's drawing tools allow users to outline communities and assign each a hazard ranking. These maps and statistical information can be then used for planning as well as during a wildfire incident.

Thermo Technologies, LLC

400 East Broadway Suite 50
Bismark, ND 58501
Tel: (701) 258-8208
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Special issue of the International Journal of Wildland Fire
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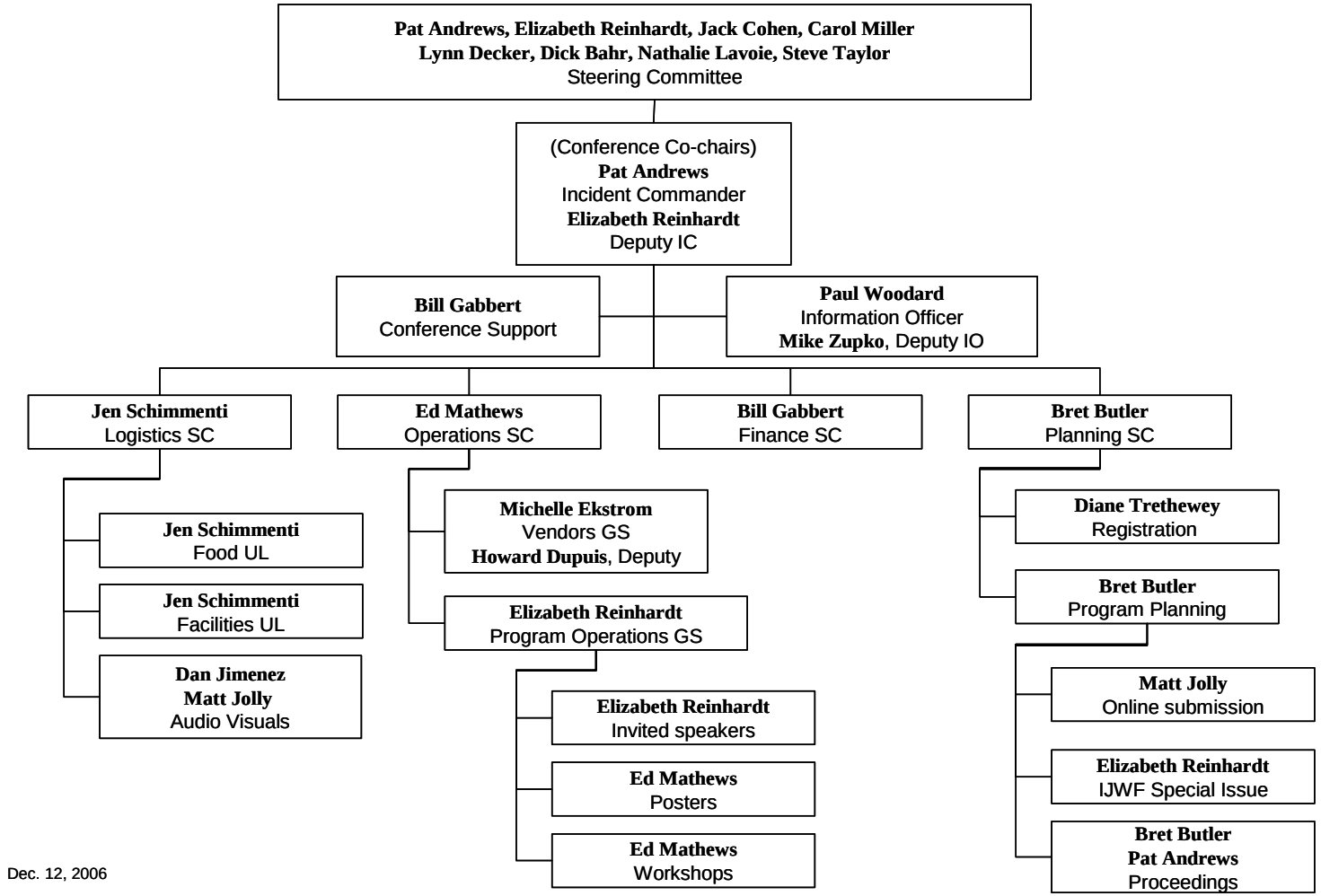

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Program

Tuesday morning, March 28			
0715-0800	***Registration and Continental Breakfast***		
0800-0830	***Grand Ballroom I*** Welcome from the International Association of Wildland Fire Pat Andrews, IAWF Board Member, Conference chair, USDA Forest Service Research		
0830-0900	**Be a Change Agent and Change the Strategy** Jerry Williams, Retired, State of Montana		
0900-0930	**Is There a Normal Fire Regime in an Always Changing Environment?** Daniel Botkin, Research Professor, University of California Santa Barbara		
0930-1000	Morning Break		
	Track 1, Session 1	**Track 2, Session 1**	**Track 3, Session 1**
	Grand Ballroom I **Decision Support Systems for Landscape Scale Planning** Session Chair: Jim Brenner, State of Florida	***Galleria*** **Wildland Urban Interface** Session Chair: Gavriil Xanthopoulos, Nat'l Agricultural Research Foundation, Greece	***Pavilion*** **Fuel Characterization** Session Chair: Jim Gould, Ensis- CSIRO Australia
1000-1020	Considerations in the use of models available for fuel treatment analysis Charles W. McHugh	A Fuel Treatment Reduces Potential Fire Severity and Increases Suppression Efficiency in a Sierran Mixed Conifer Forest Jason J. Moghaddas	How many fuels plots are needed to measure success? An in-depth look at sampling fuels in lodgepole pine for the Tenderfoot Research Project Helen Y. Smith and Colin C. Hardy
1020-1040	Decision support for evaluating wildland fire danger and prioritizing vegetation and fuels treatments Keith M. Reynolds, Paul Hessburg, Robert Keane	City of Kamloops Wildland/Urban Interface Forest Fuel Hazard Reduction Kelly P. Johnston and Willy Saari	Understanding temporal litter variability of Ozark forests through an examination of accumulation rates and disturbance Michael Stambaugh, Richard Guyette, Keith Grabner and Jeremy Kolaks
1040-1100	Using landscape-based decision rules to prioritize fuel treatment locations in the boreal mixedwood of western Canada Marc Parisien	Fuel Management Success on Private Land with Firewise Richard Reitz and Claudia Standish	FUEL3-D: a spatially explicit fractal fuel distribution model Russell A. Parsons
1100-1120	Developing Integrated Fuel Treatment Priorities at a Landscape Level Using the Multi-scale Resource Integration Tool Jeffrey L. Jones, Joseph D. Zeiler and Dale A. Hamilton	Simulating fire risk within a mixed-ownership, fire-prone landscape of northeastern Wisconsin: Interactions between human ignitions and forest dynamics. Brian R. Miranda, Brian R. Sturtevant, Eric J. Gustafson and Hong S. He	Creating a fuels baseline and establishing fire frequency relationships to develop a landscape management strategy at the Savannah River Site Bernard R. Parresol
1120-1140	Simulation of long-term landscape fuel treatment effects on potential wildfires Mark A. Finney, Robert C. Seli, Charles W. McHugh, Alan A. Ager, Berni Bahro and James K. Agee	Main Boulder River Fuels Reduction Project Dick Rath, Bill Avey, Paula Rosenthal and Mike Dannenberg	Estimating Fuel Loadings in Masticated Fuels Sharon M. Hood and Rosalind Wu
1140-1240	Lunch, box lunch provided		

Tuesday afternoon, March 28			
	Track 1, Session 2	**Track 2, Session 2**	**Track 3, Session 2**
	Grand Ballroom I **Ecological Considerations** Session Chair: Louisa Evers BLM	***Galleria*** **Prescribed Fire** Session Chair: Mark Titus, Washington State	***Pavilion*** **Fire Use / Fire Policy** Session Chair: Carol Miller, USFS
1240-1300	Comparison of the sensitivity of landscape-fire-succession models to variation in terrain, fuel pattern, climate and weather Geoffrey J. Cary, Robert E. Keane, Robert H. Gardner, Sandra Lavorel, Mike D. Flannigan, Ian D. Davies, Chao Li, James M. Lenihan, Scott Rupp and Florent Mouillot	The use of silviculture and prescribed fire to manage stand structure and fuel profiles in a multi-aged lodgepole pine forest Colin C. Hardy, Helen Y. Smith and Ward McCaughey	Influences on USFS District Rangers' decision to authorize Wildland Fire Use Martha A. Williamson
1300-1320	Integrating fuel treatments into comprehensive ecosystem management Kevin Hyde, Greg Jones, Robin Silverstein and Keith Stockmann	Fire behavior and soil heating impacts with prescribed burning in masticated fuel beds Eric Knapp, Matt Busse and Carol Shestak	British Columbia Fuel Management Program Chris D. Duffy and Sue Clark
1320-1340	Changes in fuelbed characteristics and resulting fire potentials after fuel reduction and restoration treatments in dry forests of northeastern Oregon Andrew Youngblood, Roger D. Ottmar, Clint S. Wright and James D. McIver	Effects of prescribed fire on fuels and forest structures in western ponderosa pine forests. Lisa J. Bate, Victoria Saab, William Block, John Lehmkuhl, Brett Dickson and Stephanie Jentsch	U.S. Policy Response to the Fuels Management Problem: An Analysis of the Public Debate about "Healthy Forests" Jayne F. Johnson, David N. Bengston, David P. Fan and Kristen C. Nelson
1340-1400	Measuring ecological effects of prescribed fire using birds as indicators of forest conditions John D. Alexander and Nathaniel E. Seavy	Development of burn prescriptions to balance duff reduction and overstory tree survival J. M. Varner, J. K. Hiers, Roger Ottmar and James Furman	Wildland Fire Use - Challenges Associated with Program Management across Multiple Ownerships and Land Use Situations Thomas Zimmerman, Michael Frary, Shelly Crook, Brett Fay, Patricia Koppenol and Richard Lasko
1400-1420	Response of Fuelbed Characteristics to Restoration Treatments in Pinyon-Juniper-Encroached Shrublands on the Shivwits Plateau, Arizona Helen Y. Smith, Sharon Hood, Matt Brooks, JR Matchett and Curt Deuser	Effectiveness of Prescribed Fire as a Fuel Treatment in Californian Coniferous Forests Managed by the US Forest Service Nicole M. Vaillant	Evaluating Wildland Fire Use Fires: Beyond Ecological Benefits, Measuring Their Contribution to Fuel Hazard Reduction Jo Ann Fites, Erin Noonan and Carol Ewell
1420-1440	Afternoon Break		
1440-1640	***Grand Ballroom I*** Panel: **Wildland Fire Use: it's not just for wilderness anymore**. Moderator: Carol Miller USDA Forest Service, Aldo Leopold Wilderness Research Institute Panelists: Marcia Andre, Supervisor, Gila National Forest Dick Bahr, Fire Use Specialist, National Park Service-NIFC Tom Nichols, Deputy Fire Program Planning Leader, National Park Service-NIFC Mike Rieser, FMO, Craig/Routt Fire Management Unit, Bureau of Land Management George Weldon, Deputy Director - Fire, Aviation, and Air, Forest Service, Northern Region		
1800-2000	***Grand Ballroom II*** Posters and Vendor viewing. Ice Breaker sponsored by Erickson Air-Crane.		

Wednesday morning, March 29			
0715-0755	***Registration and Continental Breakfast***		
0755-0800	***Grand Ballroom I*** **Featured Speakers** Session Chair: Elizabeth Reinhardt, USDA Forest Service Research		
0800-0830	**Federal Fuel Management Programs: Reducing Risk to Communities and Increasing Ecosystem Resilience and Sustainability** Tim Sexton, USDA Forest Service, Fire Use Program Manager		
0830-0900	**Canadian Wildland Fire Strategy: A Vision for an Innovative and Integrated Approach to Managing the Risks** Kelvin Hirsch, Canadian Forest Service		
0900-0930	**Restoring Fire as an Ecosystem Process** Greg Aplet, The Wilderness Society		
0930-1000	Morning Break		
	Track 1, Session 3	**Track 2, Session 3**	**Track 3, Session 3**
	Grand Ballroom I **Fundamental Fire Behavior Modeling** Session Chair: Russ Parsons, USFS	***Galleria*** **Sociology and Communication** Session Chair: Robin Hanford, TNC	***Pavilion*** **Fuel Mapping** Session Chair: Jim Smith, TNC
1000-1020	Project Vesta: fire behaviour study of different age fuels in dry eucalypt forests Jim Gould, Lachie McCaw and Phil Cheney	Measuring the effectiveness of wildfire risk education: a case study from Colorado Springs Geoffrey H. Donovan, Patricia A. Champ and David T. Butry	Mapping Fire Regime Condition Class Using the FRCC Mapping Tool Tom DeMeo, Jeffrey L. Jones, Joseph D. Zeiler and Lee C. Hutter
1020-1040	Experiments and computer modeling of fire spread in trees William Mell, Alex Maranghides, Samuel Manzello and Ronald Rehm	Communicating the wildland fire message: Influences on knowledge and attitude change in two case studies. Eric Toman and Bruce Shindler	Analysis of fuel variability within the landscape-scale of Rocky Mountain Region: Integration of Field Data, Geospatial Information, and Spatial Statistics Mohammed A. Kalkhan, Karl E. Brown, Cory B. Bolen and Diane C. Abendroth
1040-1100	An Experimental Study on the Ignition of Fuel Beds by Firebrands in Wildland/Urban Interface (WUI) Fires Samuel L. Manzello, Thomas G. Cleary, John R. Shields, Alexander Maranghides, William Mell and Jiann Yang	The Public and fuels management: Science findings on social understanding, beliefs, and acceptability. Sarah McCaffrey	Evaluation of Hazardous Fuel Reduction Treatments Using LIDAR Measurements in the Pine Barrens of New Jersey Nick Skowronski , Kenneth Clark , John Hom , Ross Nelson and Robert Somes
1100-1120	Modeling of Smoldering Front Propagation With Improved Emissions Estimates Carlos A. Veras, Ernesto Alvarado, David Sandberg and Joao A. Carvalho Jr	Mapping the Relationship between Wildfire and Poverty Kathy Lynn and Wendy Gerlitz	Changing Fuels Spatial Data using the Contextural Raster Editor Jeffrey L. Jones, Lee C. Hutter and Wendel J. Hann
1120-1140	A case study test of fuel management effectiveness against crown fires Dave Schroeder and Stew Walkinshaw	Social research and mitigation of wildland fire risk: Success is about communication and relationship building Jeffrey J. Brooks, Hannah Brenkert, Judy E. Serby, Joseph G. Champ, Tony Simons and Daniel R. Williams	Mapping fuels on the Okanogan – Wenatchee National Forest Crystal L. Raymond, Lara-Karena B. Kellogg and Donald McKenzie
1140-1240	Lunch, box lunch provided		

Wednesday afternoon, March 29			
	Track 1, Session 4	**Track 2, Session 4**	**Track 3, Session 4**
	Grand Ballroom I **Fire Risk Assessments** Session Chair: Melanie Miller, BLM	***Galleria*** **Multiagency Collaboration** Session Chair: Lynn Decker, TNC	***Pavilion*** **Fuel Metrics and Evaluation** Session Chair: Rick Gale, NPS retired
1240-1300	A Wildfire Risk Model for Fuels Treatment Planning Alan Ager and Mark Finney	A Collaborative Approach to Community Wildfire Hazard Reduction Marc Titus	Performance Measures in Fuels Management Douglas B. Rideout, Andrew G. Kirsch and Stephen J. Botti
1300-1320	Canadian Community Wildfire Protection Plans focus on Forest Inventory John Davies and Clark Woodward	Partnering to Increase Success: Getting the Public to Relate to Wildland Fire Mitigation Joseph G. Champ, Jeffrey J. Brooks and Daniel R. Williams	The Fire Behavior Assessment Tool – Integrating Multiple Fire Behavior Variables into a Stand-level Metric Characterizing Fire Behavior Jeffrey L. Jones and Dale A. Hamilton
1320-1340	Variation in surface and crown fire hazard with stand age in managed Coastal Western Hemlock zone forests in southwestern British Columbia Michael C. Feller and Stefanie L. Pollock	Organizational Characteristics that Contribute to Success in Engaging the Public to Accomplish Fuels Management at the Wilderness/Non-Wilderness Interface Katie Knotek and Alan Watson	Measuring Success in Your Fuels Program: From the Report Card to Valuable Learning Paula A. Nasiatka and David Christenson
1340-1400	Using quantitative risk assessment to evaluate fuel treatment effectiveness Joe Scott	Collaboration: A Key to Success Jeff Casey	Fuel Treatment Success: What are the Metrics? Elizabeth Reinhardt
1400-1420	A weighted, data-driven GIS model for assessing changes in fire risk associated with fuels treatment Crystal A. Kolden and Timothy J. Weigel	Promotion of Fine Fuel Management – Western Wildfire Impact Reduction Resource Center Jennifer Vollmer	
1420-1440	Afternoon Break		
1440-1640	***Grand Ballroom I*** Panel: **How do we define success in fuels management?** Moderator: Jack Cohen, USDA Forest Service, Missoula Fire Laboratory Panelists: Greg Aplet, The Wilderness Society, Denver, CO Steve Arno, USDA Forest Service, Missoula Fire Laboratory, retired Howard Roose, BLM, NIFC Paul Langowski, USDA Forest Service, Region 2 Jon Keely, USGS Western Ecology Center, Sacramento, CA Rocky Barker, Idaho Statesman, journalist & author, Boise, ID		
1640-1710	***Galleria*** International Association of Wildland Fire member meeting		

Thursday morning, March 30			
0715-0755	***Coffee and Continental Breakfast***		
0755-0800	***Grand Ballroom I*** **Featured Speakers** Session Chair: Bret Butler, USDA Forest Service Research		
0800-0830	***Grand Ballroom I*** **Trans-Tasman Perspective: Fuel Management—an Integral Part of Fire Management** Jim Gould, Program Leader, Bushfire CRC, Australia		
0830-0900	**Forest Fuels Management in Europe** Gavriil Xanthopoulos, Natural Agricultural Research Foundation, Greece		
0900-0915	Raffle drawing and Wildland Firefighter Foundation overview, Vickie Minor		
0915-0930	Award Announcement		
0930-1000	Morning Break		
	Track 1, Session 5	**Track 2, Session 5**	**Track 3, Session 5**
	Grand Ballroom I **Treatment Optimization Tools** Session Chair: Melanie Miller, BLM	***Galleria*** **Case Studies** Session Chair: Tim Rich, USFS	***Parlor A-B*** **Fuel Treatments** Session Chair: Sally Haase, USFS
1000-1020	Strategic Placement of Treatments (SPOTS): Maximizing the Effectiveness of Fuel and Vegetation Treatments on Problem Fire Behavior and Effects Diane M. Gercke and Susan A. Stewart	Incidental Hazardous Fuel Reduction Benefits from Biomass Removal for Endangered Species Management in Central Georgia – A Case Report Carl Schmidt	Roadside Thinning at Yosemite National Park: Monitoring effectiveness and other resource concerns Kara J. Paintner, Monica S. Buhler and Jennifer S. Hooke
1020-1040	Fire Simulation Modelling: Application and Validation Tonja Opperman, Jim Gould and Mark Finney	Cooperative fire management in the Dandenong Ranges, Victoria, Australia Jack Dinkgreve	Measuring Effectiveness of Fuel Treatments Across National Forests in California: a Practical, Programmatic Approach Jo Ann Fites, Carol Ewell and Erin Noonan
1040-1100	Guidance on Landscape Wildland Fire Analysis: Models, Tools, and Techniques Rick Stratton	Fire Management in the Inter-Galactic Interface or Thirty Years of Fire Management on Merritt Island National Wildlife Refuge Frederic W. Adrian	Fire Severity and Intensity in Natural and Manipulated Fuels During Spring Burning in Mixed Shrub Woodlands Tim Bradley, Jennifer Gibson and Windy Bunn
1100-1120	A Computational Method to Optimize Fuel Treatment Locations Mark A. Finney	Evaluating Risks Associated with Forest Management Scenarios in Areas Dominated by Mixed Severity Fire Regimes in Southeastern New Mexico Aaron M. Ortega, David S. Martinez and Roy A. Hall	Impacts of thinning and prescribed burning treatments on predicted wildfire behavior and tree health in an old-growth ponderosa pine and western larch stand Michael G. Harrington, Anna Sala and Carl Fiedler
1120-1140		An Interagency Approach to Prioritizing Fuels Treatments Paul Briggs, Dana Cohen, Brett Fay, Bruce Fields, Taiga Rohrer, John Schmidt, Cyndi Sidles, Scott Tobler and David Eaker	Assessing Mitigation of Wildfire Severity by Fuel Treatments Erik J. Martinson and Philip N. Omi
1140-1300	Lunch on your own		

Thursday afternoon, March 30

	Track 1, Session 6	Track 2, Session 6	Track 3, Session 6
	Grand Ballroom I **LANDFIRE** Session Chair: Tim Swedberg, JFSP	***Galleria*** **Fire Effects** Session Chair: Nathalie Lavoie, BCMoFR	***Parlor A-B*** **Fire Surrogate Study/Biomass Utilization** Session Chair: Mark Kaib, USFWS
1300-1320	LANDFIRE: Landscape Fire and Resource Management Planning Tools Project Kevin C. Ryan, Mathew G. Rollins, Kristine M. Lee, Zhi-Liang Zhu, James L. Smith and Kelly Pohl	Monitoring changes in soil quality from salvage logging in the Inland Northwest Deboarh S. Page-Dumroese and Martin F. Jurgensen	The National Fire and Fire Surrogate Study - Effects of alternative fuel Jon E. Keeley and Dylan Schwilk
1320-1340	Fuels Products of the LANDFIRE Project Matt C. Reeves	Grid-based monitoring and gradient modeling to quantify cumulative effects of fuels treatments Samuel A. Cushman and Kevin S. McKelvey	The Effects of Fire and Fire Surrogate Treatments on Vegetation, Surface Fuels, and Potential Fire Behavior in Western Coniferous Forests Scott L. Stephens and Jason J. Moghaddas
1340-1400	A Rapid Assessment of Fire Regime Condition Class for the Conterminous United States James Menakis, Ayn Shlisky and Kelly Pohl	Predicting Ground Fire Potential in Aspen Communities Stephen G. Otway, Edward W. Bork, Kerry R. Anderson and Marty E. Alexander	The Effects of Fire and Fire Surrogate Fuel Treatments on the Abundance of Snags and Coarse Woody Debris in a Sierran Mixed Conifer Forest Scott L. Stephens and Jason J. Moghaddas
1400-1420	LANDFIRE Rapid Assessment: Data, Tools and Applications for Fire Regime Restoration and Planning Darren Johnson	Best predictors for post-fire mortality of ponderosa pine trees in the intermountain west Carolyn H. Sieg, Joel M. McMillin, James F. Fowler, Kurt K. Allen, Jose F. Negron, Linda L. Wadleigh, John A. Anhold and Ken E. Gibson	Fuel structures created by commercial forestry in Finland Heidi Tanskanen
1420-1440	LANDFIRE Outreach and Technology Transfer Doug Havlina	The relation between forest structure and burn severity Theresa B. Jain	Biomass utilization modeling on the Bitterroot National Forest J G. Jones, Robin P. Silverstein, Martin Twer, Hans R. Zuuring and David E. Calkin
1440-1500	Afternoon Break		

Afternoon tracks continued on next page

Thursday afternoon, March 30 (continued)			
	Track 1, Session 7	**Track 2, Session 7**	**Track 3, Session 7**
	Grand Ballroom I **Fire Weather/Climate** Session Chair: Paul Woodard, Univ. of Alberta	***Galleria*** **Fuels Management Economics** Session Chair: Katie Knotek, USFS	***Parlor A-B*** **Fuel Treatment Market Model FTM-West** Session Chair: Peter Ince USFS
1500-1520	Predicting Fire Season Severity in the Pacific Northwest Paul Werth	An Integrated Approach to Fuels Treatment in the Southwestern U.S., The Harvest-Cost-Revenue Estimator Eini C. Lowell and Dennis R. Becker	Estimation of potential woody biomass supply from treatments to reduce fire hazard in the U.S. West Kenneth E. Skog and Jamie Barbour
1510-1540	The role of climate in successful fuels management Crystal A. Kolden and Timothy J. Brown	Comparing the cost effectiveness for three options of improving modeled home survival when wildfire threatens structures in the wildland urban interface Keith D. Stockmann	Design and Objectives of FTM-West Model Peter J. Ince and Henry Spelter
1540-1600	Fire Forecasting with the MC1 model: Past and Future Forecasts Ronald P. Neilson, James M. Lenihan, Dominique Bachelet and Raymond J. Drapek	Reduction of potential fire behavior in wildland-urban interface communities in southern California: a collaborative approach Christopher A. Dicus and Michael Scott	Tree-to-Sawlog Ratios for the FTM-West Model Dennis Dykstra
1600-1620	WindWizard: A new tool for fire management decision support Bret W. Butler		FTM-West Model Results for Selected Fuel Treatment Scenarios Andrew Kramp and Peter J. Ince
1620-1700	***Grand Ballroom I*** Conference Summary and Closeout Jeff Jahnke, Colorado State Forester		

Workshop Summary

Science Synthesis and Integration- Science Synthesis: FuelsTools

Anne E. Black
Aldo Leopold Wilderness Research Institute

This workshop will provide an overview and brief hands-on training of the National Science Synthesis and Integration products: Science Synthesis:FuelsTools. The project has produced a variety of written syntheses of existing information on the effects of fire and fuels treatments on the social, ecological, economic and fire behavior characteristics of dry, interior forests of the western US. The project also provides web-access to software that helps managers assess the financial effects (MyFuelTreatment Planner), effects on fire behavior (FVS-based Guidebook), smoke (SIS), watersheds (WEPP-FuMe), terrestrial wildlife (Wildlife Habitat Response Model), understory plants (Understory Response Model), and root rot (*Armillaria* Response Tool). The website also provides links to other useful programs, library search engines and document retrieval sites.

Using Fireshed Assessments to Measure Landscape Performance

Bahro, B., Barber, K., Perrot, L., Sherlock, J., Taylor, A., Wright, K., and Yasuda, D.

Fireshed assessment is a method for designing and scheduling fuels and vegetation management treatments to change outcomes of “problem” fires. The fireshed assessment process is based on the premise that management actions (in the form of fuels treatments located to modify fire behavior) can affect the outcome of a wildland fire: how large it gets, where it burns, and how severely it affects communities, habitats and watersheds. The Fireshed process assumes that, by using a carefully designed pattern of treatment areas, managers can treat a fraction of the landscape to achieve intended modifications in wildland fire behavior. Treated areas slow the spread and lower the intensity of oncoming fires, reducing damage to both treated and untreated areas and ultimately reducing the size and severity of wildland fires. For this strategy to be effective (1) the pattern of area treatments across the landscape must interrupt fire spread, and (2) treatment prescriptions must be designed to significantly modify fire behavior within the treated areas. Treatments for modifying wildfire behavior can also be designed to meet multiple resource objectives, such as improving forest health and providing habitats for at-risk species over the long-term.

Introduction to state-and-transition modeling of vegetation change using the Vegetation Dynamics Development Tool (VDDT)

Colin Daniel, ESSA Technologies
Kelly Pohl, The Nature Conservancy's Global Fire Initiative

The Vegetation Dynamics Development Tool (VDDT) is a public-domain, probabilistic state-and-transition model that provides a framework for quantifying the rate and effects of vegetation change on a landscape. Users partition the landscape into states (e.g., combinations of cover and structure) and define the transitions (e.g., disturbances, succession, and management) that cause movement between classes.

VDDT is currently being used by several agencies and organizations across North America to model the effects of fire on landscape vegetation composition. This workshop will introduce participants to state-and-transition modeling concepts, demonstrating use of VDDT to develop state-and-transition models for fire and fuel management and present state-and-transition model case studies associated with fire and fuel management and scenario testing including LANDFIRE vegetation modeling and development of reference conditions for Fire Regime Condition Class assessments.

Spatially explicit landscape-level modeling of vegetation change using the Tool for Exploratory Landscape Spatial Analysis (TELSA)

Colin Daniel, ESSA Technologies
Kelly Pohl, The Nature Conservancy's Global Fire Initiative

The Tool for Exploratory Landscape Spatial Analysis (TELSA) is a public-domain, stochastic simulation modeling framework for predicting spatial and temporal changes in vegetation over larger landscapes – typically up to one million hectares. Users are able to represent the interaction of succession, natural disturbances (e.g. fire, wind, and insects) and management using a probabilistic "state-and-transition" approach. The model also captures the spatial spread of natural disturbances (e.g. fire) across the landscape. Agencies currently using TELSA include the US Forest Service, The Nature Conservancy, Parks Canada, British Columbia Ministry of Forests and Ontario Ministry of Natural Resources.

This workshop will present an overview of the modeling approach used in TELSA and demonstrate how to use TELSA to develop spatially-explicit landscape models for fire and fuel management and present TELSA model case studies, including a project to determine the bounds of natural variation in vegetation composition and structure for the Great Lakes – St. Lawrence forest region of Ontario.

FIREMON

Duncan Lutes
Missoula Fire Sciences Lab

FIREMON is a comprehensive monitoring system that is designed to satisfy the monitoring requirements of most fire management agencies in the United States. It allows consistent and comprehensive sampling of fire effects so data can be evaluated for significant impacts, shared across agencies, and used to update and refine fire management plans and prescriptions.

FIREMON consists of four main components: (1) Integrated Sampling Strategy, (2) sampling methods that allow users to assess many ecosystem attributes, (3) common data storage in the Microsoft Access-based FIREMON database, and (4) an Analysis Tools package that can summarize data across a number of plots by any stratification and provide statistical comparison of re-measured plots using a standard multiple comparison method. Text and graphical reports can be exported into documents using standard cut-and-paste commands. The Analysis Tools package also converts tree and fuels data into files suitable for use in the Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS).

This two-hour workshop will provide a brief overview of FIREMON components including examples.

Help with using the 40 new fire behavior fuel models

Joe H. Scott, Systems for Environmental Management

A new set of 40 standard fire behavior fuel models was recently made available for use in a variety of fire behavior prediction systems, including: BehavePlus, FARSITE, FFE-FVS, FlamMap, FMAplus, and NEXUS. This workshop describes characteristics of the new fuel model set, its development, and its relationship to the original set of 13 fire behavior fuel models. Workshop participants will learn first *whether* their specific application might benefit from using the new fuel models, and secondly *how* to begin using them. We will demonstrate several tools available to assist users transition to using the new fuel models, including (1) a fuel model selection guide, (2) a fuel model crosswalk, (3) an electronic helpfile with standard fire behavior comparisons among fuel models, and (4) a spreadsheet for comparing any original or new standard fire behavior fuel models under standardized fuel conditions. Finally, we will review recent national and regional efforts to implement the new fuel models, and discuss the lessons learned from those projects.

Use of FlamMap for Fire & Fuels Planning

Mark A. Finney
Missoula Fire Sciences Laboratory

FlamMap performs fire behavior calculations for landscape data and can be used for a variety of fire and fuel planning activities. FlamMap generates information on fire behavior variables given user-supplied inputs for weather and fuel moisture. The workshop will address uses of FlamMap for 1) landscape fire behavior calculations as, for example, used in risk assessment, 2) use of FlamMap for calculating growth of individual fires, and 3) evaluating landscape-level fuel treatment opportunities

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A Suite of Fuel Management Tools: Fuel Characteristic Classification System, Natural Fuels Photo Series, and Consume 3.0

Roger D. Ottmar, Cynthia L. Riccardi, Susan Prichard, Robert E. Vihnanek, and Clint S. Wright, Pacific Northwest Research Station

The Fuel Characteristics Classification System (FCCS) is a user-friendly computer program that allows users to build, characterize and classify fuels throughout North America. The system offers consistently organized fuels data along with numerical outputs to fire behavior, fire effects, and dynamic vegetation models. The FCCS calculator outputs assigned and calculated fuel characteristics and lists results by the fuelbed, stratum, category and subcategory. The system also calculates fire potentials which provide an index of the intrinsic capacity of each fuelbed for surface fire behavior, crown fire and available consumption of fuels.

Photo series are useful tools to quickly and inexpensively evaluate vegetation and fuel conditions in the field. The natural fuels photo series is a collection of data and photographs that collectively display a range of natural conditions and fuel loadings in a wide variety of ecosystem types throughout the Americas from central Alaska to central Brazil.

Consume 3.0 is a user-friendly software application for estimating fuel consumption and emissions produced. Land managers and researchers input fuel characteristics, lighting patterns, fuel conditions, and meteorological attributes, then Consume outputs fuel consumption and emissions by combustion phase. Consume can be used for all forest, shrub and grasslands in North America.

Fire and Fuels Extension to the Forest Vegetation Simulator Workshop

Stephanie Rebain
Forest Management Service Center, Fort Collins

The Fire and Fuels Extension (FFE) is a model used throughout the United States to examine potential fire behavior and effects under various management scenarios. Because FFE is linked to the Forest Vegetation Simulator (FVS), an individual tree growth and yield model, it can assess both short and long term effects of fuel treatments and other management activities. Model outputs include estimates of fuel loading, snag levels, and potential fire behavior and effects over time. A variety of management activities can be simulated included thinning, prescribed burning, regeneration harvests, and planting.

This workshop will consist of a presentation describing the FFE-FVS model and a demonstration of some of its capabilities.

Fire Regime Condition Class: Concepts, Methods, and Applications

Doug Havlina, Bureau of Land Management,
Steve Barrett, Ecologist

The Fire Regime Condition Class (FRCC) concept serves as one benchmark of ecological health related to fire regimes and vegetation variables. Since its inception in the late 1990's, it has been applied in multi-scale assessments in many facets of natural resource planning. While initial FRCC mapping depicted national trends (i.e., 1 km^2 resolution), the process has evolved to characterize landscapes, watersheds, and project areas. In this workshop, participants will learn both qualitative and quantitative tools for FRCC evaluation through assessment of virtual landscapes.

In Portland, FRCC Working Group members will present a half-day workshop to provide an overview of the Fire Regime Condition Class assessment process. Workshop goals will be to: 1) educate the audience about state-of-the-art FRCC assessments, 2) generate class questions and discussions about FRCC, and 3) stimulate the audience to pursue FRCC user certification at a later date, if desired. This workshop will provide a combination of overview lectures, tool demonstrations, and an optional "hands-on" scenario exercise for interested participants, if time allows.

Invited Speakers

Be a Change Agent and Change the Strategy

Jerry Williams, State of Montana (retired)

Abstract:
Disasters have been around since man was there for the event. By definition, a disaster is "A natural or human-caused event which causes negative impacts on people, goods, services and/or the environment, exceeding the affected community's capability to respond". Over time, events that would not have been disasters, or even emergencies, are now major catastrophes. The increase in world population, the movement of this population to vulnerable areas, and a worldwide attitude that "the government will take care of me" has created a situation where great numbers (100's of thousands) of people die, and enormous costs (100's of billions of dollars) are incurred in relief and reconstruction. Around the world, disasters are a growth industry. At any one time there are as many as 40 major relief efforts going on by government agencies and non-governmental organizations. The major events make the news and some stay in the media focus for months or years. A large wildland fire might stay on the radar for a week or two and then disappear. Hurricane Andrew is still referred to, and Katrina and the Tsunami will be in the news for many years to come. In the world of disasters, wildfires are a passing thing.

Sixty years ago, we suppressed fires to protect the renewable resources that we were managing for the products they produced and the economies they supported. We said wildfire was bad. Hail Smokey. Then we said fire was natural and good. Then a bunch of folks lost their homes from our "prescribed" fires. Then we said we are from the government and we know what is best. Today we are in the woods wrapping houses in aluminum foil to protect them from the results of our actions or non-actions over those years. Since 1871, the death toll from wildfires is less than 3400. There is no count on structures, but then how many have burned off of the same foundation more than once?

There is a well know axiom of management, "If you do things the way you have always done them, you will get the results you have always gotten". So, it's time to find a new approach and a new horse to ride. When the insurance companies stopped paying for burned down buildings in Boston and Butte, the fires stopped. When the insurance companies stopped paying for blown down houses in the Caribbean, the people started following the building codes to build new ones. The same thing is happening in Florida and now the gulf coast. In Latin America, the West Indies and the South Pacific, business and government are working together to reduce the risk of disaster by eliminating hazards where possible and really focusing on reducing vulnerability. The best results are obtained at the individual and community levels. The Fire Safe Councils of southern California are a start but need a bigger stick to wield.

In the US, the Federal Aviation Administration (a large monolithic agency made of stone) has proposed a whole new approach to reduce the risk of general aviation accidents. And it is not regulation. Some very creative folks are going to change the way we teach people to fly. And the insurance companies are a key player in this effort.

There are some very creative folks in the wildland fire business. It's time for you to get off your bureaucratic backsides, become change agents, and get on with it.

Bio:

- Colorado State University, BS in Forestry 1957
- US Army National Guard, 1957-1995, Helicopter Pilot
- South Dakota Division of Forestry, 1957-1968, State Fire Control Forester
- Montana Division of Forestry, 1968-1986, Rural Fire Coordinator, Fire Training Officer
- US Office of Foreign Disaster Assistance, 1988-2003, Training Advisor
- Sonoran Wings Flight Training Centre, Inc, Owner/Manager
- Charter member of the Fire Training Working Team of NWCG, 1974-1984.
- Co-author of the S390 Fire Behavior individual study course. Assisted with the development of S490 and S590.
- Developer and/or subject matter expert for most of the S-courses.
- Qualified Level 1 Incident Commander/Area Commander
- Developer/coordinator/instructor of many disaster management courses presented in many of the developing countries of the world.
- Worked with the Australian Emergency Management Agency in the development of the Emergency Operations Centre course now taught throughout the South Pacific.
- Assisted the International Centre for Diarrheal Disease Research, Bangladesh, in the development of a course on prevention and treatment now used throughout the world.
- Has traveled to 50 foreign counties and instructed participants from 73 countries.
- Has been involved with the response and relief to earthquakes (7.4 in Costa Rica), floods (Jamaica), hurricanes (Andrew), and blizzards (South Dakota ’66).
- Is currently working with the FAA on the development of a new concept in the training of pilots.

Is there a normal fire regime in an always changing environment?

Daniel B. Botkin, Research Professor, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara

Abstract:
We have made a lot of progress in developing plans for prescribed fires as part of forest management, including a growing recognition by the public that fire is a natural process and that forests have natural fire regimes. But much still remains to be done, and an important part of this work concerns how we think about forest fires. We understand
today that change is natural in forest ecosystems, but in spite of our formal knowledge of the naturalness of change, our mind-set tends to remain stuck in the older ideas of a fixed climax forest and that a "natural" forest is basically unchanging over time. Part of the problem is our terminology. As long as we continue to talk about "restoring" forests, we will tend to think about them the way we think about a damaged painting or coffee table:
something that has a "right" condition to which we must restore it. We need to come to better terms with the naturalness of change, and to consider what it means to develop a fire regime within the context of a naturally changing climate and also within the context of a potentially global warming climate. Part of the solution is to improve the way we view forests as ecosystems and within a landscape perspective. And we need to keep asking ourselves how well we have gotten to public to understand these new concepts. In this presentation I will discuss these ideas and suggest what we might do to improve forest fire management in the future.

Bio:
Daniel B. Botkin has had a distinguished career in forest ecology. He developed the first successful computer model of forest growth, still used worldwide. He pioneered attempts to forecast the potential effects of global warming on forests. His research includes the first estimates of biomass of large areas of the world's forests. His book, Discordant Harmonies: A New Ecology for the 21st Century (Oxford University Press) helped revolutionize how we think about forests. As an advisor to NASA, he led the development of the application of remote sensing to forests; as an advisor to the National Science Foundation he ran workshops that created the Long-term ecological research program. He has been on the faculty of the University of California, Santa Barbara, Yale University's School of Forestry and Environmental Studies, and George Mason University.

Among his many honors are:

- Textbook Excellence Award, Text and Academic Authors Assn. (For Environmental Science: Earth as a Living Planet, 4th edition (Wiley))
- Elected to Environmental Hall of Fame, at California Polytechnic Institute, Pomona, CA.
- Fernow Award for Outstanding Contributions in International Forestry, given by American Forests and the German Forestry Association.
- Mitchell International Prize for Sustainable Development, 1st prize, 1991
- Fellow, Rockefeller Bellagio Study and Conference Center, Como Italy, 1985
- Fellow, East-West Center, Honolulu, Hawaii, 1985-86; 86-87
- Fellow, American Association for the Advancement of Science (Elected 1986)
- Sigma Xi National Lecturer, 1981 - 82; 1982 - 83.
- Distinguished Visiting Professor at a number of universities including Notre Dame and Michigan State University.

Federal Fuel Management Programs: Reducing Risk to Communities and Increasing Ecosystem Resilience and Sustainability

Tim Sexton Branch Chief - Fire Use, USDA – Forest Service, National Interagency Fire Center, Boise, Idaho.

Abstract:
During the last twenty years there has been a significant increase in large, costly wildfires which have damaged natural resources and improvements on public and private lands. A great deal of scientific research points to fuel accumulations and changes in species composition and plant community structure as principal reasons for these costly, damaging wildfires. The primary five federal agencies with wildland fire management responsibilities (US Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and US Fish and Wildlife Service) are coordinating efforts to manage fuels to reduce the likelihood of large, damaging wildfires. The National Interagency Fuels Coordination Group (NIFCG) with representatives from the five primary federal wildland fire agencies has been tasked to coordinate federal strategies for mitigating wildfire hazards through fuel treatments. These agencies have agreed on several key goals and objectives for managing the fuels problem. These include:

- aligning federal fuels management policies, practices, and procedures
- prioritizing fuel treatments which key components of Community Wildfire Protection Plans, provide natural resource products for local economies, reduce hazard on a landscape scale, and are cost-effective
- expanding wildland fire use as a means of treating fuels
- providing support for development and deployment of technologies for facilitating planning and implementation of fuel reduction projects
- restoring and maintaining ecosystems so that they are resilient to disturbance and sustainable in the goods and services which they provide to the American Public.

In addition to the key goals and objectives, NIFCG provides leadership and coordination in the development and implementation of an effective interagency fuels management program including addressing risks from severe fires in WUI communities and restoring healthy ecological systems in other wildland areas.

Bio:
Tim worked seasonally as a survey aid, fire and fuels crewmember, and crewboss on the Shasta-Trinity National Forest and Gifford Pinchot National Forest from 1970 to 1975. From 1976 to 1978 he served as a Fire Operations Technician with the BLM at the Boise Interagency Fire Center. In 1978 Tim moved to the Umpqua National Forest in southwest Oregon serving as Assistant Fire Management Officer and later as District Fuels Specialist. In 1981, Tim was selected as the Superintendent of the Redmond Hotshot Crew. In 1986 he accepted the District Fire Management Officer position at Chiloquin Ranger District on the Winema National Forest in south central Oregon.

In 1998, Tim transferred to the National Park Service as Wildland Fire Specialist for the NPS Intermountain Region in Denver, Colorado. In 1999, Tim moved to the National Interagency Fire Center in Boise, Idaho accepting a position with NPS as the National Fire Ecologist. In 2003, Tim accepted his current assignment as US Forest Service Fire Use Program Manager.

Tim has served on Fire Use Management Teams as IC, PSC, OSC, LTAN , and FBAN. He has served on Type II IMTs as LSC, PSC, FBAN, and IC. He has served on Type I IMTs as FBAN, Operations Section Chief and Incident Commander. He has conducted prescribed burns as a RXB1 in five states.

Tim earned a B.A. in History from Boise State University and an M.S. in Fire Ecology from Oregon State University. His personal interests include photography, skiing, reading, hunting, fishing and woodworking.

Canadian Wildland Fire Strategy: A Vision for an Innovative and Integrated Approach to Managing the Risks

Kelvin Hirsch, Natural Resources Canada, Canadian Forest Service

Abstract:
The Canadian Wildland Fire Strategy (CWFS) provides a vision for a new, innovative, and integrated approach to wildland fire management in Canada. It was developed under the auspices of the Canadian Council of Forest Ministers as a result of the socio-economic impact of recent forest fire seasons, especially 2003 in western Canada, increasing emphasis of all levels of government on public safety, and recognition of the increasing vulnerability to wildland fire coupled with a declining fire management capability.

The CWFS seeks to balance the social, ecological, and economic aspects of wildland fire through a risk management framework that emphasizes hazard mitigation, preparedness, and recovery as well as efficient fire suppression and response. This strategic and holistic approach is needed to address both the root causes and symptoms of current and future wildland fire management challenges.

The desired future state advocated in the CWFS is one consisting of communities that are empowered to enhance their own safety and resilience, forest ecosystems that are healthy and productive, and wildland fire management agencies that utilize modern business practices. To foster change in attitudes, policy, and practices, the highly independent provincial, territorial, and federal governments are currently working collaboratively to create a joint cost-shared program in excess of 1 billion dollars over 10 years to address 4 strategic objectives: (i) pan-Canadian FireSmart initiative, (ii) wildland fire preparedness and response capability, (iii) public awareness and risk and policy analysis, and (iv) innovation. The underlying tenet is that managing the risks from wildland fire is a shared
responsibility of individuals, stakeholder groups, the private sector, and all levels of government and therefore requires integrated and cooperative actions.

Bio:
Kelvin Hirsch works with Natural Resources Canada, Canadian Forest Service (CFS) in Edmonton, Alberta, Canada. He is currently the manager of the fire program at the Northern Forestry Centre (NoFC), co-leader of the Canadian Wildland Fire Strategy “core team”, and scientific director for the Canadian Climate Impacts and Adaptation Research Network (C-CIARN) Forest Sector. Kelvin has worked with CFS since 1984 doing research and technology transfer in the fields of fire behaviour, wildland-urban interface, and integrating fire and forest management. Kelvin has a B.Sc.F. from the University of Alberta (1984) and a M.Sc.F. from the University of Toronto (1996). Outside of work Kelvin enjoys spending time with his wife Mary and their two teenage boys, Matthew and Russell.

A landscape approach to fire restoration

Greg Aplet, The Wilderness Society

Trans-Tasman Perspective: Fuel management- an integral part of fire management

Jim Gould, Program Leader, Bushfire CRC, Australia

Abstract:
Although Australia and New Zealand have quite different fire climates and fuels, the understanding of fire behaviour underlies many facets of fire management in both countries. Fire management is the legal responsibility of various government land management agencies that manage government land; and individuals, local governments or corporations that manage private land. Specific activities such as fire suppression and fuel management volunteer bushfire/rural brigades have been formed throughout the rural and peri-urban areas and are coordinated by rural and metropolitan fire authorities. During the last two decades there has been an increasing interaction between Australia and New Zealand rural and land management fire agencies exchanging fire management practices, lessen learnt, common incident command systems and more recently in partnership in their research programs.

Both countries face a similar array of challenges in meeting their fire management objectives and the task is becoming increasingly difficult. As a government service, fire management has been subject to the financial pressures resulting in staff reductions and erosion of traditional levels of fire management resources. Resources are declining at a time when demands for protection by the general community are increasing. Concurrently, the demands for ecologically appropriate fire management practices and concerns about the long-term impacts of prescribed burning have led to suggestion that, in some areas, fire is adversely affecting biodiversity and long-term sustainability of natural ecosystems. These issues are overlain by debate about how fire can affect climate change, greenhouse gas balance at the landscape and national level, and to whether those changes are being exacerbated by managed and/or wildland fires.

Bio:
Jim Gould is Group Leader with Ensis Bushfire Research Group (the joint forces of CSIRO (Australia) and SCION (New Zealand) and Program Leader with the Bushfire CRC Safe Prevention, Preparation and Suppression Program. Jim has been working with CSIRO for over 20 years with his first project in evaluation of air tankers and a cost-benefit study of aerial suppression of bushfires. Completion of this study, Jim concentrated his research into fire behaviour and fuel management of various vegetation types throughout Australia. The results of this research has been a revision of grassland fire behaviour models, prescribed burning guidelines for regrowth forest in SE New South Wales. He has published a number of scientific papers on fire behaviour science in national and international journals. Jim is currently working with other bushfire scientists from CSIRO and Western Australia investigating the behaviour and spread of high-intensity bushfires in dry eucalypt forests with different fuel ages and understorey vegetation structures. Jim current research role is coordinating research project for both Ensis and the Bushfire CRC in the area of fire behaviour, fire weather, and suppression technology and bushfire risk management.

Forest fuels management in Europe

Gavriil Xanthopoulos, National Agricultural Research Foundation, Greece

Abstract:
The problem of forest fires is intense in the countries of Southern Europe. Reasons such as abandonment of rural areas, tourism increase and development of wildland-urban interface areas have increased the incidence of fires and the annually burned area sharply in the last three decades. In response, the fire suppression capacity in all countries increased substantially, as well as the firefighting cost. This increase has brought some results but in bad fire seasons the potential for major disasters is still there, as demonstrated by the last three catastrophic fire seasons in Portugal. The need for reducing fire hazard through active fuel management is quite obvious, but, in general, little funding is diverted from suppression to prevention.

Current fuel management practices vary considerably between countries. Topography, forest and forest fuel characteristics, size and compartmentalization of forest, forest management practices, land uses, land ownership, size of properties, legislation, and, of course, tradition, are reasons for these differences.

Firebreak construction, although not as clearly favored as in the past, is still a prominent fuel management technique. Fuelbreak construction has been adopted quite extensively in the last decades. Fuel treatments along the sides of roads are common. Use of prescribed burning is generally very limited. However, in most countries, fire is used quite extensively, but illegally, by shepherds. Furthermore, stubble burning is a very common type of fire use, which often becomes source of wildfires. Grazing of cattle, sheep and goats is very common in the wildlands of Mediterranean countries. In spite of many recent social changes, it is still prevalent. Although its effect is often negative, when the carrying capacity of the land is exceeded, it does offer a significant contribution towards controlling fuel accumulation. In some cases animal herds are actively used as means for controlling vegetation re-growth in areas of fuel treatment.

The work presented here is an effort to provide a good overview of fuel management activities in the European countries, mainly those with Mediterranean climate, simultaneously making comparisons between them. In doing so, it is tried to investigate the reasons that have led to the current practices.

Bio:
Dr. Gavriil Xanthopoulos is a forester specialized in Forest Fire Science. He has earned his Forestry Degree from the Aristotelian University of Thessaloniki, Greece in 1981 and his M.Sc. and Ph.D. degrees in Forestry with specialization in Forest Fires at the University of Montana, U.S.A., in 1986 and 1990 respectively. In 1992 he founded his own consulting firm “Natural Resource Technologies Consulting”, which he operated until 2001, when he joined the Institute of Mediterranean Forest Ecosystems and Forest Products Technology, which belongs to the National Agricultural Research Foundation of Greece, as a forest fire researcher.

In his career until now, Dr. Xanthopoulos has participated in 16 competitive research projects funded by the European Union as well as one project funded by the Greek General Secretariat for Research and Technology. He has taught forest fire related subjects in numerous firefighter training programs, university level seminars, and advanced post-graduate courses, and has worked as assistant professor at the Forestry College in Drama Greece. In parallel, he has acquired first-hand experience on operational fire management issues as member to various organizational committees appointed by the Greek Minister of Agriculture and as specialized advisor to the General Secretary of Forests and Natural Environment (1994-

1996). He also served for three years (1999-2001) as technical advisor on forest fire issues to the Greek Minister of Public Order who has the responsibility for the Greek Fire Service, and participated in a consulting committee supporting the General Secretary of Civil Protection (2001-2002). During this time (1995-2004) he has been responsible, either personally or as member of a team, for the daily preparation of the operational Fire Danger Prediction Map for Greece during each fire season.

Dr. Xanthopoulos has joined the International Association of Wildland Fire since the early 1990s, and currently serves as a member of the Board of Directors. He is an associate editor for the "International Journal of Wildland Fire" and has often offered his services as a reviewer for this and other scientific journals. He has also served many times as an evaluator of research proposals for the European Commission.

The research interests of Dr. Xanthopoulos include forest fire behavior, fire danger rating, forest firefighting and forest fuel management. His emphasis is on work that can directly benefit the operational world of forest fire management, with which he maintains good links.

Conference Summary and Closeout

Jeff Jahnke , Colorado State Forester

Bio:

Education: BS. Forestry - Michigan Technological University
MS. Forest and Range Mgt. - Washington State University

Employment History:

1970-1982	Various professional forestry positions, MT DNRC
1982-1985	Assistant Professor, State Univ. of New York
1985-1992	Chief Forest Management Bureau, MT DNRC
1992-1994	Deputy State Forester, MT DNRC
1994-1997	Regional Manager, MT DNRC
1997-2005	State Forester, AK DNR
2005-	Colorado State Forester

Worked in state natural resource management for more than 36 years, primarily in Montana and Alaska. Experienced in many state resource management programs to include fire management, state and private cooperative forestry and the management of state forested lands. Involved in fire management and suppression since 1969. Served in many fire overhead positions beginning with initial attack and culminating in service on several National Type I fire teams as Operations Section Chief and Deputy Incident Commander. Currently serving as Chairman of the National Association of State Foresters Forest Fire Protection committee, Chairman of the Colorado Forestry Advisory Board, member of the Wildland Fire Leadership Council and past Co-Chairman of the Western Forestry Leadership Coalition.

Panel Discussion Summary

Panel - Wildland Fire Use: it's not just for wilderness anymore.

Moderator: Carol Miller, Research Ecologist, USDA Forest Service, Aldo Leopold Wilderness Research Institute, Missoula, Montana.

Abstract: To meet the goals of fuels management, wildland fire and fuel managers will need to employ all available options and opportunities for reducing hazardous fuels, including prescribed fire, mechanical treatments, and wildland fire use (WFU). Until recently, the strategy of Wildland Fire Use (WFU) was reserved for a relatively small number of wilderness areas and national parks to restore and maintain the natural process of fire. WFU is increasingly being recognized and used as a valuable fuels management strategy for lands outside wilderness. This trend presents significant opportunities and challenges for wildland fire managers. Panelists will discuss the disincentives and barriers that can limit WFU and will explore how to facilitate its use. Topics addressed by the panel will include cross-boundary collaborative planning, air quality regulations, policy and implementation procedures, organizational culture, and budget and funding structures. Short presentations by the panel will be followed by a 30-40 minute discussion.

Panelists:
Marcia Andre, Supervisor, Gila National Forest
Dick Bahr, Fire Use Specialist, NPS-NIFC
Tom Nichols, Deputy Fire Program Planning Leader, NPS-NIFC
Mike Rieser, FMO, Craig/Routt Fire Management Unit, BLM
George Weldon, Deputy Director - Fire, Aviation, and Air, Forest Service Region 1

Carol Miller Research Ecologist, USDA Forest Service, Aldo Leopold Wilderness Research Institute, Missoula, Montana.

Bio: After a brief career as an engineer, Carol has found much more satisfaction in the field of landscape fire ecology. She earned her M.S. and Ph.D. degrees from Colorado State University in Forest Sciences and Ecology. Her research interests include landscape fire ecology, the effects of global climatic change on fire regimes, the use of simulation models to better understand the consequences of management decisions, and the feasibility of restoring natural fire regimes. She is currently leading the fire research program at the Leopold Institute, a cross-disciplinary program focused on wildland fire use and improving wilderness stewardship.

Marcia R. Andre – Forest Supervisor, Gila National Forest

Bio: After growing up in the farmlands of Illinois, Marcia moved to California to study forestry at the College of the Redwoods in California's beautiful redwood region. Following graduation, she joined the Forest Service and began a career path that included the Six Rivers, Lassen, and Olympic National Forests in California and Washington. She became the Forest Supervisor of the Gila National Forest in SW New Mexico in 2000. Prior to that she served, for eight years as a District Ranger in California. While the early part of her career was spent primarily in a variety of timber management positions, Marcia has been active in a number of fire management coordination and leadership roles. Her passion for the restoration of fire adapted ecosystems is well known, and in particular her support and experience with wildland fire use as Forest Supervisor on the Gila. She is an extremely active supporter for this program and is asked to speak regularly about her experiences and perspectives.
She is married with one grown son who also works for the Forest Service. She and her family are avid travelers, and enjoy a full range of mostly outdoor activities.

Dick Bahr, Science and Ecology Program Lead, Fire Management Program Center, Boise, ID

Bio: Dick's work experience consists of several years of retail sales and management while attending college and pursuing graduate course work in statistics and microbiology. He began his Park Service career in Glacier NP (1976) as a Microbiologist and moved to fire management in 1982. Dick began wildland firefighting in 1980 while in Glacier. He moved to Everglades NP in 1985 as the Cache Manager. In 1987 he returned west to Yellowstone NP as the Helitack Foreman and was promoted to the Assistant Fire Management Officer position in 1989. In 1997 he accepted the Prescribed Fire Specialist position at the NPS Midwest Regional Office in Omaha, Nebraska. In 1999 he accepted the Fuels Management Specialist for the NPS. He recently accepted the NPS Science and Ecology Program lead providing leadership and guidance to the fuels, fire use, science and ecology programs of the National Park Service.

Dick has a B.S. Degree in Microbiology from Montana State University. He attended S-590 Fire Behavior Analyst in 1989 and Rx-590 Prescribed Fire Behavior Analyst in 1994.

Mike Rieser Fire Management Officer, Bureau of Land Management

Bio: Mike began his career in Fire in 1973 with CDF in California, moving to the Forest Service in 1975. While in California Mike worked on hand crews, helitack, a variety of engines and for a spell packing mules (a great job that has better prepared him for working with upper management). In 1984 he moved to Region two, changed agencies to the BLM in 1985, working as a fuels technician in Grand Junction. In 1986 he moved to Craig as the Fire Suppression Specialist. Recently he can be found working out of Craig Colorado as the Inter Agency FMO for the Northwest Colorado Fire Management Unit. Mike has participated on overhead teams, as an Operations Section Chief on the Rocky Mountain Type 1 Team, more recently on a Fire Use Team and flies some Air Attack.

Mike owns the Baja Flyfishng Co. LLC and is currently working on his retirement plans by training Baja boat Captains how to fly fish and earn big tips from tourist anglers. This planning effort goes full time in May of this year.

George Weldon Deputy Director of Fire, Aviation and Air, USDA Forest Service, Northern Region, Missoula, Montana

Bio: George is currently the Deputy Director of Fire, Aviation and Air in the Northern Regional Office of the Forest Service. He also serves as a Northern Rockies Fire Use Incident Commander. George was formerly the Forest Supervisor on the Ashley National Forest, the Deputy Forest Supervisor on the Lewis and Clark National Forest and spent eight years as the District Ranger on the Townsend Ranger District, Helena National Forest. During his tenure on the Helena, George also briefly served as acting Natural Resources Team Leader. Prior to his stint on the Helena, George worked as assistant district ranger on the Sheridan Ranger District, Beaverhead National Forest. He also worked as fire, timber and minerals assistant for the Beartooth Ranger District, Custer National Forest, for nearly three years.

Originally from northern California, George attended Humboldt State University where he earned a bachelor's degree in forest management with a minor in forest resource conservation. His interests include hunting, fishing, camping and hiking - anything outdoors.

Tom Nichols – Deputy Fire Planning Program Leader, National Park Service, Fire Management Program Center, Boise, ID.

Bio: Tom joined the Park Service in 1977 as a seasonal park technician in Resource Management, monitoring and documenting the effects of natural and prescribed fires in Sequoia and Kings Canyon National Parks. In 1978, he returned as a seasonal for resources management, and wrote much of the Park's Fire Management Plan, Fire Monitoring Guidelines, and part of the Prescribed Burning Guidelines. In 1979, he was hired as a permanent forestry technician (fire ecology), responsible for refining the prescribed burning program and developing the prescriptions used in the various vegetation types in the Parks. He also acquired the responsibility for writing smoke management guidelines and for determining and documenting air quality in the Park.

In 1981, he became the Park's Environmental Specialist, responsible for prescribed burning, fire monitoring activities, fire effects studies, air quality monitoring, fire management training, and the refinement of the Fire Management Plan and its prescriptions and procedures. Tom was also involved in backcountry management and acid rain research. In 1992, he became the Prescribed Fire Specialist for the Western Region of the National Park Service. He became Fire Management Officer for the Pacific Great Basin Support Office in 1996, and supervised fire management programs for National Park Service units in California, Nevada, and Hawaii. In 1999 this was expanded to the entire Pacific West Region, with the addition of Washington, Oregon, and Idaho. Tom accepted the Fire Management Officer position with Yosemite National Park in 2002. In 2005, Tom moved to Boise as the Deputy Fire Planning Program Leader for the National Park Service's Fire Management Program Center.

Tom received a B.A. degree in Chemistry and Earth Sciences from the University of California at San Diego, and an M.S. degree in Biology with a specialization in Ecology from San Diego State University.

Panel - How do we define success in fuels management?

Moderator: Jack Cohen

Abstract: The success of fuels management depends first on the ability to appropriately define the purposes for managing fuels and then depends on the ability to conduct the management and appropriately determine (measure) the outcomes of those practices. The panelists and moderator will conduct a discussion with audience participation that will explore fuels management in terms of the human/management and ecological factors. The panel format will produce idea exchange and development among the panelists and moderator through discussion rather than participant presentations followed by questions.

Panelists:
Greg Aplet, The Wilderness Society, Denver, CO
Steve Arno, USDA Forest Service, Missoula Fire Laboratory, retired
Howard Roose, BLM, NIFC
Paul Langowski, USDA Forest Service, Region 2
Jon Keely, USGS Western Ecology Center, Sacramento, CA
Rocky Barker, Idaho Statesman, journalist & author, Boise, ID

Howard K. Roose – Fire Program Analysis System BLM Core Team Member , NIFC, Boise, Idaho.

Bio: Howard began his career in fire management with the Idaho Department of Lands in 1969, on the Cataldo Protective Unit. In 1971, he was a member of the Coeur d' Alene Hotshot Crew on the Coeur d' Alene National Forest. Howard remained on the crew until 1976 having served as Squad Boss and Superintendent. Howard was one of the lucky winners of the lottery, Selective Service that is and spent two wonderful years in the Army, from 1972 - 1974. In 1976, Howard transferred to the Tiller Ranger District, Umpqua National Forest in Oregon as a fuels assistant. From 1977 through 1978, he was once again the Superintendent of the Coeur d' Alene Hotshot Crew located on the Idaho Panhandle Forests. From the Hotshot crew he moved into a fuels/prescribed fire planning position on the Wallace Ranger District of the Idaho Panhandle Forests until 1983. Howard moved to the Ninemile Ranger District of the Lolo National Forest as the Assistant District Fire Management Officer and remained there until 1989, moving to the Forest Supervisor's Office as the Forest Fire Planner. Howard remained on the Lolo as the Deputy Forest Fire Management Officer until September 1999, then became the Regional Fire Planner for the Northern Region of the Forest Service in Missoula, Montana. Following a three month stay as the regional fire planner, Howard moved to the position of National Fire Planner with the Forest Service, located at the National Interagency Fire Center in Boise, Idaho.

Howard transferred to the Department of Interior, Bureau of Land Management, National Fire Planning Specialist, November of 2001and served there until June of 2002, moving into his current position working on the Fire Program Analysis System project.

Howard has attended college at North Idaho College, Universities of Idaho and Montana, majoring in Forestry.

Stephen Arno, USFS retiree

Bio: Steve is a forest ecologist who retired in 1999 from the USDA Forest Service's Rocky Mountain Research Station after 31 years in federal service. He holds a Ph.D. in forestry and plant science from the University of Montana, and has practiced restoration forestry on his family's ponderosa pine forest for over 30 years. He studied the effects of fire and the use of prescribed fire and fuel reduction treatments and authored over 100 scientific publications, but upon retirement he had to learn how to write in order to communicate! To this end he teamed up with science writer Steve Allison-Bunnell and produced the 2002 book "Flames in Our Forest: Disaster or Renewal?" Now, he is trying to learn how to peddle books, and will today be speaking about the new book co-authored by Professor Carl Fiedler called "Mimicking Nature's Fire: Restoring Fire-Prone Forests in the West."

Paul Langowski - Branch Chief for Fuels and Fire Ecology, USDA Forest Service Rocky Mountain Region

Bio: As Branch Chief for Fuels and Fire Ecology, Paul has program leadership responsibility for fuels management and fire use programs on National Forests and Grasslands lands in Colorado, Wyoming, South Dakota, Nebraska and Kansas.

Paul is a 1977 graduate of the State University of New York College of Environmental Science and Forestry, where he received a B.S. in Resources Management. His Forest Service career began in 1977 as a seasonal employee with the White River National Forest in Colorado. Since then, he has served as a resource technician on the Helena National Forest, in Montana, District Silviculturist and Timber Staff on the Kaibab National Forest in Arizona, Forest Silviculturist on the Lincoln National Forest in New Mexico and Zone Timber and Fire Management Staff on the Arapaho Roosevelt National Forest in Colorado.

Paul is a certified silviculturist and a graduate of Technical Fire Management. Paul is actively involved with integrating fire management issues into the land management planning process, and in the development of processes and procedures for the analysis of the effects of fuels treatments. He is also currently a member of the Governing Board for the Joint Fire Science Program.

Jon E. Keeley, Research Ecologist, US Geological Survey

Bio: Dr. Keeley earned his Ph.D. in botany and ecology from the University of Georgia in 1977 and has a Master's degree in biology from San Diego State University. He is currently a research ecologist with the U.S. Geological Survey, stationed at Sequoia National Park and is an adjunct professor in the Department of Ecology and Evolutionary Biology at the University of California, Los Angeles, and is a research associate of the Rancho Santa Ana Botanic Garden. In 1997-98 he served 1 year in Washington, D.C. as director of the ecology program for the National Science Foundation. Prior to this he was professor of biology at Occidental College for 20 years and spent a sabbatical year at the University of Cape Town, South Africa. He has over 250 publications in national and international scientific journals and books. His research has focused on ecological impacts of wildfires as well as other aspects of plant ecology, including rare plants, rare habitats such as vernal pools, and ecophysiology of seed germination and photosynthetic pathways. His current research includes projects on the role of fire suppression in crown fire ecosystems, interaction between fire and invasive species, and the impact of fire season on prescription burning in mixed conifer forests. In 1985 he was awarded a Guggenheim Fellowship and is a Fellow of the Southern California Academy of Sciences and an Honorary Lifetime Member of the California Botanical Society. He has served on the LA County Department of Regional Planning Environmental Review Board and the State Natural Communities Conservation Program (NCCP) Scientific Board.

Rocky Barker, Journalist

Bio: Rocky is the author of Scorched Earth: How the Fires in Yellowstone Changed America published in 2005 by Island/Shearwater Press. He also is the author of Saving All the Parts, Reconciling Economics and the Endangered Species Act, which was published in 1993 by Island Press. The book was a finalist for the Sigurd F. Olson Nature Writing Award. The National Wildlife Federation awarded him with its National Conservation Achievement Award in 1999.

As environmental reporter for the Idaho Statesman, he has covered fires across the West. He is a contributor to National Public Radio's "Living on Earth" program and a syndicated as a columnist in more than 70 newspapers across the West by Writers on the Range, a service of High Country News he co-founded.

Previously, he was columnist and reporter for the Idaho Falls(ID) Post Register, when he covered the Yellowstone fires in 1988. He has written about environmental issues ranging from mining in Wisconsin, acid rain in Canada, rain forest protection in Hawaii, to fish and wildlife conservation in Russia's Far East and Africa.

Abstracts (Oral and Poster)

Oral Presentations

Presentation Type: Oral Presentations ***Session Title:*** Decision Support Systems

Track: 1 ***Session:*** 1

Considerations in the use of models available for fuel treatment analysis

Charles W. McHugh

Abstract

Fire planners are required to evaluate, display or justify the effectiveness of planned fuel treatments in reducing or positively affecting fire growth, behavior and intensity pre and post-treatment. With the plethora of models currently available, todays fire planner can become overwhelmed when deciding which model to use. Each model has a required level of expertise in order to develop the necessary data, run the model(s), and analyze and interpret their associated outputs. In addition, each model has an appropriate temporal and spatial scale for its use, e.g., stand level versus landscape level. Traditional fuel treatment analyses have focused on stand level changes in fire behavior and effects. This approach does not take into account the topological effects of treatments in modifying fire growth, fire behavior and fire effects. In order to fully analyze fuel treatment effectiveness any analysis needs to examine the spatial interaction of fuel treatments. This requires the use of spatial models to analyze and display these effects. The objectives of this paper are to discuss general issues in fire modeling, the different models strengths and weaknesses, their appropriate scale of use, and some of the common errors encountered during their use and analysis.

Author Biographies

Charles (Chuck) McHugh is a Forester with the Rocky Mountain Research Station, in the Fire Behavior Research Unit at the Missoula Fire Sciences Lab. His research interests are the spatial anaylsis of fuel treatment efficacy and their effects on fire growth and movement, development of spatial data for use in spatial fire growth models, and fire occurrence analysis. He has a M.S. in Forestry from Northern Arizona University.

Decision support for evaluating wildland fire danger and prioritizing vegetation and fuels treatments

Keith M. Reynolds, Paul F. Hessburg and Robert E. Keane

Abstract

Danger of wildfire, related to forest fuel conditions, was evaluated for the 500 6th-field watersheds of the Wasatch Mountains in central Utah with the Ecosystem Management Decision Support (EMDS) extension to ArcMap. Most data for fuels evaluation came from base layers of the LandFire Project, or derived layers from the FireHarm application of Landfire (USDA Forest Service). A second phase of the EMDS analysis established priorities for watershed treatment, based on results of the initial evaluation, as well as additional logistical factors that influence the feasibility or efficacy of fuel treatments. Implications for fuel treatment planning at national, regional, and local scales are discussed.

Author Biographies

Dr. Reynolds is a research forester with the USDA Forest Service, Pacific Northwest Research Station. He specializes in decision support for landscape evaluation and planning.

Presentation Type: Oral Presentations ***Session Title:*** Decision Support Systems
Track: 1 ***Session:*** 1

Using landscape-based decision rules to prioritize fuel treatment locations in the boreal mixedwood of western Canada

Marc A. Parisien, David R. Junor and Victor G. Kafka

Abstract

This study uses a rule-based approach to prioritize fuel treatment locations in the boreal mixedwood forest of western Canada. This was achieved by mapping the burn probability (BP) in and around Prince Albert National Park in Saskatchewan using the Burn-P3 (Probability, Prediction, and Planning) model. Fuel treatment locations were determined according to three scenarios and five fuel treatment intensities (i.e., defined as area treated). Each scenario had a set of decision rules for locating fuel treatments according to: (i) jurisdictional boundaries and BP, (ii) BP only, and (iii) a combination of non-flammable landscape features, BP, and fuel treatment orientation. First, a baseline BP map was created from the original fuel grid to help prioritize fuel treatment locations. Fuel treatments were then added to the fuel grid and BP maps were produced for each combination of scenario and treatment intensity. To assess their effectiveness BP values of the treated landscapes were compared to those of the baseline BP map. Results varied substantially among scenarios and treatment intensities. Locating fuel treatments solely as a function of the park boundary yielded the lowest BP reduction. Our results suggest that clumping a large amount of fuel treatments within a limited area or using landscape features to maximize the spatial benefits of the fuel treatments over a larger part of the landscape can significantly reduce landscape-level BP. While both strategies may produce similar overall reductions in BP, their appropriateness and usefulness depends on management objectives.

Developing Integrated Fuel Treatment Priorities at a Landscape Level Using the Multi-scale Resource Integration Tool

Jeffrey L. Jones, Joseph D. Zeiler and Dale A. Hamilton

Abstract

Integrated assessments allow land managers to focus management activities in areas where multiple objectives can be accomplished. The Multi-Scale Resource Integration Tool (MRIT) was developed as an extension of ArcMap to facilitate the integration and summarization of spatial data layers. MRIT derives the composition, percent composition, or area-weighted average of selected attributes from feature layers within user-defined reporting units. The extension then standardizes the compositional values, and classifies the reporting units based upon the frequency distribution of the standardized data. Managers can then use MRIT to integrate the results of the compositional assessments from two or more themes at the reporting unit level. Users can select an algorithm that classifies reporting units based upon the average of the standardized values from each theme, or they can select a clustering algorithm that classifies reporting units based upon their similarity of standardized values from each theme. The results from either method of integration can be used by land managers to develop spatially integrated priorities and objectives. This paper will demonstrate a simple application of MRIT to integrate spatial layers characterizing fire behavior hazard, fire regime condition class, and wildland-urban interface for a study area located in southern Utah.

Author Biographies

-Jeffrey L. Jones: Landscape Ecologist; USDA Forest Service; National Interagency Fuels Technology Team; Kalispell, MT
-Joseph D. Zeiler: Software Engineer; USDA Forest Service; Kalispell, MT
-Dale A. Hamilton: Software Engineer; Systems for Environmental Management; National Interagency Fuels Technology Team; Missoula, MT.

Presentation Type: Oral Presentations ***Session Title:*** Ecological Considerations
Track: 1 ***Session:*** 2

Comparison of the sensitivity of landscape-fire-succession models to variation in terrain, fuel pattern, climate and weather

Geoffrey J. Cary, Robert E. Keane, Robert H. Gardner, Sandra Lavorel, Mike D. Flannigan, Ian D. Davies, Chao Li, James M. Lenihan, Scott Rupp and Florent Mouillot

Abstract

The purpose of this study was to compare the sensitivity of modelled area burned to environmental factors across a range of independently-developed landscape-fire-succession models. The sensitivity of area burned to variation in four factors, namely terrain (flat, undulating and mountainous), fuel pattern (finely and coarsely clumped), climate (observed, warmer & wetter, and warmer & drier) and weather (year-to-year variability) was determined for four existing landscape-fire-succession models (EMBYR, FIRESCAPE, LANDSUM and SEM-LAND) and a new model implemented in the LAMOS modelling shell (LAMOS(DS)). Sensitivity was measured as the variance in area burned explained by each of the four factors, and all of the interactions amongst them, in a standard generalised linear modelling analysis. Modelled area burned was most sensitive to climate and variation in weather, with four models sensitive to each of these factors and three models sensitive to their interaction. Models generally exhibited a trend of increasing area burned from observed, through warmer and wetter, to warmer and drier climates with a twenty three fold increase in area burned, on average, from the observed to the warmer, drier climate. Area burned was sensitive to terrain for FIRESCAPE and fuel pattern for EMBYR. These results demonstrate that the models are generally more sensitive to variation in climate and weather as compared with terrain complexity and fuel pattern, although the sensitivity to these latter factors in a small number of models demonstrates the importance of representing key processes. The models that represented fire ignition and spread in a relatively complex fashion were more sensitive to changes in all four factors because they explicitly simulate the processes that link these factors to area burned.

Author Biographies

-Geoff Cary is Senior Lecturer in bushfire science at the Australian National University.
-Robert E. Keane is a Research Ecologist with the USDA Forest Service, Rocky Mountain Research Station at The Missoula Fire Sciences Laboratory.
-Robert H. Gardner is a professor and director of the Appalachian Laboratory, University of Maryland Center for Environmental Science (UMES).
-Sandra Lavorel is a Research Scientist with the National Center for Scientific Research (CNRS) in France.
-Mike Flannigan is research scientist with the Canadian Forest Service.
-Ian Davies is a software developer working with Prof. Ian Noble at the Research School of Biological Science at the Australian Nation University.
-Chao Li is a Research Scientist for the Canadian Forest Service in Edmonton, Alberta, Canada. H
-James Lenihan is a Research Ecologist with the USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR.
-Scott Rupp is a forest ecologist interested in boreal forest disturbance dynamics.
-Florent Mouillot is a fire ecologist with the National Center for Scientific Research (CNRS) in France where he models processes at the landscape and global level.

Presentation Type: Oral Presentations ***Session Title:*** Ecological Considerations
Track: 1 ***Session:*** 2

Integrating fuel treatments into comprehensive ecosystem management

Hyde Kevin, Greg Jones, Robin Silverstein and Keith Stockmann

Abstract

Forest managers plan fuel treatments in the context of comprehensive ecosystem management. They must meet multiple-use and environmental objectives, address administrative and budget constraints, and reconcile performance measures from multiple policy directives. We demonstrate a multiple criteria approach to measuring success of fuel treatments developed in the Butte North Strategic Placement of Treatments (SPOT) pilot project. Located in the Beaverhead, Deerlodge NF, MT, the project presents multiple issues; altered wildlife habitat affecting sensitive species, grassland conversion to forest, an insect epidemic, water resource concerns, WUI development, and wildland fire management. Managers worked with research advisors from multiple RMRS research units in Missoula to develop dynamic landscape management strategies, employing multiple modeling systems to assess current and future vegetation structure with and without treatment. Besides changes to fire behavior, they evaluated the effects of proposed treatments on wildlife habitat, disturbance processes, water quality and economics of treatment alternatives 30 years into the future. The intent was to effectively integrate fuel management with Forest Plan goals and comprehensive ecosystem management. This approach offers a structure to use multiple criteria to evaluate success of fuel management activities in the context of other resource objectives.

Author Biographies

-Kevin Hyde, a landscape modeler and hydrologist, works as a contractor through METI providing technical research support. Hyde, Jones, and Silverstein are located in the Forestry Sciences Lab of the Rocky Mountain Research Station in Missoula.
-Greg Jones is the Project Leader for Economic Aspects of Forest Management on Public Lands and the Program Leader of the Bitterroot Ecosystem Management Research Project.
-Robin Silverstein, Forester/Biologist, is also a METI contractor supporting research and modeling activities.
-Keith Stockmann is a doctoral candidate in the College of Forestry at The University of Montana.

Changes in fuelbed characteristics and resulting fire potentials after fuel reduction and restoration treatments in dry forests of northeastern Oregon

Andrew Youngblood, Roger D. Ottmar, Clint S. Wright and James D. McIver

Abstract

Many fire-dependent forests are denser, contain fewer large trees, have higher fuel loads, and greater horizontal and vertical fuel continuity than occurred historically. Managers have used prescribed burns, thinning, and combinations of both to reduce fuels in these forests, yet better information on treatment effects is needed to guide decisions. We report initial fuelbed conditions and changes immediately and four years after fuel reduction treatments in an operational-scale experiment in low elevation dry ponderosa pine (Pinus ponderosa) and Douglas-fir (Pseudotsuga menziesii) forests of northeastern Oregon. Replicated treatments were prescribed burning only, mechanical thinning, mechanical thinning followed by prescribed burning, and control. Fuelbeds are described by loading of live and dead size classes. In addition, we use the Fuel Characteristic Classification System (FCCS) to build a representative fuelbed for each unit from inventoried data and calculate fuel characteristics for the canopy, shrub, nonwoody, woody, litter, and duff strata. Finally, we present the FCCS fire potentials for surface fire behavior, crown fire behavior, and available fuels for consumption as measures of the change in fire hazard resulting from our treatments. This work is a part of the national Fire and Fire Surrogate (FFS) study, designed to evaluate ecological effects, economic viability, and operational aspects of different fuel reduction treatments across a network of 13 experimental sites.

Presentation Type: Oral Presentations ***Session Title:*** Ecological Considerations
Track: 1 ***Session:*** 2

Measuring ecological effects of prescribed fire using birds as indicators of forest conditions

John D. Alexander and Nathaniel E. Seavy

Abstract

To evaluate the ecological effects of prescribed fire, we conducted bird and vegetation surveys in four study areas of the Klamath National Forest where prescribed fires are being applied as a management tool. In each area, we collected bird and vegetation data at sites treated with prescribed fire and nearby untreated control sites. Data were collected at stations from 2000 (pre-treatment) to 2004 (1-4 years post treatment). The treated sites ranged in size from 9-30 ha, and during the course of the study 25-73% of each study area was treated with either hand-pile or broadcast burns. Over this time period, we found no consistent change in the volume of vegetation in either the tree or shrub strata. Similarly, we found no measurable effect of prescribed burning on the overall bird community. Spatial variation (probably associated with habitat characteristics) and annual variation in abundance (associated with stochastic populations dynamics) appear to be more important than the change induced by prescribed burning at this scale and intensity. We also investigated the abundance of eight individual species that have been identified as conservation focal species for coniferous forests. There were no consistent changes in the abundance of these species that we could attribute to the application of prescribed fire. Our results suggest that the prescribed fire applied in these treatment units had negligible effects on landbird community composition.

Author Biographies

John Alexander, KBO Director, helps management agencies implement Partners In Flight conservation objectives by linking research results with priority management issues. John studies the ecological effects of fire suppression, wildfire, and fuels management (http://www.KlamathBird.org/Projects/fire.htm).

Response of Fuelbed Characteristics to Restoration Treatments in Pinon-Juniper-Encroached Shrublands on the Shivwits Plateau, Arizona

Helen Y. Smith, Sharon Hood, Matt Brooks, JR Matchett and Curt Deuser

Abstract

The encroachment of pinyon and juniper trees into historically shrub- and grass-dominated landscapes has caused major changes in ecosystem structure and function, including dramatic changes in fuel structure and fire regimes. Restoration techniques are often labor intensive and expensive to implement, so it is prudent to determine their effectiveness before they are applied over large areas. Land managers on the Shivwits Plateau in northwestern Arizona are currently faced with thousands of acres of tree-invaded shrub- and grass-lands and are seeking effective techniques to restore these areas to pre-invasion conditions and reduce wildfire hazard. We established a study on the Shivwits Plateau to test the effectiveness of three techniques for reducing the density of post-invasion pinyon and juniper trees: (1) cut and leave, where 80% of the trees were cut down and left where they fell; (2) cut and scatter, where 80% of the trees were cut down, then bucked and scattered; and (3) herbicide, in which 80% of the trees were sprayed with Tordon 22k around the base of the trunks. We employed cover-frequency plots and line-point intercept to characterize changes in the fuelbed structure and will discuss the differences between methods and treatments. Generally, there was more shrub and herbaceous development in the treatment units versus the control units as well as an addition of woody fuels to the initially sparse sites that would help to carry surface fire through the treated areas.

Presentation Type: Oral Presentations ***Session Title:*** Fundamental Fire Behavior
Track: 1 ***Session:*** 3

Project Vesta: fire behaviour study of different age fuels in dry eucalypt forests

Jim Gould, Lachie McCaw and Phil Cheney

Abstract

There is a universal need for a better understanding of forest fuels and how they determine fire behaviour - particularly under severe weather conditions. This is required not only to build better models to predict fire spread at a local or regional level but also to evaluate the impact of fuel reduction burning to reduce the behaviour of wild fires burning under dry summer conditions. Project Vesta was an experimental study to quantify age-related changes in fuel attributes and fire behaviour in dry eucalypt forests typical of southern Australia. Over 100 experimental fires were conducted during dry summer conditions at two sites with understorey fuels ranging in age from 2 to 22 years since fire in south-western Australian eucalypt forests. The improved understanding of relationships between fuel age and potential fire behaviour in dry eucalypt forests gained from Project Vesta provides a better basis for assessing the benefits of various fuel management alternatives that may be employed to reduce difficulty of fire suppression and protect assets from damage during high intensity wildfires. This is important not only for planning prescribed burning programs, but also for determining, monitoring and managing suppression of wildfires.

Author Biographies

Jim Gould is Group Leader with Ensis Bushfire Research Group (the joint forces of CSIRO (Australia) and SCION (New Zealand) and Program Leader with the Bushfire CRC Safe Prevention, Preparation and Suppression Program. Jim's current research role is coordinating research project for both Ensis and the Bushfire CRC in the area of fire behaviour, fire weather, and suppression technology and bushfire risk management.

An Experimental Study on the Ignition of Fuel Beds by Firebrands in Wildland/Urban Interface (WUI) Fires

Samuel L. Manzello, Thomas G. Cleary, John R. Shields, Alexander Maranghides, William Mell and Jiann Yang

Abstract

Wildland-urban interface (WUI) fires have plagued the United States for centuries. Recent WUI fires include the 2003 Southern California Fires, 2002 Hayman Fire, and the 1991 Oakland Hills Fire. Firebrands are produced as vegetation and structures burn in WUI fires. These firebrands are entrained in the atmosphere and may be carried by winds over long distances. Hot firebrands ultimately come to rest and may ignite fuel beds far removed from the fire, resulting in fire spread. This process is commonly referred to as spotting. Understanding how these hot firebrands can ignite surrounding fuel beds is an important consideration in mitigating fire spread in communities. A series of real scale fire experiments were performed to determine the size distribution of firebrands generated from Douglas-Fir trees. The results of the real scale fire experiments were used to determine firebrand sizes to perform reduced scale ignition studies of fuel beds in contact with burning firebrands. The reduced scale ignition experiments were performed using a custom ignition apparatus. The firebrand ignition apparatus allowed for the ignition and deposition of both single and multiple firebrands onto the target fuel bed. The moisture content of the fuel beds used was varied and the fuels considered were pine needle beds, shredded paper beds, and shredded hardwood mulch. Firebrands were constructed by machining wood (Douglass-Fir) into small cylinders of uniform geometry and the size.

Presentation Type: Oral Presentations ***Session Title:*** Fundamental Fire Behavior
Track: 1 ***Session:*** 3

Experiments and Computer Modeling of Fire Spread in Trees

William Mell, Alex Maranghides, Samuel Manzello and Ronald Rehm

Abstract

Fire spread through suspended vegetation, such as tree crowns, is a basic component of wildland fires. Most models of fire spread do not resolve the burning of individual trees. Instead, fire spread through a forest canopy, representing a collection tree crowns in an average sense, is modeled. There are a number of fire problems where an understanding of fire spread at a level that includes individual trees is needed. Among these fire problems are: the effect of a fire on tree health, the influence of a given fuel treatment on fire intensity, and fire spread through the intermix of vegetation and structures in the wildland-urban interface (WUI). NIST currently has an experimental and modeling project that seeks to improve our understanding of WUI fires. In this talk a number of laboratory experiments, conducted at NIST, on the burning of different sized Douglas firs will be described. Some results of these experiments will be presented and compared to three-dimensional, physics based, computer simulations. The simulation technique will also be applied to fire spread through tree stands in the International Crown Fire Experiments conducted in Canada.

Modeling of Smoldering Front Propagation With Improved Emissions Estimates

Carlos A. Veras, Ernesto Alvarado, David Sandberg and Joao A. Carvalho Jr.

Abstract

This paper presents a two dimensional numerical model to investigate front propagation of the smoldering combustion phase in logs and deep ground organic layers. Smoldering combustion is in many fuel beds the most important source of smoke emissions and also of heat that causes environmental damage. Nevertheless, little work has been done to model the smoldering phase and its relation to biomass emissions and environmental damage. We used phenomenological pyrolysis models that allow improved predictions for product amounts and gas composition. The set of partial differential equations was solved dynamically after mathematical discretization using a control volume approach. The phenomenological pyrolysis sub models are based on the chemical percolation devolatilization model (CPD) and on the distributed activation energy model (DAEM). Validation of numerical results is performed by comparing to field and laboratory experimental data. The model will improve the emission estimates and assist to understand the environmental effects from heat release from fires occurring in forest with heavy accumulation of fuels produced by harvesting, deforestations, thinning, extensive tree mortality, and deep ground organic layers such as those in the boreal forests and other temperate forest with long periods without fire.

Author Biographies

Dr. Veras works for the Energy and Environmental Laboratory, Mechanical Engineering Department at University of Brasilia (Brazil). He currently works in the College of Forest Resources at UW, and is carrying out research on numerical modeling of biomass combustion. -Ernesto Alvarado is a Fire Scientist for the University of Washington in Seattle, Washington. His research includes a variety of topics in wildfires, prescribed fires, and climate change in collaboration with the Fire and Environmental Research Applications (FERA) team of the USFS Pacific Wildland Fire Sciences Laboratory in Seattle, Washington.
-Dr. Sandberg is a scientist and Team Leader with the USDA Forest Service Pacific Northwest Research Station (PNW) Fire and Environmental Applications Team. Dr. Carvalho Jr. is currently working for the Mechanical Engineering Department at Sao Paulo State University (Brazil) as a research team leader in a variety of projects such as pulse combustion, forest fire, atmospheric combustors, oxygen enriched flames, NOx formation and control.

Presentation Type: Oral Presentations ***Session Title:*** Fundamental Fire Behavior
Track: 1 ***Session:*** 3

A case study test of fuel management effectiveness against crown fires

Dave Schroeder and Stew Walkinshaw

Abstract

Fuel management is widely advocated as a component of protection strategies for communities and other values; however, there is little empirical data showing fire behavior interaction between managed and unmanaged stands. To address this shortfall, the Forest Engineering Research Institute of Canada (FERIC), Government of the Northwest Territories (NWT) and Alberta Sustainable Resource Development established two crown fire/fuel management test plots in the NWT during 2004 (formerly the International Crown Fire Modeling Experiment site). The plots were established in conifer stands, and set up so that a crown fire would burn into the fuel management plot. The fuel management included understory and dead stem removal, and overstory thinning to 2 and 3 m inter-crown spacing. The 3 m crown spacing plot was tested with a crown fire in 2005. As expected, the crown fire became a surface fire in the treated plot; however, spot fires occurred throughout the treated plot. Fuel inventory details for the treated stand, treatment methods, and fire behavior (including in-fire video clips) will be presented.

Author Biographies

-Dave Schroeder - Researcher with Forest Engineering Research Institute of Canada, Wildfire Operations Research Group based in Hinton, Alberta.
-Stew Walkinshaw - Provincial wildland/urban interface coordinator, Alberta Sustainable Resource Development.

Presentation Type: Oral Presentations ***Session Title:*** Fire Risk Assessments
Track: 1 ***Session:*** 4

A Wildfire Risk Model for Fuels Treatment Planning

Alan Ager and Mark Finney

Abstract

A number of wildfire risk systems have been developed in recent years to provide land managers with tools to examine potential wildfire impacts. However, few of these efforts use accepted definitions of risk from the actuarial sciences, and none are sufficiently detailed for watershed-scale fuels treatment planning. Wildfire risk is the expected loss, calculated as the product of (1) probability of a fire at a specific intensity and location, and (2) the resulting financial or ecological damage. Wildfire risk assessment is concerned with changes in expected loss in response to fuel treatments, suppression, structure improvements, and assumptions about fire weather. We developed a wildfire risk model to estimate expected loss and tested it on 16,000 ha wildland-urban interface in Eastern Oregon. Conditional wildfire probabilities were calculated by simulating large numbers of wildfires via a mechanistic wildfire spread model. A financial loss function used flame length at each pixel to determine the fire effects on standing timber volumes and residential structures. We also considered the positive value of low intensity wildfire in terms of reducing fuel loads and future wildfire intensity. We simulated a range of fuel treatment alternatives and examined the net change in expected loss. Our work advances the application of actuarial science to wildfire risk management and fuels treatment planning on Federally-managed lands.

Author Biographies

-Alan Ager, Operations Research Analyst at the Pacific Northwest Research Station, La Grande, OR
-Mark Finney is a Research Forester at the Rocky Mountain Research Station, Missoula, MT.

Canadian Community Wildfire Protection Plans focus on Forest Inventory

John Davies and Clark Woodward

Abstract

A solid fuel hazard assessment is fundamental to the core of many Community Wildfire Protection Plans. A Canadian company presents its approach to developing Community Wildfire Protection Plans with a focus on wildfire risk assessment and fuel hazard mapping. A simple, objective ranking system helps define high risk fuel hazards. Interface areas are ranked for risk using the wildfire hazard data. This fuels data determines the critical interface zones where specific fuel treatments will be prescribed. This methodology has proven very successful in assisting communities and BC Parks mitigate interface wildfire risk. Case studies for Kelowna, Prince George, Squamish and Pemberton, British Columbia are discussed and illustrated with examples of forest inventory, wildfire risk analysis and fuel hazard assessments. Also covered is the role of RedZone Software for field collection, data analysis and data delivery aspects of the CWPP. Users can make their own map books, draw GIS data and load their own surveys to a handheld for field mapping. Davies Wildfire Management Inc. uses RedZone to collect field data, map fuel type polygons and convert them to hazard ratings. With a handheld, users incur fewer costs and data entry errors, reduce reliance on GIS professionals, and provide flexibility for all sizes of fuel assessment projects.

Author Biographies

-John Davies is the CEO of Davies Wildfire Management based in Vancouver, British Columbia. Davies Wildfire is involved in many Community Wildfire Protection Plans, Fire Management Plans, and Fuel Management Strategies being developed in British Columbia.
-Clark Woodward is the founder of RedZone Software of Boulder, CO. RedZone provides emergency mapping and planning software to fire departments across North America.

Presentation Type: Oral Presentations ***Session Title:*** Fire Risk Assessments
Track: 1 ***Session:*** 4

Variation in surface and crown fire hazard with stand age in managed Coastal Western Hemlock zone forests in southwestern British Columbia

Michael C. Feller and Stefanie L. Pollock

Abstract

Surface and crown fuels were measured in 186 stands ranging in age from 0 years after clearcutting to old growth forests > 300 years old in Pseudotsuga menziesii Tsuga heterophylla Thuja plicata dominated forests in southwestern mainland British Columbia. Woody debris mass ranged from <1 to 30 kg/m2 while canopy foliage density ranged from 0 to 0.44 kg/m3. Indexes of surface fire hazard, based on woody debris loads, and of crown fire hazard based on canopy foliar density, height to live crown, woody debris loads, ladder fuels, and snag quantities, were developed. A crown fire hazard index was chosen using correlations with the Crowning Index from the Fire and Fuels Extension to the Forest Vegetation Simulator (Scott and Reinhardt 2001). Using the indexes developed, surface fire hazard followed a U-shaped trend with stand age, being highest for the first few years after clearcutting, declining to a minimum 20-40 years after harvesting, then rising again to old growth forests. Crown fire hazard was lowest for the first few years after clearcutting, rose to a maximum 7-20 years after harvesting, then declined to low values in 100-150 year-old forest, before rising to higher values in old-growth.

Author Biographies

-M.C. Feller - Associate Professor in the Forest Sciences Department, University of B.C. Has been studying 1) prescribed burning effects on fuels, soils, vegetation, and water for 30 years, and 2) forest fires as disturbance agents for the last 10 years.
-S.L. Pollock - Currently a graduate student in the Departement de Biologie et Centre d`Ãtudes nordiques, Universitad Laval, Quebec, with research interests in forest ecology

Using quantitative risk assessment to evaluate fuel treatment effectiveness

Joe H. Scott

Abstract

Federal, state and local fire management agencies are entering a new era of fire management ”fuel treatment” in which efforts to suppress fire growth and mitigate fire loss are undertaken long before an ignition occurs. To date, however, no useful metric has emerged to guide fire managers in deciding where, when, and how such treatments should be implemented, much less to confirm that they clearly should be done in the first place. A fuel treatment is an investment of resources today for a benefit to be received in the future; the benefit of a fuel treatment is quantitative reduction in risk. Wildland fire risk is the expected annual (net) loss to wildland fire; it is expressed quantitatively as the product of the probability and amount of loss under the range of possible fire behaviors. Fuel treatment benefit therefore arises from reducing the probability of observing damaging fire behaviors (i.e., high intensity fires) or by reducing loss for a given level of fire behavior (for example, by making a structure more resistant to damage). Investment analysis tools such as present net value (PNV), internal rate of return (IRR), and benefit-cost ratio (BC) should therefore be useful in guiding many fuel treatment decisions. Fuel treatments should be implemented where they (alone or in concert with other spatially arranged treatments) confer more benefit than their cost. In this paper I show how the simplest of those measures, benefit-cost ratio, can inform fuel treatment decisions, explains our current responses to wildland fire risk, and supports an emerging new approach to managing wildland fire -- mitigation rather than suppression.

Author Biographies

Joe has more than 15 years experience in wildland fire science research and development, including almost 10 years with Systems for Environmental Management in Missoula, MT. Joe is the lead developer of NEXUS, lead developer of FireWords, co-developer of FuelCalc, and lead developer of a new set of standard fire behavior fuel models for national application.

Presentation Type: Oral Presentations ***Session Title:*** Fire Risk Assessments
Track: 1 ***Session:*** 4

A weighted, data-driven GIS model for assessing changes in fire risk associated with fuels treatments

Crystal A. Kolden and Timothy J. Weigel

Abstract

Wildlfire risk assessments often drive fuels treatment planning and policy, and frequently use GIS and other knowledge-driven models to create maps and quantify risk. While knowledge-driven models certainly have a role in planning for wildfire risk, they require expert knowledge of the factors that create risk and are not reproducible without that knowledge. We used the Spatial Data Modeler extension (ArcSDM) for ArcGIS to create a data-driven fire ignition risk model that uses past fire history data to quantify the variables most important in calculating fire risk. ArcSDM has been used extensively in the mining industry to predict gold deposits, and we suggest that it has great potential for predicting areas of increased or decreased fire ignition risk based on the case study presented in this paper. We used a fire ignition history dataset to quantify how proximity to roads, aspect, land cover, land ownership, and elevation are correlated to fire risk in San Diego County, California. We used ArcSDM to calculate weights and produce a probability map of fire risk. We then inserted a scenario for future development into the model to assess changes in fire risk. Information on changes in risk is critical for planners and policymakers, and can help prioritize fuels treatments. Additionally, the ArcSDM model can be used to assess changes in risk associated with planned fuels treatments.

Author Biographies

-Crystal A. Kolden is a research assistant with the Climate, Ecosystem, and Fire Applications Program at the Desert Research Institute in Reno, Nevada.
-Timothy Weigel is a graduate student in the Geography Department at the University of Nevada, Reno.

Presentation Type: Oral Presentations ***Session Title:*** Treatment Optimization Tools
Track: 1 ***Session:*** 5

Strategic Placement of Treatments (SPOTS): Maximizing the Effectiveness of Fuel and Vegetation Treatments on Problem Fire Behavior and Effects

Susan A. Stewart and Diane M. Gercke

Abstract

Several pilot teams participated in integrated landscape design to maximize the effectiveness of fuel treatments in reducing problem fire behavior, adverse fire effects, and costs in 2005. This interagency approach to standardizing the assessment of risks and proposing strategically placed treatments to mitigate that risk expands upon the successes of California's strategic Stewardship and Fireshed Assessment process, which uses an iterative, collaborative fuels planning approach to proposing landscape scale treatment patterns. The pilot projects used spatially explicit fire behavior prediction models to evaluate the effectiveness of proposed treatments on problem fire behavior at scales appropriate to address the expected problem fire event. A primary objective of the pilot projects was to develop a consistent, systematic approach that integrates multiple land and resource management objectives when addressing and evaluating fuels risks. The use of fire modeling software to evaluate changes in fire behavior and spread on the landscape are critical to the process and offer a potential for rapid evaluation of the effectiveness of planned treatments in reducing problem fire size and severity. This paper discusses the accomplishments and challenges faced as strategic placement of treatment methods were tested by the pilot project teams across the nation, focusing on strategies and adaptations to the process in different landscapes, vegetation, fire regimes, and ownership patterns.

Applying North American fires spread simulators in New Zealand and Australia: results from an international seminar

Tonja Opperman, Jim Gould, Mark Finney and Cordy Tymstra

Abstract

There is currently no spatial wildfire spread and growth simulation model used commonly across New Zealand or Australia. The New Zealand Department of Conservation (DOC) is interested in adopting a spatial fire growth simulation model for enhanced decision-making and resource allocation on public lands managed for conservation. New Zealanda's native vegetation is not generally fire-adapted, and DOC must measure conservation success by comparing the actual area burned to the potential area burned without suppression. Australia, a more fire-prone nation, has experienced some of its most devastating wildfires in the past two decades with significant damage to property, infrastructure, and the environment, including loss of civilian lives. In response to these wildfires, the Australian government has recommended continued development and coordination of wildfire simulation models to enhance decision-making. Additionally, private plantation companies in both nations are interested in how various wildfire scenarios might affect their investments. For these reasons, we met in January 2006 to evaluate the most appropriate spatial fire spread applications for both New Zealand and Australia. Developers from Canada, the United States, and Australia were invited to apply Prometheus, FARSITE, and other similar models to New Zealand and Australian wildfires in grass, scrub, and forested fuel types. Prometheus and FARSITE performed very well and will be further investigated to understand how each might be customized for use with local fire spread models.

Author Biographies

-Tonja Opperman is a wildfire scientist with Ensis Forest Biosecurity and Protection, SCION, Christchurch, New Zealand and the Fire Ecologist for the Bitterroot National Forest, Montana, USA.
-Jim Gould is the Research Leader with Ensis Forest Biosecurity and Protection, CSIRO, Canberra, ACT, Australia and the Program Leader, Bushfire CRC, East Melbourne, Victoria, Australia.
-Mark Finney is a Research Forester with the USDA Forest Service Fire Sciences Laboratory, Rocky Mountain Research Station, Missoula, MT, USA.
-Cordy Tymstra is a Fire Science and Research Supervisor in the Wildfire Policy and Business Planning Branch, Forest Protection Division, Department of Sustainable Resource Development, Edmonton, Alberta Canada

Presentation Type: Oral Presentations ***Session Title:*** Treatment Optimization Tools
Track: 1 ***Session:*** 5

Guidance on Landscape Wildland Fire Analysis: Models, Tools, and Techniques

Richard D. Stratton

Abstract

There is an increasing need for spatial wildland fire analysis in support of incident management teams, fuel treatment planning, wildland-urban assessment, and land management plan development. However, little guidance was been provided to the field in the form of training, support, or research examples. This paper provides direction in the use of models (FARSITE, FlamMap, RERAP), tools/programs (KCFAST, RAWS, FireFamily Plus, Wind Wizard), and procedures for landscape fire analyses. The approach includes a brief discussion about models and their assumptions and limitations, historical fire and weather analysis, landscape file data acquisition and development, landscape file and model output critique, and model calibration.

Author Biographies

Rick D. Stratton is a fire modeling analyst with Systems for Environmental Management (SEM), a nonprofit research and educational corporation in Missoula, MT. His current research interests include fire modeling, the wildland-urban fire problem, fuel treatment design, and wildland fire use. He received his MS at Utah Sate University in forestry (fire and GIS emphasis) and earned his BS in conservation biology (wildlife emphasis) from Brigham Young University.

Simulation of long-term landscape fuel treatment effects on potential wildfires

Mark A. Finney, Robert C. Seli, Charles W. McHugh, Alan A. Ager, Berni Bahro and James K. Agee

Abstract

A simulation system was developed to explore how fuel treatments placed in random and optimal spatial patterns affect the growth and behavior of large fires when implemented at different rates over the course of five decades. The system consists of a forest/fuel dynamics simulation (FVS) module, logic for deriving fuel model dynamics from FVS output, a spatial fuel treatment optimization program, and spatial fire growth and behavior model to evaluate the performance of the treatments in modifying large fires. Simulations were performed for three study areas: Sanders County in western Montana, the Stanislaus National Forest in California, and the Blue Mountains in eastern Oregon. Response variables reported here include: 1) fire size distributions, 2) large fire spread rates, and 3) burn probabilities and all revealed the same trends. For different spatial treatment strategies, our results illustrate how the rate of fuel treatment (percentage of land area treated per decade) competes against the rates of fuel recovery to determine if fuel treatments accrue multi-decade cumulative impacts on the response variables or not. Using fuel treatment prescriptions that involve thinning and prescribed burning, even optimal treatment arrangements (designed to disrupt the growth of large fires) require at least 15% to 20% of the landscape to be treated each decade. Randomly arranged units with the same treatment prescriptions require about twice that rate to produce the same effectiv

Author Biographies

Mark Finney is a Research Scientist with the USDA Forest Service in Missoula, MT. mfinney@fs.fed.us

Presentation Type: Oral Presentations ***Session Title:*** Treatment Optimization Tools
Track: 1 ***Session:*** 5

A Computational Method to Optimize Fuel Treatment Locations

Mark A. Finney

Abstract

Modeling and experiments have suggested that spatial fuel treatment patterns can influence the movement of large fires. On simple theoretical landscapes consisting of two fuel types (treated and untreated) optimal patterns can be analytically derived that disrupt fire growth efficiently (i.e. with less area treated than random patterns). Although conceptually simple, the application of these theories to actual landscapes is made difficult by heterogeneity (fuels, weather, and topography) compared to the assumptions required for analytical solutions. Here I describe a computational method for heterogeneous landscapes that identifies efficient fuel treatment units and patterns for a selected fire weather scenario. The method requires input of two sets of spatial input data: 1) the current fuel conditions and 2) the potential fuel conditions after a treatment (if it were possible). The contrast in fire spread rate between the two landscapes under the weather scenario conditions indicates where treatments are effective at delaying the growth of fires. Fire growth from the upwind edge of the landscape is then computed using a minimum travel time algorithm. This identifies major fire travel routes (areas needing treatment) and their intersections with the areas where treatments occurred and reduced the spread rate (opportunity for treatment). These zones of treatment need and opportunity are iteratively delineated by contiguous patches of raster cells up to a user-supplie

Author Biographies

Mark Finney is a research scientist with the USDA Forest Service in Missoula, MT.

Presentation Type: Oral Presentations ***Session Title:*** LANDFIRE
Track: 1 ***Session:*** 6

LANDFIRE: Landscape Fire and Resource Management Planning Tools Project

Kevin C. Ryan, Mathew G. Rollins, Kristine M. Lee, Zhi-Liang Zhu, James L. Smith and Kelly Pohl

Abstract

Managers are faced with reducing hazardous fuels, restoring fire regimes, and decreasing catastrophic wildfire threats. Often, the comprehensive scientifically-credible data and models needed to test alternative fuel treatments across multi-ownership landscapes is lacking. The USDA Forest Service, Department of the Interior, and The Nature Conservancy are implementing the LANDFIRE project, which produces consistent and comprehensive spatial data on vegetation, historic fire regimes, fire regime condition class and fuels across the entire United States, including Alaska and Hawaii. LANDFIRE provides a scientific foundation for multi-scale fire, fuels and risk assessments. While it will fill immediate needs for testing alternative fire management scenarios, planning fuel treatments, and allocating resources, the data and models will also have much broader applications in research, biodiversity conservation, and strategic forest and resource management planning. The presentation will discuss the objectives and methods of the LANDFIRE project, the management challenges it aims to address, and research opportunities afforded by the data and models. The presentation will raise awareness of the LANDFIRE project and describe potential applications to the fire research/vegetation ecology communities and fuels treatment and restoration to protect communities at risk.

Author Biographies

Kevin Ryan is the Program Manager for the LANDFIRE Program, USDA Forest Service Fire Sciences Laboratory, Missoula, Montana. He received his Ph.D. in Forest Ecology from the University of Montana in 1993.

Fuels Products of the LANDFIRE Project

Matt C. Reeves

Abstract

The LANDFIRE project is a collaborative interagency effort designed to provide seamless, nationally consistent, locally relevant geographic information systems (GIS) data layers depicting wildland fuels, vegetation and fire regime characteristics. The LANDFIRE project is the first of its kind and offers new opportunity for fire management and research activities. Here we introduce the LANDFIRE wildland fuels data layers including fire behavior fuel models, canopy bulk density, canopy base height, canopy cover, canopy height and new Fuel Loading Models. Specifically, we focus on the methods and data used to create these layers and present preliminary assessments. Few studies have evaluated these data, partly due to the infancy of the LANDFIRE data stream, but we highlight some recent activities whose aim was to assess their efficacy. These key fuels layers will support fuels and smoke management and fire behavior modeling in addition to providing essential information for developing community wildfire protection plans.

Author Biographies

Matthew C. Reeves is the fuels team leader and GIS specialist for the LANDFIRE program. He earned a Ph.D. from the University of Montana, School of Forestry.

Presentation Type: Oral Presentations ***Session Title:*** LANDFIRE
Track: 1 ***Session:*** 6

A Rapid Assessment of Fire Regime Condition Class for the Conterminous United States

James Menakis, Ayn Shlisky and Kelly Pohl

Abstract

Over the last couple of decades, we have seen a tremendous increase in the size, number, and intensity of wildfires in the United States, resulting in Congress implementing the National Fire Plan, 10-Year Comprehensive Strategy, and Healthy Forests Restoration Act. In response of these events, Hardy and others (2001) developed several coarse scale spatial data layers to try to get an estimated of the extent of this problem. One of these layers Fire Regime Condition Classes (FRCC) proved very valuable for visualizing and estimating the fuels problems, as it relates to the departure from the Historical Natural Fire Regimes. Unfortunately this data was developed at too coarse a scale for regional and sub-regional level planning. To address this data need, the Wildland Fire Leadership Council authorized the LANDFIRE project, a five-year project to develop geospatial data that will support the analyses required for prioritization and planning of fire management activities at national, regional, and sub-regional level. Part of the LANDFIRE project, is the Rapid Assessment (RA), a first pass, regional scale assessment for the conterminous United States, that is intended to support national and regional fire management planning. The RA provides rapidly produced and quickly delivered products, which include models of Reference Condition and spatial data of Potential Natural Vegetation Groups, Reference Fire Regimes, and FRCC. This paper summarizes the results of the RA.

LANDFIRE Rapid Assessment: Data, Tools and Applicationsfor Fire Regime Restoration and Planning

Darren Johnson

Abstract

The LANDFIRE Rapid Assessment (RA) project is a first pass regional scale assessment for the conterminous United States and is intended to support national and regional fire management planning. The project will provide moderately accurate, rapidly produced, and quickly delivered products. These products, available in October 2005, include reference condition models and spatial data of potential natural vegetation groups, reference fire regimes (often called historical natural fire regimes), and fire regime condition class (FRCC). The RA models and spatial data are being developed to meet short-term national and regional fire management planning needs, while providing a foundation for the implementation of the National LANDFIRE project, which will eventually provide more robust and accurate data for the nation (http://www.landfire.gov). In early 2006, a Rapid Assessment Rollout workshop is being planned to introduce regional and national users to RA data, and to present appropriate applications of RA data from participants. The 1st annual Fire Behavior and Fuels Conference provides a great opportunity to further transfer RA technology, as well as showcase lessons learned through real world applications tested during the workshop. The ½-day special session will contain 2 general information papers sandwiching 3-5 real-world, case studies developed by RA data users.

Presentation Type: Oral Presentations ***Session Title:*** Fire Weather/Climate
Track: 1 ***Session:*** 7

Predicting Fire Season Severity in the Pacific Northwest

Paul Werth

Abstract

Projections of fire season severity that integrate historical weather and fire information can be used by fire managers when making decisions about allocating and prioritizing fire fighting resources. They enable fire managers to anticipate fire activity and pre-position resources to maximize public and firefighter safety, reduce environmental impacts and lower fire fighting costs. This research determines the potential severity of fire seasons in the Pacific Northwest by using statistical techniques that correlate weather data and annual-acreage-burned figures for five fire management agencies in Washington and Oregon (U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Oregon Department of Forestry, and Washington Department of Natural Resources). Weather and fire trends for the 1970 to 2004 time period were calculated, and thresholds for above average, average, or below average fire seasons were determined based upon annual acres burned. Eight weather parameters were then correlated using scatter diagrams, contingency tables, and multivariate regression equations to predict above average, average, or below average fire seasons based upon projected acres burned. Results show considerable variance in predictors by fire agency with accuracy rates of 60 to 85% for predictions of above average fire seasons and 85 to 90% for average and below average fire seasons.

Author Biographies

Paul A. Werth - Fire Weather Meteorologist, Weather Research and Consulting Services, LLC., Battle Ground, Washington. Paul is an experienced Incident Meteorologist, having supported numerous wildland and prescribed fires from Oregon to Florida. He participated in the development and instruction of many fire weather-related courses.

The role of climate in successful fuels management

Crystal A. Kolden and Timothy J. Brown

Abstract

Climate has a pronounced role in fuel dynamics, fire behavior, ecosystem health and desired management outcomes. Wet and dry climate periods have not only changed fuel characteristics over time, but are also related to both management practices (e.g., response strategies during drought) and dramatic population growth in desirable climate regions. Thus, climate impacts fuel management in both physical and social contexts. The role that climate plays directly in fuels and treatments is poorly understood, and management of fuels would likely benefit from a better understanding of climate impacts on vegetation and treatment schedules. There are numerous research issues to resolve, however. Fuel loading fluctuates at multiple temporal scales related to climate, but few attempts have been made to quantify these relationships. Additionally, the timing of optimal treatment periods (such as prescribed burning windows for both fire behavior and air quality) depends on climatology to adequately meet treatment objectives. In this paper, we suggest that successful fuels management requires a more in-depth understanding and quantitative definition of the role climate plays in fuel loading and management, and that an effort must be made to collect and centralize data on fuels treatments for research purposes for this understanding to be realized. We focus on three ideas. First, that climate change will likely impact fuels, key management objectives and desired outcomes. Second, that the consideration of climate variability and change may necessitate a paradigm shift in land management or at least in the assumptions inherent in management plans. Third, that a proactive risk assessment approach, which incorporates cross-scale climatic information including forecasts, can improve fuels management policy formulation and implementation. Finally, we discuss the need to determine entry points and establish effective pathways for climate information across scales in policy, management and operational responses.

Author Biographies

-Crystal A. Kolden is a research assistant with the Desert Research Institute's Climate, Ecosystem, and Fire Applications Program.
-Timothy J. Brown, PhD., directs the Climate, Ecosystem, and Fire Applications Program at the Desert Research in Reno, Nevada.

Presentation Type: Oral Presentations ***Session Title:*** Fire Weather/Climate
Track: 1 ***Session:*** 7

Fire Forecasting with the MC1 model: Past and Future Forecasts

Ronald P. Neilson, James M. Lenihan, Dominique Bachelet and Raymond J. Drapek

Abstract

The MC1 Dynamic General Vegetation Model (DGVM) has been used to simulate fire over the past 100 years, for numerous future climate scenarios over the next 100 years and for rolling monthly fire forecasts over the next seven months. Examples, of each of these timescales will be presented with some discussion of the skill of the model at each historical and near-term timescale. The risks of fire over the ensuing 7 months will be contrasted with those being forecast over the conterminous U.S. for the next 100 years. The future climate forecasts show very large increases in fire over most of the U.S. The potential use of fire suppression will also be discussed in its historical context and what would be needed to meet the potential fire risks of the future.

Author Biographies

-Ronald P. Neilson is the leader of the MAPSS vegetation modeling team with the Pacific Northwest Research station of the U.S. Forest Service.
James M. Lenihan is a fire and ecosystems modeler within the MAPSS vegetation modeling team of the U.S. Forest Service.
-Dominique Bachelet is an Associate Professor with Oregon State University and a Biogeochemical cycling modeler with the MAPSS team of the U.S. Forest Service.
-Raymond J. Drapek is an ecosystem modeler and GIS technician with the MAPSS team of the U.S. Forest Service. He contributes to the simulation and analyses of vegetation and fire dynamics over historical and future timeframes at continental to global scales.

WindWizard: A new tool for fire management decision support

Bret W. Butler

Abstract

Wind is a dominant variable in fire behavior. A new software tool has been developed that provides users with the ability to estimate surface wind flows at the 100m scale. This tool is especially useful when trying to estimate fire behavior in mountainous terrain. The tool is based on CFD technology and has been tested against measured wind flows. In recent years it has been used to support fire management decisions to improve firefighter and public safety, understand the environmental conditions that led to entrapments, identify prescribed fire prescription conditions, and estimate fire potential. Outputs from this tool include tiff images, GIS shape files, and FARSITE weather input files.

Author Biographies

Bret Butler is a research mechanical engineer at the Rocky Mountain Research Station's Missoula Fire Sciences Laboratory.

Presentation Type: Oral Presentations ***Session Title:*** Wildland Urban Interface
Track: 2 ***Session:*** 1

A Fuel Treatment Reduces Potential Fire Severity and Increases Suppression Efficiency in a Sierran Mixed Conifer Forest

Jason J. Moghaddas

Abstract

Fuel treatments are being implemented on public and private lands across the western U.S. While scientists and managers have an understanding of how fuel treatments can modify potential fire behavior under modeled conditions, there is limited information on how treatments perform under real wildfire conditions in Sierran mixed conifer forests. The Bell Fire started on 9/23/2005 on the Plumas National Forest, CA. This high severity burned upslope into a 1-year old mechanical 390-acre fuel treatment on private land. The fuel treatment was located on the lee (north) side of the slope on which the main fire burned. Prior to impacting the fuel treatment, the main fire ignited spot fires 400 feet into the treated area. Within the treated area, loadings 1, 10, & 100 hour fuels averaged 5.2 tons per acre. Stand density averaged 73 trees per acre, with a live crown base of 30 feet, and 36% canopy cover. Upon impact, the fire scorched trees on the perimeter of the fuel treatment adjacent to the burned area but the fire was easily suppressed. This fuel treatment resulted in: 1) increased penetration of retardant to surface fuels, 2) improved visual contact between fire crews and the IC, 3) safe access the main fire, 4) quick suppression of spot fires. This treatment was relatively small and isolated from other fuel treatments but resulting low severity, suppression costs, and post fire rehabilitation needs led to cost savings for local public and private land managers.

Author Biographies

Jason Moghaddas is a Fire Ecologist on the Plumas National Forest. He currently works with the Mt Hough, ID Team planning large scale fuel treatments on the Mount Hough Ranger District

City of Kamloops Wildland/Urban Interface Forest Fuel Hazard Reduction

Kelly P. Johnston and Willy Saari

Abstract

The City of Kamloops has been active in fuel management since 1985. In 2003 Kamloops adopted the Partners in Protection FireSmart program and established an interagency FireSmart Committee. This was followed by a wildfire risk analysis and forest fuel management plan. Kamloops encompasses 33,557 hectares with 7,480 hectares of wildland/urban interface (WUI) area assessed in the high or extreme wildlfire hazard classes. Dry Ponderosa/Douglas fir and grassland fuel types dominate the area, with an annual average of 175 potential WUI fire occurrences. Since 2003, Kamloops has initiated an aggressive three-pronged approach, using the pillars of fire prevention: Education- FireSmart WUI education and information sessions and individual engagement; Enforcement- implementation of WUI covenants for new developments and wildfire hazard bylaws on private lands; and Engineering - a forest fuel management plan targeting city owned lands. The prime operations contractor is H.I.S. Ventures Ltd. The objective of the fuel management plan is to reduce the assessed extreme and high hazard areas to moderate. Some of the challenges facing the team are: Ponderosa pine also being affected by an epidemic outbreak of Mountain Pine Beetle and Western Pine Beetle; Difficult access, low market value fibre , minimize scorch and smoke impacts; Significant reduction in visual screening; Landscape level treatment and response planning requires partnerships with private land owners and other government agencies. Collaborative efforts between the City, the contractor and members of the interagency committee resulted in the following solutions: Thinning targets red and green pine beetle attack trees; On site milling of dimensional lumber for value added products to be used within the city and local non-profit organizations; An Aspen tree planting partnership with local residents to promote species conversion and screening; Partnership with private land owners and other government land agencies to create a comprehensive community wildfire protection plan.

Author Biographies

-Kelly Johnston oversees the City of Kamloops Natural Resources program and is a fire management consultant. He holds a degree in Natural Resource Science.
-Willy Saari provides wildland fire services throughout Western Canada and the United States. Willy has been with the company for 18 years and as general manager, oversees all operations, including suppression, prescribed fire and wildland/urban interface, involving over 60 fire fighters and support staff.

Presentation Type: Oral Presentations ***Session Title:*** Wildland Urban Interface
Track: 2 ***Session:*** 1

Fuel Mangement Success on Private Land with Firewise

Richard Reitz and Claudia Standish

Abstract

This presentation will look at fuels management beyond federal and state land. It will include a quick overview of diffusion theory, and then demonstrate how diffusion theory has worked in the SW to accomplish fuel management objectives. One measurement of success is the exponential increase in the number of firewise type workshops given across AZ and NW since 1999. The data through graphs and tables will show workshop participants how diffusion has helped increase homeowner training through time. This displayes the BIG picture. Then this data will be brought to the ground, so to speak, by highlighting specific actions taken by communities/neighborhoods/individual homeowners that show how firewise workshops motivated them to reduce their fire risk. This will be highlighted by identifying various measurable practices these community folks are taking to accomplish their fuels management objectives.

Author Biographies

-Richard Reitz works for the USDA Forest Service's Southern Research Station in Athens, GA as a wildland fire technical transfer specialist.
-Claudia Standish works for the USDA Forest Service's Santa Fe National Forest in Santa Fe, NM as a wildland urban interface and fire prevention specialist .

Simulating fire risk within a mixed-ownership, fire-prone landscape of northeastern Wisconsin: Interactions between human ignitions and forest dynamics.

Brian R. Miranda, Brian R. Sturtevant, Eric J. Gustafson and Hong S. He

Abstract

The risk of wildfire in northern Wisconsin depends on interactions between human-caused ignitions and the configuration of fuels. We used LANDIS 4.0 to simulate interactions between current ignition patterns, ecosystem constraints, forest management, and succession to estimate long-term fire risk for a district of national forest experiencing rapid development of its wildland urban interface (WUI). Our base scenario simulated forest management defined by the current forest plan, a spatial distribution of fire ignitions incorporating housing density and road networks, and realistic burn patterns influenced by fuels and fire breaks. The fire risk and ecological implications of four mitigation strategies were investigated relative to the base scenario using a replicated factorial study design with the following factors: (1) adding firebreaks within fire-prone areas, (2) reducing ignitions along roads through vegetation management, (3) reducing ignitions by restricting debris burning, and (4) redistributing fire-prone forest types to areas outside the WUI. Removing debris-burning ignitions had the greatest reduction in cumulative area burned, followed by redistributing forest types. None of the mitigation strategies had effects on forest composition, due to the long fire rotations resulting from fire suppression. Our study illustrates the importance of human-ecological interactions and the value of a landscape approach when addressing fire mitigation strategies in the WUI.

Author Biographies

-Brian Miranda is an Ecologist with the North Central Research Station of the Forest Service, located in Rhinelander, Wisconsin, along with co-authors Brian Sturtevant and Eric Gustafson. All have research interests in landscape-scale interactions between forest succession, natural disturbances including insects and fire, and forest management patterns.
-Hong He is an associate professor in the Forestry Department of the University of Missouri-Columbia, and a primary developer for LANDIS 4.0. The National Fire Plan funded this research.

Presentation Type: Oral Presentations ***Session Title:*** Wildland Urban Interface
Track: 2 ***Session:*** 1

Main Boulder River Fuels Reduction Project

Dick Rath, Bill Avey and Mike Dannenberg

Abstract

The Main Boulder River fuels project is a joint effort between the USFS, BLM, Montana DNRC and private landowners. The project is located approximately thirty miles south of Big Timber, Montana. The Boulder Canyon is a very narrow drainage that provides access to the Abasaroka/Beartooth Wilderness Area, numerous summer cabins and four church camps. From the mouth of the canyon to the headwaters, it is approximately twenty-four miles in length. The canyon is surrounded on three sides by the Absaroka/Beartooth Wilderness Area. Most of the non wilderness portion of the canyon is less than one quarter mile wide. The Gallatin NF is proposing a fuel treatment on over 2,000 of National Forest lands that are located adjacent to the private land ownership. The Boulder River Fuels committee is administering National Fire Plan grant monies to treat the fuels on private ownership and the four Church Camps. This project has been underway for over three years and has seen significant success. It could be considered a demonstration site for future fuels management efforts that require cooperation between multiple federal, state and local government as well as supportu amd cooperation from local landowners. This project demonstrates that with a concerted effort solutions are often available that benefit all involved parties.

Author Biographies

-Bill Avey is the District Ranger on the Big Timber RD, Gallatin National Forest.
-Mike Dannenberg, State Lead for Community Assistance MT/Dakota's BLM.
-Dick Rath, is a retired USFS Fire Manager, Northern Region.

Presentation Type: Oral Presentations ***Session Title:*** Prescribed Fire
Track: 2 ***Session:*** 2

The use of silviculture and prescribed fire to manage stand structure and fuel profiles in a multi-aged lodgepole pine forest

Colin C. Hardy, Helen Y. Smith and Ward McCaughey

Abstract

This project evaluated the ecological and biological effects of two innovative silvicultural treatments coupled with prescribed fire in an attempt to both manage fuel profiles and create two-aged stand structures in lodgepole pine. Researchers and National Forest staff developed two shelterwood silvicultural treatments designed to enhance the existing multi-aged stand structure on the Tenderfoot Creek Experimental Forest (TCEF), central Montana: the first with reserve trees evenly distributed; the second with reserves contained within small (1/10-1/4 acre) groups. Retention of reserve trees was targeted at 50%, without regard to diameter or species. Eight even-retention and eight group-retention treatments were applied on 16 units totalling 649 acres. Half of the units were broadcast burned following harvest using a common burn prescription on all units, with an allowable overstory mortality of 50%. Plot-based fuel inventories were performed prior to and following harvest, and after burning. Fuel moisture samples were acquired prior to ignition. Prescribed fire consumed less fuel in the group-retention than in the even-retention units, even though large fuels were dryer within the groups. Additional data collected at the plots includes trees per acre, residual tree mortality, regeneration, windthrow, hydrologic responses, soil impacts, and beetle activity. A comprehensive summary of the treatments will follow subsequent monitoring scheduled to occur five years after burning.

Fire Behavior And Soil Heating Impacts With Prescribed Burning In Masticated Fuel Beds

Eric Knapp, Matt Busse and Carol Shestak

Abstract

Mastication is increasingly being used to treat shrub and small tree fuels to reduce fire hazard at the wildland-urban interface where prescribed burning is impractical or to break up fuel ladders prior to prescribed burning. Physical structure and fire behavior have yet to be well characterized for these fuels. Due to the compactness of the fuel bed and the highly fragmented nature of the woody particles, standard slash fuel models may not adequately predict fire behavior and fire effects. The objective of this study was to characterize the fuel bed in masticated units at the Challenge Experimental Forest, California, and evaluate fire behavior and effects when these units were later burned under prescription conditions. Fuel loading was quantified by collecting all surface organic material within plots and sorting into size classes. After burying thermocouples at different depths in the soil, fires were ignited in May and June 2005 when fuels and soil were still relatively moist. Fuel loading averaged 83 Mt/ha prior to the burns. The woody fuels (55 Mt/ha) were mainly in the one-hr (26%) and ten-hr (46%) size categories. Fuel bed depth averaged only 13cm. This led to mild fire behavior, with flame lengths for backing fires averaging 0.4m despite the high fuel loads. Many of the small ponderosa pine trees in the plots were extensively scorched, but relatively little of the heat penetrated deeply into the soil. Only one out of 44 thermocouples buried at 5cm depth in the soil registered >60 deg C. While outputs of above-ground fire effects models may need to be adjusted to account for the greater flaming residence time, adverse below-ground impacts can seemingly be avoided if masticated fuels are burned when the soils are moist.

Author Biographies

Eric Knapp is a research ecologist with the USFS Pacific Southwest Research Station.

Matt Busse is a research soil microbiologist with the USFS Pacific Southwest Research Station.

Carol Shestak is a biogeochemist with the USFS Pacific Southwest Research Station.

Presentation Type: Oral Presentations ***Session Title:*** Prescribed Fire
Track: 2 ***Session:*** 2

Effects of prescribed fire on fuels and forest structures in western ponderosa pine forests.

Lisa J. Bate, Victoria Saab, William Block, John Lehmkuhl, Brett Dickson and Stephanie Jentsch

Abstract

Most prescribed fire plans focus on reducing the hazards of wildfire with little consideration given to effects on wildlife populations and their habitats. To ensure effective prescribed burn projects while maintaining or enhancing wildlife habitat, we began a large-scale study known as the Birds and Burns Network in 2002. We are characterizing forest structure, fuel loads and their reduction, and avian community structure and productivity (cavity nesters) in unburned and prescribed-burned ponderosa pine/mixed-coniferous forests across the West. We will explore the use of software programs such as BehavePlus or Nexus for estimating fire behavior in both pre- and post-treatment landscapes. Second, we will present changes in fine and coarse woody fuels after treatment. A third goal is to examine the effects of prescribed fire on habitat structures important to wildlife such as large diameter (> 23 cm dbh) snags, trees and logs. As of 2005, study sites in AZ, NM, ID, and WA have undergone fire treatments. Preliminary results from a portion of our sample indicate that prescribed fire decreased small diameter (< 23 cm) trees by a mean of 276 stems per hectare ($p = 0.015$) in the Southwest Region. By contrast, small diameter snag densities increased by a mean of 111 stems per hectare (< 0.001) in the Southwest and increased by a mean of 602 stems per hectare ($p < 0.001$) in the Northwest. Effects of prescribed fire on fine and coarse woody debris are in progress. Results of this study will help managers develop scientifically sound and legally defensible prescribed fire projects that will reduce fuels and concurrently enhance wildlife habitat.

Author Biographies

-Lisa J. Bate is a Research Wildlife Biologist contracting with the US Forest Service, Rocky Mountain and the Pacific Northwest Research Stations. lisabate@centurytel.net
-Victoria Saab is a Research Wildlife Biologist with the US Forest Service, Rocky Mountain Research Station. vsaab@fs.fed.us web: http://www.rmrs.nau.edu/lab/4251/birdsnburns
-William Block is Project Leader/Supervisory Research Wildlife Biologist for the Rocky Mountain Station, Flagstaff, AZ 86001. wblock@fs.fed.us
-John F. Lehmkuhl is a Research Wildlife Biologist with the US Forest Service, Pacific Northwest Research Station, Wenatchee Forestry Sciences Lab. jlehmkuhl@fs.fed.us
-Brett Dickson is a PhD Graduate Research Assistant at the Noon Lab of Conservation and Landscape Ecology, Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523-1474. dickson@cnr.colostate.edu
-Stephanie Jentsch recently completed a Masters degree in Wildlife and Fisheries Science at the University of Arizona, Department of Natural Resources, University of Arizona, Tucson, AZ 85721. sjentsch@cox.net

Presentation Type: Oral Presentations ***Session Title:*** Prescribed Fire
Track: 2 ***Session:*** 2

Development of burn prescriptions to balance duff reduction and overstory tree survival

J. M. Varner, J. K. Hiers, Roger Ottmar and James Furman

Abstract

Burn prescriptions are often needed that accomplish conflicting land management objectives. In southeastern longleaf pine forests where fire has been excluded, management objectives focus on reducing accumulated forest floor fuels (primarily duff) while minimizing overstory pine survival, two outcomes that rarely co-occur. In longleaf pine and many other long-unburned ecosystems, there is abundant evidence that increased duff consumption leads to substantial mortality of large, old trees. To satisfy these opposing objectives, we burned 12 fire-excluded (35-45 y since fire) longleaf pine stands in northern Florida. Post-fire mortality was linked to pre-burn duff moisture and resulting duff consumption (R^2=0.76; $p<0.001$). In dry burns (duff moisture= 55%), duff consumption averaged 47%, but overstory pine mortality was 21% (range 8 to 42). Conversely, in wet burns (dm=115%), overstory mortality ranged from 0 to 2%, but only 5% of accumulated duff was consumed. In intermediate burns (dm=85%), some duff was consumed in all 4 burns (range 9 to 22%) and overstory pine mortality was minimal (mean= 3%). This framework provides promise for other long-unburned longleaf pine stands and potentially other fire-excluded coniferous forests where the goal of duff consumption often accompanies heavy and undesired tree mortality.

Author Biographies

Morgan Varner is Assistant Professor of Wildland Fire Management at Humboldt State University in Arcata, CA. His research interests include understanding patterns of fuel loading, duff ignition, and linking fuels to fire behavior and effects.

Effectiveness of Prescribed Fire as a Fuel Treatment in Californian Coniferous Forests

Nicole M. Vaillant, Scott L. Stephens and JoAnn Fites-Kaufman

Abstract

Effective fire suppression for the past century has altered forest structure and increased fuel loads. As a direct result over half of California is at high to extreme risk of catastrophic wildland fire. Prescribed fire as a fuels treatment can reduce both fire size and severity. This study tests how prescribed fire effects fuel loads, forest structure, potential fire behavior, and modeled tree mortality at 80th, 90th, and 97.5th percentile fire weather conditions, at nine prescribed fire treatments on eight National Forests in California. Prescription burning did not significantly change forest structure at most sites in spite of reducing tree densities up to 32%. Total fuel loads (litter, duff, 1, 10, 100, and 1000-hour) were reduced significantly in three sites, although not significant fuels were reduced from 23-78% in all of the sites. This reduction altered potential fire behavior by reducing rate of spread, flame length, and fireline intensity. Three of the nine sites were at an elevated risk of crown fire (low torching index and crowning index combined with high fuel loads) pre-treatment at 97.5th percentile weather conditions. Increased torching index coupled with decreased fuel loads reduced crown fire potential post-treatment. A 22% reduction of crowning fire behavior, even during extreme fire conditions, is noted after application of treatments. Predicted tree mortality decreased post-treatment as an effect of reduced potential fire behavior and fuel loads. Forest managers must consider many aspects when choosing locations for treatment. With the vast forested areas classified at high risk for catastrophic wildland fire in California it would be wise to target stands that benefit the most from treatment.

Author Biographies

N. Vaillant is currently a graduate student at the University of California, Berkeley working toward a PhD specializong in fire science.

Presentation Type: Oral Presentations ***Session Title:*** Sociology and Communication

Track: 2 ***Session:*** 3

Measuring the effectiveness of wildfire risk education: a case study from Colorado Springs

Geoffrey H. Donovan, Patricia A. Champ and David T. Butry

Abstract

Unlike other natural hazards such as floods, hurricanes, and earthquakes, wildfire risk has not previously been examined by using a hedonic property value model. In this article, we estimate a hedonic model based on parcel-level wildfire risk ratings from Colorado Springs. The data used in this study include both overall wildfire risk ratings and the underlying variables used to calculate the overall risk ratings. As homes at greater risk of loss from wildfire are often associated with positive amenities such as superior views, the disaggregated data allow us to disentangle these confounding effects. We find that providing homeowners with specific information about the wildfire risk rating of their property has changed the effects of some of the underlying wildfire risk variables on housing prices.

Communicating the wildland fire message: Influences on knowledge and attitude change in two case studies.

Eric Toman and Bruce Shindler

Abstract

Recent federal initiatives such as the National Fire Plan and Healthy Forests Restoration Act recognize the importance of citizen support to the successful implementation of fuel reduction strategies. To be effective in their efforts to engage outside stakeholders, resource professionals need to understand citizens knowledge of and attitudes toward current practices as well as how to best communicate with local communities about proposed actions. A variety of outreach methods, ranging from traditional activities (e.g., brochures and exhibits) to more innovative approaches (e.g., demonstration areas, guided field tours) have been used to communicate the rationale behind fuel reduction techniques. To date, limited evaluation of these efforts has occurred resulting in a lack of information available to guide the outreach decisions of agency personnel. In this paper we assess the effects of two basic communication strategies, unidirectional information exchange and interactive approaches on participant understanding and attitudes. Two study locations, Sequoia and Kings Canyon National Parks in California and the World Forestry Center in Portland, Oregon were selected based on the communication style utilized at each site. Data was collected in two phases; first, citizens completed a survey on-site prior to their participation in outreach activities, then, a follow-up questionnaire was mailed to each participant two weeks following initial contact. Resulting data enable assessment of the influence of outreach activities on participant understanding and attitudes and evaluation of factors that contributed to program success. Findings suggest outreach methods that encourage interaction may be more effective at influencing knowledge and attitudes than those consisting of a one-way flow of information. However, both types of programs influenced participants with low initial understanding of fire management or less supportive attitudes toward fuel practices. Results also showed a strong association between knowledge and attitude change suggesting fire professionals have a real opportunity to help shape public perceptions about appropriate management actions. We conclude by discussing consequences for outreach planning.

Author Biographies

-Eric Toman is a Faculty Research Associate at Oregon State University. He has conducted substantial research on the social aspects of fire management. His recent work has focused on evaluating communication strategies and partnerships as methods of accomplishing fuel management objectives with a particular interest in the role of citizen-agency interactions in building trust, understanding, and support for management activities.
-Bruce Shindler is Professor of Forest Resources at Oregon State University He has conducted substantial research on the social values of natural resource management and has extensive experience working on problems in communities at the wildland forest interface.

Presentation Type: Oral Presentations ***Session Title:*** Sociology and Communication

Track: 2 ***Session:*** 3

The Public and fuels management: Science findings on social understanding, beliefs, and acceptability.

Sarah McCaffrey

Abstract

Successful fuels management programs depend upon public approval and often active public involvement. Under the National Fire Plan, significant research effort has gone into understanding social aspects of fire management. This presentation will summarize key findings from research examining public views and acceptance of different fuels management efforts including prescribed fire, thinning, and defensible space. It will focus on key variables and processes associated with increased acceptance of and active support for the different practices. For instance, familiarity with a practice and trust in the people implementing it are key to acceptance. Managers interested in increasing acceptability should ensure that their program includes personal interaction with the affected public to explain need for the treatments and discuss potential issues and options. This process increases both familiarity and, if done well, trust and in so doing is an effective means of building public support for fuels management efforts. Additionally, research indicates that residents who live in the WUI fully understand the high level of fire risk, but have decided that the day to day benefits associated with where they live outweigh the risk. Thus working to increase risk perception is unlikely to encourage defensible space, rather managers would do well to show how defensible space can increase benefits (more wildlife for instance) associated with living in the WUI.

Author Biographies

Sarah McCaffrey is a Research Social Scientist for the USDA Forest Service, North Central Research Station. She currently oversees an NFP project examining the social acceptability of fuels treatments and is co-leader of a national effort to synthesize scientific knowledge related to fuels treatments and make the information accessible to fuels managers

Mapping the Relationship between Wildfire and Poverty

Kathy Lynn and Wendy Gerlitz

Abstract

Wildfires and related government roles and responsibilities for federal wildland management are prominent in our national consciousness because of the increased severity in the last decade of fires on and around public lands. In recent years, laws, strategies, and implementation documents have been issued to direct federal efforts for wildfire prevention, firefighting, and recovery. Reliable national-level information and monitoring are essential to ensure good decision-making and agency accountability. Social and economic information about communities at risk from wildfire is critical to these decisions. Despite the indispensable nature of this information for understanding communities, wildfire risk, and cooperative efforts, there is a void in policy direction within the federal agencies to collect, understand, and use social and economic information in wildfire management programs. This study addresses community capacity and examines socioeconomic indicators as elements of wildfire risk. The study investigates whether communities most at risk from wildfire are able to access and benefit from federal programs established to serve these communities. In other words, are the dollars, assistance, and fuels-reduction projects hitting the ground in the areas throughout the country that are most at risk to wildfire? This presentation will provide a forum to discuss the needs of rural and underserved communities in relationship to fire and fuels management programs.

Author Biographies

-Kathy Lynn works with Resource Innovations, an organization affiliated with the University of Oregon and is responsible for working with rural communities and Native American Tribes to build capacity to reduce wildfire risk and increasing awareness about the relationship between wildfire and poverty.
-Wendy Gerlitz is responsible for research and policy work for the National Network of Forest Practitioners. Previously, Wendy worked with Pacific Northwest Tribes on watershed planning. She served as a staff liaison to the President's Council on Sustainable Development.

Presentation Type: Oral Presentations ***Session Title:*** Sociology and Communication
Track: 2 ***Session:*** 3

Social research and mitigation of wildland fire risk: Success is about communication and relationship building

Jeffrey J. Brooks, Hannah Brenkert, Judy E. Serby, Joseph G. Champ, Tony Simons and Daniel R. Williams

Abstract

A retreat brought together forestry practitioners and social science researchers who work in wildfire risk prevention to share ideas concerning the social aspects of wildland fire risk mitigation in Colorado's urban interface communities. The two-day retreat, sponsored by the Colorado State Forest Service; Larimer County, Colorado; and the USDA Forest Service, had four objectives: reveal obstacles to effective wildland fire mitigation, share alternatives among practitioners facing similar barriers, open lines of communication between practitioners and social scientists, and provide opportunities to build agendas for further research and workshops. Participants worked in small groups to discuss how social research can benefit community projects and to develop a list of barriers to implementation. Facilitators took notes and social scientists video recorded the sessions that were independently studied by three of the researchers and synthesized into key findings and conclusions including: Forestry practitioners expressed frustration over a lack of apparent concrete solutions from social research findings to address the challenges they face. It appears that the research needs of forestry practitioners are primarily unknown or misunderstood by researchers. The urban interface fire problem will not be solved solely because funds are appropriated. Differing goals and definitions of success used by stakeholders make it difficult to work together. Practitioners agreed that relationship building and developing trust are paramount when working with interface communities. Inadequate communication exists at three levels: organizational, community, and individual homeowner. Stakeholders at these levels of organization do not share goals and definitions of success for wildland fire risk mitigation.

Author Biographies

-Jeffrey J. Brooks is a post doctoral social science analyst with the USDA Forest Service, Rocky Mountain Research Station in Fort Collins. Jeffrey has earned degrees in natural resource recreation, conservation ecology/sustainable development, and biology.
-Hannah Brenkert is a Graduate Research Assistant, Institute of Behavioral Science, University of Colorado Boulder, CO 80309
-Judy E. Serby is Conservation Education Division Supervisor Colorado State Forest Service, Fort Collins, CO 80523
-Joseph G. Champ is Assistant Professor in the Department of Journalism and Technical Communication, Colorado State University Fort Collins, CO 80523
-Tony Simons is a Wildfire Safety Specialist in Larimer County, Fort Collins, CO 80524
-Daniel R. Williams is a Research Social Scientist with the USDA Forest Service Rocky Mountain Research Station, Fort Collins, CO 80526

Presentation Type: Oral Presentations ***Session Title:*** Multiagency Collaboration
Track: 2 ***Session:*** 4

Organizational Characteristics That Contribute To Success In Engaging The Public To Accomplish Fuels Management At The Wilderness/Non-Wilderness Interface

Katie Knotek and Alan Watson

Abstract

Fire suppression policy on wilderness and other wildlands over the past century has resulted in hazardous accumulations of fuel in forest and grass lands. In many places, fire is a naturally occurring process, and fire exclusion has spurred greater incidents of large-scale, uncharacteristic wildfire impacting both ecological and social values across the interface of wilderness and non-wilderness lands. The urgency, complexity, and contentiousness of fuels treatment have signaled the need for increased public engagement in management decisions. In the fall of 2003, the Rocky Mountain District of the Lewis and Clark National Forest initiated a large-scale prescribed burn in the Scapegoat Wilderness to make the wilderness boundary more defensible from wildfire and to establish conditions that will allow fire to play a natural role within the wilderness in the future. Using this prescribed burn in the Scapegoat Wilderness as a case study, qualitative research was conducted in 2005 to understand the local management unit's public outreach efforts for this burn and its subsequent influence on public attitudes towards the burn. A series of in-depth interviews with a sample of agency personnel involved in the burn, and representatives from local communities who were aware of and/or participated in public outreach efforts for the burn, serves as the primary source of data for this research. A framework of mindfulness processes exhibited by High Reliability Organizations is used in analysis for identification and understanding of organizational characteristics that contribute to success in engaging the public in agency efforts to treat hazardous fuels and manage the risk of wildfire. As a case study, the methods and results will provide a means of comparison to additional cases in other management units.

Author Biographies

Katie Knotek has worked as a Social Science Research Assistant at the Aldo Leopold Wilderness Research Institute for the past 3 years. She works in support of the National Fire Plan applying social science theory and methods to fire and fuels management issues across the interface between wilderness and non-wilderness lands.

Partnering to Increase Success: Getting the Public to Relate to Wildland Fire Mitigation

Joseph G. Champ, Jeffrey J. Brooks and Daniel R. Williams

Abstract

Following Colorado's devastating 2002 fire season, a consortium of federal and state agencies organized to work toward mitigating the risks of future wildfire events along the Front Range of the Rocky Mountains. The Front Range Fuels Treatment Partnership (FRFTP) was created to substantially increase the acres of hazardous fuels treated. An important goal of the project has been improving communication between FRFTP leaders and the public. FRFTP documents call for such things as high quality information transfer, strategies for coordinating fire management messages, education, and collaboration with key communities. To provide a clearer understanding of the publics with whom the FRFTP wish to communicate, we conducted a series of qualitative focus group interviews with constituents from a diversity of stakeholder groups. Drawing perspectives from across communication theory, we discuss the results of our analysis of the interviews and offer alternative viewpoints about what it takes to be successful when communicating with publics about critical wildland fire risk reduction and fuels management.

Author Biographies

-Joseph G. Champ is an assistant professor in the Department of Journalism and Technical Communication at Colorado State University in Fort Collins, Colorado
-Jeffrey J. Brooks is a social science analyst at the USDA Forest Service, Rocky Mountain Research Station in Fort Collins, Colorado
-Daniel R. Williams is a research social scientist at the USDA Forest Service, Rocky Mountain Research Station in Fort Collins, Colorado

Presentation Type: Oral Presentations ***Session Title:*** Multiagency Collaboration
Track: 2 ***Session:*** 4

A Collaborative Approach to Community Wildfire Hazard Reduction

Marc Titus and Jennifer Hinderman

Abstract

This presentation will introduce participants to the very successful collaborative approach to community wildfire hazard reduction being used in the 5 county NW Region of the Washington State Department of Natural Resources. NW Region cooperators have created a successful model to help affected communities reduce their risks to wildland fire. Identified high risk communities have been approached by a multi-agency team with Firewise education and hazard assessment methodology. Participating communities have received mini-Firewise workshops, community hazard assessments and hazard mitigation planning assistance. By working collaboratively with communities, local fire districts, County Conservation Districts, County Fire Marshalâ€™s Offices and Departments of Emergency Management, as well as other State and Federal fire managers, dramatic results in the Region have been achieved. The Firewise Communities/USA model has been used to guide communities through a nationally recognized process of risk assessment, mitigation planning and community specific outcome based solutions. Community fuels reduction efforts have focused on the creation of defensible space and shaded fuel breaks, reducing structural ignitability, as well as implementation of forest stewardship and greenbelt management plans. Community recognition by the Firewise Communities/USA program is our measure of success. Case studies will be reviewed. Participants will gain tools to incorporate these methods in their local areas.

Author Biographies

-Marc Titus is the Wildfire Prevention Coordinator for the NW Region, Washington State Department of Natural Resources. He coordinates the Firewise Communities/USA program in the region. Marc has worked for the DNR and the forest industry for fifteen years. He graduated from the University of Montana School of Forestry.

-Jennifer Hinderman is the Firewise Coordinator for the Skagit Conservation District. She oversees the Firewise activities of the 5 Conservation Districts in NW Region. She graduated from Huxley College of Environmental

Collaboration: A Key To Success

Jeffrey A. Casey

Abstract

The Coeur d'Alene Field Office of Idaho BLM manages approximatley 97,000 acres in the 5 Northern Counties of Idaho. Collaboration in fuels treatment activities is critical for the Fuels Management Program to succeed. This collaboration occurs on several levels. For initial project identification and development, the Field Office Natural Resource and Fuels/Fire Staff act in concert to determine appropriate treatment for both fuels reduction and forest health considerations. Collaboration also occurs with County Governments during the initial phase of project identification, to facilitate fuels reduction activities on those tracts of public land that are identified as having potential to support high intensity wildfire adjacent to or in proximity of County identified Wildland Urban Interface Areas. Local contractors are then utilized, as the initial phase of most fuel treatments in North Idaho is vertical fuels manipulation by biomass utilization. Upon completion of this phase, contractors and other agencies co-operate with the BLM to conduct piling of activity fuels or site preparation for broadcast burning. As the prescribed burning phase of treatment is initiated, the BLM unites efforts with contracted, State, other Federal, and rural fire departments to apply fire as a management tool, and with County Fire Mitigation programs to inform and educate the public. Co-operation and collaboration was critical during broadcast burning conducted during the fall of 2005.

Author Biographies

Jeff Casey is currently the Fire Use Specialist for the Coeur d'Alene Field Office of Idaho BLM. He Served 9 years in the U.S. Army and earned a Bachelor of Science degree in Range and Animal Science from North Dakota State University.

Presentation Type: Oral Presentations ***Session Title:*** Multiagency Collaboration
Track: 2 ***Session:*** 4

PROMOTION OF FINE FUEL MANAGEMENT - WESTERN WILDFIRE IMPACT REDUCTION RESOURCE CENTER

Jennifer L. Vollmer

Abstract

Urban and wildland threat from wildfire can be greatly minimized through proactive efforts that reduce and slow spread through use of effective green strips or fuel breaks that aid in decreasing fire volatility by removal of fine fuels. The Western Wildfire Impact Reduction Resource Center (www.westernwildfires.org) addresses this need while striving for clear communication on the science of fire, fuel management, community needs and building cooperation. A coordinated network of effective green strips and fuel breaks across the Great Basin will result in protection of urban interface areas, aid in the rehabilitation of key wildlife habitat areas and give greater safety to fire fighters. In addition, areas surrounding the Great Basin are recording an increased amount of fine fuels in relation to prescribed burns, construction and other disturbance. The fight against western wildfires is typically reactive as suppression, with splintered efforts toward vegetation management. The Western Wildfire Impact Reduction Resource Center is striving to bring fuel management specialists and industry services, suppliers and manufactures together to aid communities in making informed decisions on fuel management projects. Focus groups identified the need for sharing fuel management program information for both urban and wildland areas to aid in collaboration, available resources and sharing knowledge. Communication between vegetation management specialists, including contractors, and threatened urban areas is key to the Center's success. The Center promotes this collaboration, emphasizing the need for inclusion of fine fuels treatments such as cheatgrass, Russian thistle and kochia. FIREWISE programs have aided in improving awareness and need for vegetation management. The Center intends to build on this model, including fine fuel management in prescriptions for firebreaks, and fostering a coordinated effort between community green strips and wildland fuel breaks.

Author Biographies

-Dr. Vollmer is a Weed Scientist based in Wyoming. She is an Ecological Restoration Specialist for BASF with 100% invasive species responsibility, advising government agencies on herbicide use in IPM programs and fine fuel management for the Western US. She represents the steering committee of the Western Wildfire Impact Reduction Resource Center.

Presentation Type: Oral Presentations ***Session Title:*** Case Studies
Track: 2 ***Session:*** 5

Incidental Hazardous Fuel Reduction Benefits from Biomass Removal for Endangered Species Management in Central Georgia A Case Report

Carl Schmidt

Abstract

Piedmont National Wildlife Refuge is located in central Georgia, in the Southern Piedmont Plateau. The red-cockaded woodpecker (RCW), an endangered species, occurs on the refuge. The principal refuge management goal is to produce a sustained, uniform flow of RCW habitat. Although there are many other benefits from forest management, they are incidental to RCW management. Many of the silvicultural practices commonly used in RCW management (i.e. biomass removal) to meet objectives of the National Fire Plan. First, despite the fact that silvicultural treatments increase the available fuel load, these operations mitigate hazardous fuel accumulations by rearranging the horizontal continuity and vertical arrangement of fuels, thereby limiting potential wildfire spread, torching, crowning and spotting, thus reducing the difficulty of control and fire size. Since most of the refuge is in the wildland/urban interface, these treatments also reduce the potential hazard to WUI communities. These benefits are realized no matter what wood products are removed. Secondly, the historic forest of the southern Piedmont, a mix of upland oaks with shortleaf and loblolly pine, was a fire adapted ecosystem. The current forest cover types on the refuge are not historic; they are the product of European contact. The southern Piedmont is in the understory fire regime classification, with a fire return interval of 2 to 5 years. While fires in the understory fire regime can change the midstory and understory, they generally do not change the overstory. Silvicultural treatments are important to manipulate the overstory and restore this ecosystem; furthermore, silviculture combined with fire is more cost efficient than fire alone. Silvicultural treatments are necessary to manipulate the overstory and restore this ecosystem. Finally, these treatments promote community assistance by using local resources to harvest and mill the wood products. Both the loggers who buy the timber and the mills they sell the timber to occur within a 50 mile radius of the refuge.

Author Biographies

Carl Schmidt is the Supervisory Forester, Piedmont National Wildlife Refuge. Prior to that he worked various fire and forestry positions with the USDA Forest Service, the National Park Service and the US Fish and Wildlife Service. He has a BSF from Purdue University.

Presentation Type: Oral Presentations ***Session Title:*** Case Studies
Track: 2 ***Session:*** 5

Case study - cooperative fire management in the Dandenong Ranges, Victoria, Australia

Jack Dinkgreve

Abstract

The Dandenong Ranges, 35 kilometres east of Melbourne, Victoria, Australia has long been recognised as an area of immense beauty and attraction with tall mountain forests, fern gullies and abundant wildlife. It is also recognised as an area where there is conflict between people living amongst this forested environment and being over run by wildfire. During the 1890s and 1920s most of the small communities in the Dandenongs were developed along the mountain ridges. These communities are now surrounded by eucalypt forest with a shrubby understory, vegetation that is very volatile and fire reliant/dependant. There is a reasonably high level of community awareness of the risks that fire poses, particularly after the extensive fires in the north east of Victoria during the summer of 2003, however, there is often a bi-polar view: either suppress fire quickly, completely and always or use prescribed burning and other hazard reduction techniques to mitigate the risks and acknowledge fire's role as a major component of the environment. Parks Victoria, Department of Sustainability and Environment, the Country Fire Authority and local communities have been working together to reduce fire risk by increasing the broader community's understanding of the risk, planning for fuel hazard reduction and undertaking priority hazard reduction works on private and public lands while also maintaining an effective fire suppression program. During the autumn of 2005 this was most clearly demonstrated by the involvement of staff from three organisations working to deliver 14 prescribed burns within the Dandenong Ranges National Park.

Author Biographies

-Jack has 25 years experience in park management working in national parks, regional parks and reserves and Community and External Grants Programs with Parks Victoria and has been actively involved in fire management since 1998. He is currently a participant in Parks Victoria/Parks Canada Staff Exchange Program 2005/2006.

Presentation Type: Oral Presentations ***Session Title:*** Case Studies
Track: 2 ***Session:*** 5

Fire Management in the Inter-Galactic Interface or Thirty Years of Fire Management on Merritt Island National Wildlife Refuge

Frederic W. Adrian

Abstract

Merritt Island National Wildlife Refuge is located on the Kennedy Space Center (KSC) on the central east coast of Florida. The vegetation evolved with fire, and many of the plant communities are fire maintained. Human activities also contributed to amount of fire in the landscape. Native Americans, early settlers and ranchers used fire. This continued until the 1960s when NASA acquired the land for KSC. Fire was excluded from the ecosystem for almost 20 years after the acquisition of the land. The lack of fire caused numerous changes in the ecosystem, including an increase in fuel loading. In 1981, the Refuge experienced a severe wildfire season with two fatalities and over 19,000 acres burned. An intensive prescribed burning program was initiated with the primary objective being the reduction of hazardous fuels. Large burn units; with a variety of fuel types were typical of this period. In 1993, more emphasis was place on using fire to restore and maintain wildlife habitat. The biggest challenge to developing this much needed burning program was not the limitations mentioned above, but using fire in and around a spaceport. Many restrictions to burning were initiated by KSC and the Air Force Station. As first specified, these restrictions would have effectively eliminated prescribed burning. Overcoming these restrictions took a combination of education, negotiation, external pressure and another bad fire season to accomplish. Key KSC personnel were briefed on the need for fuels reduction to minimize potential impacts of wildfires. Managers were made aware of the extensive training of fire personnel, and the amount of planning done to carry out a successful burn. They were also taken to the field to observe prescribed burn operations. The coordination efforts with KSC have allowed an average of over 15 prescribed fire totaling between 15,000 and 20,000 acres each year. Secondly, even with several bad fire seasons after 1981, there have been no injuries or fatalities, and the acres burned in wildfires has been significantly decreased.

Author Biographies

Fred (AKA Freddy the Fire Troll) has been the Forester at Merritt Island National Wildlife Refuge for over 23 years. He has participated in numerous prescribed fire and wildland fire suppression actions (stopped counting at 600), throughout the country. He is a Burn Boss Type 1, and IC Type 3 and a Fire Behavior Analyst. He is mostly happily married, has two children, one out on his own and the other, hopefully, soon to reach that status. He plans to retire in the near future and pick bluegrass music.

Presentation Type: Oral Presentations ***Session Title:*** Case Studies
Track: 2 ***Session:*** 5

Evaluating Risks Associated with Forest Management Scenarios in Areas Dominated by Mixed Severity Fire Regimes in Southeastern New Mexico

Aaron M. Ortega, David S. Martinez and Roy A. Hall

Abstract

The Lincoln National Forest has experienced several catastrophic fires over the last decade, including the 2000 Scott Able Fire. These fires have reduced available nest/roost habitat for the Spotted Owl over the landscape. Since 2000, the Sacramento Ranger District alone has experienced three fires that have affected thirteen Protected Activity Centers. Monitoring of the Scott Able Fire has shown that Spotted Owls can survive catastrophic fires, but will either occupy small remnant stands of suitable habitat or adjust use outside the fire boundary within suitable habitat. The objectives of this analysis are to review the results of the suite of hazardous fuels prescriptions to protect human life and property within the Lincoln National Forest, including a detailed analysis within the Rio Penasco Watershed. This is a mixed ownership landscape that includes U.S. Forest Service and private residential forest. The study area encompasses late-successional reserves and supports several protected species (including the Mexican Spotted Owl (MSO), Strix occidentalis lucida, and the Checkerspot Butterfly, Euphydryas anicia cloudcrofti). Due to managing for late-successional reserves, a significant amount of fuel loading has accumulated within the analysis area. Furthermore, high concentration of designated protected activity centers, threshold habitat, and critical habitat are characteristic throughout the whole Sacramento Ranger District. In an effort to frame how much fuel treatment is needed to protect human life and property, a ½ mile buffer was identified as a reference for consultation purposes and a starting point to be used in development of survival space needed for safe firefighting operations. Reduced characteristic crown fire potential and resultant spotting distance becomes the primary measurable goals and objectives of all fuel treatment prescriptions in WUI. In some instances the ½ mile buffer is adequate to obtain objectives of safely protecting life and property. Based on these goals and objectives, fuel treatment deferment located adjacent to and upwind of WUI could predispose wildfire behavior potential that would result in catastrophic wildfire loss of both amenities; the community and MSO habitat.

Author Biographies

-Aaron M. Ortega is Deputy Fire Staff, Lincoln National Forest Alamogordo, NM 88310
-David S. Martinez is Regional Fire Ecologist, Southwestern Region Albuquerque, NM 87102
-Roy A. Hall is Regional Fuels Program Manager, Southwestern Region Albuquerque, NM 87102

An Interagency Approach to Prioritizing Fuels Treatments

Paul Briggs, Dana Cohen, Brett Fay, Bruce Fields, Taiga Rohrer, John Schmidt, Cyndi Sidles, Scott Tobler, David Eaker and Anne Stanworth

Abstract

The Color Country Fuels Committee (CCFC), comprised of representatives from state and federal fire management programs in Southwest Utah and Northwest Arizona, has been nationally recognized for its work in hazardous fuel treatments. Beginning in 2000, the CCFC undertook an intensive assessment of the 148 identified communities at risk in the Color Country fire management response area. These assessments have been the foundation for prioritizing fuels treatments, determining focus areas, and targeting the development of Community Wildfire Protection Plans within the Color Country Interagency Fire Management area. This presentation highlights the history and success of the Committee's risk management process. Since the assessments began, several high-risk communities within the Color Country have received their trial by fire. They include New Harmony and Central, UT and in each case timely community wildfire protection plans and interagency fuels treatments were vital to protecting the area residences. This presentation highlights the history and success of the Committee's risk management process. Since the assessments began, several high-risk communities within the Color Country have received their trial by fire. They include New Harmony and Central, UT and in each case the timely fuels treatments were vital to protecting the area residences.

Author Biographies

The purpose of the CCFC is to serve as an interagency forum for identifying and resolving wildland/urban interface, hazardous fuels and vegetation management issues which directly impact firefighter and public safety. Effective management of the Color Country's ecosystems, in accordance with the National Fire Plan, the National Cohesive Strategy, and local land management plan objectives, is the mission of the Committee.

Presentation Type: Oral Presentations ***Session Title:*** Fire Effects
Track: 2 ***Session:*** 6

Monitoring changes in soil quality from post-fire logging in the Inland Northwest

Deboarh Page-Dumroese, Martin Jurgensen, Thomas Rice, Ann Abbott, Joanne Tirocke, Sue Farley and Sharon DeHart

Abstract

In the wake of the wildland fires of 2000, 2002, and 2003, many opportunities were created to conduct post-fire logging operations in the Inland Northwest. Management options are needed to balance removal of dead and dying timber with maintaining soil productivity. However, relatively little information is available on the impact of salvage logging operations on long-term soil/site productivity, or on the best method for monitoring these changes. A study of post-fire-logged sites across a wide range of soil and climatic conditions in Idaho and Montana was established to evaluate the suitability of current USFS soil quality standards and guidelines, which were developed for timber harvesting operations, to monitor changes in forest productivity and sustainability after post-fire logging operations. We examined stands in which logging had taken place in either winter or summer, using forwarders, tractors, or rubber-tired skidders. Our results will provide monitoring techniques for detecting detrimental changes from post-fire logging and recommend best management practices for limiting disturbance.

Author Biographies

-D. Page-Dumroese is project leader of the Microbial Processes as Ecosystem Regulators in Western Forests unit of the Rocky Mountain Research Station. She has been working on long-term soil productivity and soil quality standard revisions for the past 20 years.
-M. Jurgensen is Professor of Forest Soils at Michigan Technological University, Houghton, MI. He has been working on organic matter and soil productivity issues for the past 35 years.

Grid-based monitoring and gradient modeling to quantify cumulative effects of fuels treatments

Samuel A. Cushman and Kevin S. McKelvey

Abstract

The President's Healthy Forests Initiative and the National Fire Plan call for prescriptive thinning on millions of acres of forestland across the western United States to reduce fuel loads. These management practices will alter landscape structure and vegetative community composition, and likely will have substantial indirect effects on animal populations. However, the landscape-level cumulative effects of fuels treatment on biodiversity are poorly understood. Thus it is critical to determine the impacts broad-scale implementation of fuels reduction may have on the distribution and abundance of animal species. In addition, there is an urgent need to measure current distributions and habitat relationships of native fauna as a benchmark to assess future ecological changes resulting from management activities, such as fuels treatments, climate change and altered fire regimes. This paper describes a multi-scale approach to quantify interrelationships between fuels treatments, biophysical gradients, and animal biodiversity. The analysis provides multi-scale analysis of the cumulative effects of fuels treatments, spatially explicit predictions of current species distributions, and evaluation of expected impacts of several alternative future scenarios

Author Biographies

-Samuel A. Cushman, PhD. Post-doc research ecologist, USFS RMRS 4201
-Kevin S. McKelvey, PhD. Research Ecologist, USFS RMRS 4201

Presentation Type: Oral Presentations ***Session Title:*** Fire Effects
Track: 2 ***Session:*** 6

Predicting Ground Fire Potential in Aspen Communities

Stephen G. Otway, Edward W. Bork, Kerry R. Anderson and Marty E. Alexander

Abstract

The process of fire, in conjunction with herbivory and flooding, are some of the key drivers in the ecosystem of Elk Island National Park (EINP), Canada. The associated use or non-use of fire is one tool at the disposal of Park staff to modify habitat. Clearly understanding the role of fire in aspen (Populus tremuloides Michx.) forests within the Park would directly contribute towards improving the management of vegetation. Data on the duff moisture conditions under which ground fire may start, persist or expand in aspen are presented, as well as the results of test ground fires. Undesirable social consequences of severe, deep burning ground fires include smoke generation and impaired plant community re-growth. Different topographic positions, plant communities and seasons were factored into the research design. The Duff Moisture Code and Drought Code indices of the Canadian Forest Fire Weather Index System were calculated and factors including duff moisture content, bulk density and inorganic content measured at the time of sample ignition. New probability of ignition non-linear equations were modelled for the aspen forest (D-1) fuel type. Fire research activities continue to include refinement of the FWI/FBP system components, including those applicable to aspen dominated forest types. This research will contribute to the national Fire Weather Index System and to our understanding of ground fire likelihood and effects under the soil conditions of EINP.

Author Biographies

-S. Otway is Manager Resource Conservation, Elk Island National Park.
-E. Bork is Associate Professor, Range Management, University of Alberta.
-K. Anderson is a Fire Research Officer, Canadian Forest Service.
-M. Alexander is a senior Fire Behaviour Research Officer, Canadian Forest Service/FERIC.

Best predictors for post-fire mortality of ponderosa pine trees in the intermountain west

Carolyn H. Sieg, Joel M. McMillin, James F. Fowler, Kurt K. Allen, Jose F. Negron, Linda L. Wadleigh, John A. Anhold and Ken E. Gibson

Abstract

Models designed to predict post-fire probability of tree mortality that incorporate data collected in a consistent manner from a number of sites over a broad geographic area have not been developed for ponderosa pine. We quantified tree attributes, crown and bole fire damage, ground fire severity, and evidence of insect attacks on a total of 5083 trees in four wildfires in four Intermountain states that burned in 2000. Crown consumption (%) and scorch (%) volume collectively accounted for the majority of predictive capacity in all four individual models and in the pooled four-fire model (67%). The pooled model had a Receiver Operating Characteristic (ROC) score of 0.96, and correctly classified 3-year post-fire mortality of 90% of the trees. Tree diameter, presence of Ips beetles, ground fire severity rating and minimum bole scorch height were also significant variables in the pooled model, but added little to the ability to predict tree mortality. We tested the validity of the pooled, four-fire model using data collected from a 2001 wildfire. The model correctly classified 3-year post-fire mortality of 96% of the trees. These results indicate the importance of including estimates of both crown consumption and scorch volume in assessing mortality of ponderosa pine trees following growing season fires in the Intermountain West. Predictive models are important in monitoring post-fire effects following prescribed and wildland fires.

Author Biographies

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-McMillin is Entomologist with U.S. Forest Service Region 3 Forest Health Protection, Flagstaff, AZ.
-Fowler is Ecologist with Rocky Mountain Research Station in Flagstaff.
-Allen is Entomologist with U.S. Forest Service Region 2 Forest Health Management in Rapid City, SD.
-Negron is Research Entomologist with Rocky Mountain Research Station in Fort Collins, CO.
-Wadleigh is Region 3 Fire Ecologist with the U.S. Forest Service, stationed in Flagstaff, AZ.
-Anhold is Entomologist with U.S. Forest Service Region 3 Forest Health Protection, Flagstaff, AZ.

Presentation Type: Oral Presentations ***Session Title:*** Fire Effects
Track: 2 ***Session:*** 6

The relation between forest structure and burn severity

Theresa B. Jain, Russell T. Graham and David Pilliod

Abstract

The study funded through National Fire Plan evaluates the relation between pre-wildfire forest structure and burn severity across three forest types: cold (subalpine fir/lodgepole pine), moist (grand fir/western redcedar/western hemlock), and dry (Douglas fir/ponderosa pine). Over 70 wildfires have been sampled in Idaho, Oregon, Montana, Colorado, and Utah, which burned between 2000 and 2003. Because of the wide breath of sampling, results from this study are applicable for understanding the relation between forest structure and severity within a wide range of forest types within the Rocky Mountains. This paper will discuss the burn severity classification that integrates fire intensity, fire severity, and response and will discuss the role of overstory density and its relation to different burn severity outcomes.

Author Biographies

-Theresa (Terrie) B. Jain is a Research Forester at the Rocky Mountain Research Station, in Moscow Idaho. She received her Bachelors, Masters, and PhD from University of Idaho in forest resources with concentrations in silviculture, landscape ecology and statistics.

Presentation Type: Oral Presentations ***Session Title:*** Fuels Management Economics

Track: 2 ***Session:*** 7

An Integrated Approach to Fuels Treatment in the Southwestern U.S., The Harvest-Cost-Revenue Estimator

Eini C. Lowell and Dennis R. Becker

Abstract

Fuels reduction treatments generate a large amount of woody by-products, most of which are small in diameter and of marginal economic value. Opportunities to process this material are few in many parts of the United States limiting the ability to reduce the threat of wildfire to communities. Planning fuels treatments should take into account many variables beginning with the stand conditions and following through to the market opportunities that match the resource characteristics of the stand. The Harvest-Cost-Revenue Estimator was developed to evaluate stand-level economic thresholds for harvesting small diameter ponderosa in the southwestern United States. The software is a Windows-based, public domain financial/engineering model designed for a diverse set of users to allow evaluation of costs of fuel reduction treatments through in-woods decision making regarding tree selection, residuals left on site, and product opportunities for regionally based markets. The HCR Estimator is used to predict fuel reduction treatment costs by combining site specific costs with knowledge of regional market potential to better prioritize fuel treatments in the wildland-urban interface.

Author Biographies

-E. Lowell works for the PNW Research Station as a scientist focusing on deterioration of dead and dying trees (fire and insects), utilization of hardwoods, and opportunities (with a value-added emphasis) for using small diameter trees. She received a B.S. degree in Forestry with a Wood Science and Technology emphasis from University of Maine at Orono, a M.S. degree in Forest Products was obtained at Oregon State University.

Comparing the cost effectiveness for options of improving modeled home survival when wildfire threatens structures in the wildland urban interface

Keith D. Stockmann

Abstract

Wildland fire hazard to residential structures is now being taken very seriously. Communities across the western US are developing Community Wildfire Protection Plans and land management agencies are prioritizing much of their project work and grant assistance around fuel treatments. Although structure protection is rarely the sole land management objective in any area, even the WUI, information is lacking on the cost effectiveness of various options for hazard mitigation targeting this objective. To address this void, I combine a probabilistic landscape-disturbance modeling tool with a structure-ignition modeling tool to first evaluate the current hazard to structures in a community. Then by modeling potential hazard reductions with several budget levels applied through either fuel treatment prescriptions in the surrounding forested landscape or structure and fuel modifications in the home ignition zones I compare the relative cost effectiveness of each option, given the sole objective of protecting homes from wildland fire ignition. This information can then be colored by other resource and property values to complement the analysis of multiple approaches to mitigation. This project should help move economics squarely into future wildland fire management decision-making by communities and land management agencies.

Author Biographies

Keith Stockmann is a PhD Candidate University of Montana, College of Forestry and Conservation, Missoula, MT.

Presentation Type: Oral Presentations ***Session Title:*** Fuels Management Economics

Track: 2 ***Session:*** 7

Evaluating Alternative Prescribed Burning Policies to Reduce Net Economic Damages from Wildfire

D. E. Mercer, Jeffrey P. Prestemon, David T. Butry and John M. Pye

Abstract

Recently, wildfires in the United States have produced total damages and costs that exceed billions of dollars annually. This has resulted in controversial proposals by land managers and policy makers to dramatically increase the amount of fuels management to reduce the risk of wildfire. Yet, there have been few empirical studies of the impacts of fuel reduction treatments on actual wildfire risk. Most studies of the efficacy of fuels reduction for wildfire risk reduction are derived from extrapolations of how fires burn at fine scales. Rarely, have studies examined how wildfire risk relates to human activities, vegetation management, and land use patterns. We use a cross-sectional, time series data set of wildfires and prescribed burning permits for the state of Florida to estimate two wildfire risk functions that estimate the risk of wildfire acreage and severity as a function of weather/climate, prescribed burning history, wildfire history, timber harvest history, ecosystem type and housing density. Then, we apply this wildfire risk function to develop an economic optimization model to estimate the optimal amount of prescribed burning to minimize the total costs of wildfire (suppression and damages) plus prescribed burning costs across a landscape. As a case study, we use Monte Carlo simulations of 20 fuels reductions policies to estimate the optimal amount of prescribed burning to produce the lowest net cost from wildfires for a county in Florida

Reduction of potential fire behavior in wildland-urban interface communities in southern California: a collaborative approach

Christopher A. Dicus and Michael Scott

Abstract

This paper discusses changes in potential fire behavior before and after implementation of various fuel treatment strategies in a wildland-urban interface community in southern California. It also provides a case study on how fire behavior modeling successfully led to a collaborative effort between fire service personnel, homeowners, and multiple environmental regulatory agencies to reduce the risk of a devastating wildfire while simultaneously minimizing deleterious environmental impacts of fuel treatments there. FARSITE, a state-of-the-art, GIS-based fire modeling software, was utilized to assess potential fire behavior under average and extreme weather conditions in the community of Rancho Santa Fe in San Diego County, which was developed adjacent to a designated open-space area that consisted primarily of 60-year-old, decadent chaparral. Pre-treatment fire modeling illustrated extreme rates of spread and intensity. The effectiveness of various fuel modification strategies were then modeled to illustrate their ability to reduce fire behavior, which varied by treatment type. Results of fire behavior simulations led to a recognition for the need for fuels treatments by all stakeholders, including homeowners and regulatory agencies that were originally adverse to any type of treatment due to perceived environmental degradation that would occur. Through a collaborative process, these diverse stakeholders worked to create and maintain effective fuel treatments that minimize degradation to the site. By any measure, the fire behavior modeling and collaborative approach by fire personnel, homeowners, and regulatory agencies in Rancho Santa Fe is a success story that could be a template for interface communities throughout southern California.

Author Biographies

-Christopher A. Dicus is an Associate Professor in the Natural Resources Management Dept. at Cal Poly State University, where he heads the Wildland Fire & Fuels Management concentration of the Forestry major.
-Michael Scott, is the Urban-Fire Forester for the Rancho Santa Fe Fire District in San Diego County, California.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Characterization
Track: 3 ***Session:*** 1

FUEL3-D: a spatially explicit fractal fuel distribution model

Russell A. Parsons

Abstract

Efforts to quantitatively evaluate the effectiveness of fuels treatments are hampered by inconsistencies between the spatial scale at which fuel treatments are implemented and the spatial scale, and detail, with which we model fire and fuel interactions. Central to this scale inconsistency is the resolution at which variability within the fuel bed is considered. Crown fuels are characterized by clumps of fuel separated by gaps between needles, between branches, and between trees. A growing body of evidence suggests that this variability plays an important role in how fire spreads. A new system currently in development for representing fuels with higher detail, called FUEL3-D, is presented. FUEL3-D is designed to both facilitate fundamental fuel and fire science research and to provide detailed guidance to managers in the design and evaluation of fuel treatments. Unlike existing fuel models which do not deal with spatial structure or variability within the fuelbed, FUEL3-D represents fuels with spatially explicit detail; individual branches on individual trees are resolved and quantified using fractal geometry and allometric relationships. Fuels can be summarized to 3-D pixels, at any scale, as input to advanced physical numerical fire behavior models such as FIRETEC and WFDS. FUEL3-D can thus be used to represent fuels before and after treatment with much greater detail than has been possible before. Model development, validation against destructively-sampled crown fuels data sets, and current research inquiries are discussed.

Author Biographies

Russ Parsons is a fuels researcher and modeler with the Fire Ecology and Fuels research unit at the USFS Fire Sciences Lab in Missoula, MT. Russ holds degrees in forestry from UC Berkeley (B.S., 1992), U Idaho (M.S., 1999) and is currently pursuing his Ph.D. in forestry at the University of Montana.

Understanding temporal litter variability of Ozark forests through an examination of accumulation rates and disturbance

Michael Stambaugh, Richard Guyette, Keith Grabner and Jeremy Kolaks

Abstract

Measuring success of fuels management is improved by understanding rates of litter accumulation and decay in relation to disturbance events. Despite the broad ecological importance of litter, little is known about the parameters of accumulation and decay rates in Ozark forests. Previously published estimates were used to derive accumulation rates and combined litter measurements, model estimates, and fire scar history data were used to derive a decay constant (k=0.39). We used accumulation equations to demonstrate temporal changes in litter loading. Region-wide litter data were used to derive a dynamic accumulation equilibrium from which we applied accumulation rates to describe temporal changes in litter loading resulting from fire events. For example, after a fire event that consumes nearly 100 percent of the litter, about 50% of the litter accumulation equilibrium is reached within 2 years, 75% within 4 years, and the equilibrium (99% accumulation) after approximately 12 years. These results can be used to determine the appropriate prescribed burning intervals for a desired fire severity. For example, fire history data show that the percentage of trees scarred, a surrogate for fire severity, is influenced by the length of historic fire intervals (i.e., amount of litter accumulated). This information will be incorporated into regional fire risk assessments and can be used as a basic knowledge of litter dynamics for both fire management planning and forest ecosystem understanding.

Author Biographies

-M. Stambaugh is a senior research specialist in the Department of Forestry at the University of Missouri-Columbia.
-R. Guyette is an associate professor in the Department of Forestry at the University of Missouri-Columbia.
-K. Grabner is an Ecologist, U.S. Geological Survey, Biological Research Division, Columbia Environmental Research Center.
-J. Kolaks is a Forest Community Ecologist, Missouri Department of Conservation.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Characterization
Track: 3 ***Session:*** 1

How many fuels plots are needed to measure success? An in-depth look at sampling fuels in lodgepole pine for the Tenderfoot Research Project

Helen Y. Smith and Colin C. Hardy

Abstract

The Tenderfoot Creek Experimental Forest (TCEF) is located in the Little Belt Mountains of central Montana and is the only Forest Service Experimental Forest that features the lodgepole pine forest type. The Tenderfoot Research Project was developed to evaluate and quantify the ecological and biological effects of two innovative silvicultural treatments with and without prescribed fire in an attempt to create two-aged stand structures in lodgepole pine. The silvicultural treatments were shelterwood harvest with reserves left evenly distributed or in small groups. Half of the research units were broadcast burned following harvest. We established 239 fuels plots within 16 treatment units occupying a combined area of 649 acres. At each plot we established two permanent 50 foot-long fuel transects perpendicular to one another, resulting in 478 individual fuel transects. Each plot was sampled before and after harvest, and after burning, where applicable. This level of sampling is very intensive and would not be recommended for land managers attempting to set up a monitoring program. Through data exploration, we determined the minimum number of plots we could have established while still capturing an acceptable level of variability within the data. Since each treatment activity also affects the variability, we will present this information for fuel conditions prior to and following each silvicultural treatment as well as for post burn conditions.

Creating a fuels baseline and establishing fire frequency relationships to develop a landscape management strategy at the Savannah River Site

Bernard R. Parresol

Abstract

There are currently no periodic regional or national fuels inventories being conducted, which makes it difficult to gauge the effectiveness of fuels and fire management strategies. We modified standard forest inventory methods to incorporate a complete assessment of fuel components on over 600 plots. Because of deficiencies in south-wide data on litter-duff bulk densities, we developed new bulk density relationships. We examined the relationships among stand variables, fire frequency and fuel component loadings through use of analysis of variance and regression. We created spatial maps of fuel loadings for the 800 km2 of the Savannah River Site, a National Environmental Research Park located in the upper coastal plain of South Carolina. For the major forest types (loblolly, longleaf, slash, pine-hardwood) stand variables generally explained the larger fraction of the variability in total fuel loading. The variables basal area, stand age, and site index were important in accounting for variability in ladder fuel, coarse woody debris, and litter-duff for pine types. For a given pine stand condition, litter-duff loading decreased in direct proportion to the number of burns in the preceding thirty years. Ladder fuels for loblolly and longleaf increased in direct proportion to the years since the last prescribed burn. The spatial pattern of fuel loading across the landscape reflects both stand management and fire management.

Author Biographies

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-Dan Shea is Fire Planner, USDA Forest Service, Savannah River, New Ellenton, SC 29809
-Roger Ottmar is Research Forester, USDA Forest Service, Pacific Northwest Research Station, Seattle, WA 98103

Presentation Type: Oral Presentations ***Session Title:*** Fuel Characterization
Track: 3 ***Session:*** 1

Estimating Fuel Loadings in Masticated Fuels

Sharon M. Hood and Rosalind Wu

Abstract

Masticated fuel treatments are used increasingly as a mechanical means to treat fuels. Gathering fuel loading information on masticated fuels allows fire managers a way to monitor changes in fuels and assess their treatments effects on fire behavior. However, Brown's planar transects may not correctly estimate fuel loadings because masticated fuels violate the assumption that the fuel is round. We found no studies that compared the estimated loadings from the planar intercept method to actual masticated fuel loadings. Based on the hypothesis that masticated material will behave more like duff than dead and down woody fuels, we developed a sampling method for estimating masticated fuel loadings. We estimated percent cover and average depth along fuel transects in ponderosa/Jeffrey pine, ponderosa pine/gambel oak, pinyon-juniper, and mixed conifer forest types. We then collected the masticated material, duff, and litter samples to mineral soil. The samples were dried and weighed to determine bulk densities of the each component of the forest floor (duff, litter, and masticated material). The data will be used to develop regression equations based on the percent cover and depth to predict bulk densities. Photographs were also taken of each sample before collection that can be used as a field aid to estimate cover classes. We hope that this method will provide managers with an accurate way to quickly and easily estimate fuel loadings in masticated treatment areas.

Author Biographies

-Sharon Hood is a forester for the Fire Ecology and Fuels Unit at the Fire Sciences Lab in Missoula, MT. She received a M.S. in Forestry from Virginia Tech and a B.S. in Forestry from Mississippi State University.
-Ros Wu is the Fire Ecologist for the San Juan Public Lands, Durango, CO. Her work focuses on fire history studies and fire and fuels treatment monitoring across the San Juan NF and neighboring BLM lands.

Presentation Type: Oral Presentations ***Session Title:*** Fire Use/Policy
Track: 3 ***Session:*** 2

Influences on USFS District Rangers' decision to authorize Wildland Fire Use

Martha A. Williamson

Abstract

United States wildland fire policy and program reviews in 1995 and 2000 required reduction of hazardous fuel and recognition of fire as a natural process. Although an existing policy, Wildland Fire Use (WFU), permitted managing natural ignitions to meet resource benefits, most fuel reduction is still achieved through mechanical treatments and prescribed burning. However resource constraints suggest that successful fuel and ecosystem management hinges on expanding WFU. The decision to authorize WFU in the U.S. Forest Service rests with line officers, and the go/no go decision constitutes a time-critical risk assessment. Factors influencing this decision clearly impact the viability of WFU. This study examined influences on line officers go/no go decision. A telephone survey was conducted of all U.S. Forest Service district rangers with WFU authority in the Northern, Intermountain, and Southwestern Regions. The census was completed during February 2005 and obtained an 85 percent response rate. Data were analyzed using classification and regression tree (CART) analysis. Personal commitment to WFU provided the primary classifier for 91 percent of the district rangers who authorized WFU. External factors, negative public perception, resource availability, and a perceived lack of support from the Agency were the main disincentives to authorizing WFU.

Author Biographies

Martha received her B.A. in Chemistry and Public Policy Analysis from the University of North Carolina at Chapel Hill in 2000 and her M.S. in Forestry from the University of Montana in Missoula in 2005. HMartha is currently a Fire Management Specialist on the Humboldt-Toiyabe National Forest, working to implement Wildland Fire Use.

U.S. Policy Response to the Fuels Management Problem: An Analysis of the Public Debate about â€œHealthy Forestsâ€

Jayne F. Johnson, David N. Bengston, David P. Fan and Kristen C. Nelson

Abstract

The Healthy Forests Initiative and Healthy Forests Restoration Act represent major policy and legislative responses to the fuels management problem in the United States. This study examined the nature and evolution of the public discussion and debate about these policy responses (referred to here as a Healthy Forests). The InfoTrend computer content analysis method was used to analyze about 2,800 news stories about Healthy Forests from August 1, 2002 through December 31, 2004. Favorable and unfavorable beliefs about Healthy Forests were identified and coded. The most frequently mentioned favorable beliefs that emerged included the view that Healthy Forests will (1) reduce the buildup of fuels in forests and reduce the risk of catastrophic wildfire, (2) protect people, communities, and property, and (3) cut red tape and speed up decision making processes. The most commonly expressed unfavorable beliefs included the view that Healthy Forests (1) is an excuse to increase logging and subsidize the timber industry (stealth logging), (2) will weaken important environmental protections, and (3) will reduce public input in decision making. An analysis of the evolution of the public debate about Healthy Forests over time revealed some evidence of a growing consensus on the problem of fuel buildup and the need to reduce the risk of wildfire. But mistrust was found to be an ongoing issue as Healthy Forests is implemented. Building trust will be a key to continuing to gain support.

Author Biographies

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-Kristen C. Nelson is an associate professor of Human Dimensions of Natural Resources and Environmental Management in the Department of Forest Resources at the University of Minnesota, Twin Cities. Email: kcn@umn.edu

Presentation Type: Oral Presentations ***Session Title:*** Fire Use/Policy
Track: 3 ***Session:*** 2

British Columbia Fuel Management Program

Chris D. Duffy and Sue Clark

Abstract

After the unprecedented 2003 forest fire season, an external evaluation of British Columbia(BC)'s fire management was commissioned. The report recommended developing a fuel management strategy in the Wildland Urban Interface (WUI) areas of B.C. Stemming from these recommendations, the Ministry of Forests initiated a Fuel Management Program in 2004. Its delivery is based upon a strategic partnership with the Union of BC Municipalities (UBCM), which represents the 182 Municipalities and Regional Districts in BC. One of the principles of the Fuel Management program is to have Local Governments lead fuel management planning and treatments in the WUI. The Ministry of Forests in conjunction with the UBCM, has made concerted efforts to assist communities in developing strategies to identify and reduce the threat from wildfires. The Four key components of the Fuel Management Strategy are: 1. Provincial Strategic Threat Analysis - a spatial analysis of forest fuels posing a threat to the WUI. 2. Community Wildfire Protection Plans - plans that communities develop to identify forest fire threats to their community and the steps required to mitigate them. 3. Pilot Projects - small trial areas designed to explore the economic and operational viability of different fuel treatment methodologies and equipment. 4. Operational treatments - larger scale fuel treatments of forest fuels to protect communities and values.

Author Biographies

-Chris Duffy is the Superintendent of Fuel Management and a Fire Behavior Specialist for the Province of British Columbia. He is in his 22nd year of Fire Management and has been Zone Protection Officer for a number of areas throughout the province
-Sue Clark is the Programs Officer for the Union of BC Municipalities and has worked with local government for the past eight years. She is currently responsible for the management of programs funded through the Province of British Columbia and directed at community level programming.

Wildland Fire Use: Challenges associated with program management across multiple ownership and land use situations

Thomas Zimmerman, Michael Frary, Shelly Crook, Brett Fay, Patricia Koppenol and Richard Lasko

Abstract

The application and use of wildland fire use for a range of beneficial ecological objectives is rapidly expanding across landscapes supporting diverse vegetative complexes and subject to multiple societal uses. Wildland fire use originated in wilderness has become a proven practice successful in meeting ecological needs. The use of wildland fire in non-wilderness is emerging as an important practice but its success is predicated on the acknowledgment of the fundamental inseparability and equal importance of ecological, social, and economic needs and requirements. The 2005 western fire season resulted in the single largest scale application of wildland fire use in non-wilderness to date and illustrated that managing wildland fire use in these areas is associated with a higher level of complexity driven by a number of elements including: spatial scale differences; presence of multiple ownerships and increased values to be protected; increased needs to plan and implement mitigation actions; temporal scale differences for implementing mitigation actions; greater social and economic concerns and needs; and increased public information needs. Continuing expansion of wildland fire use implementation across federal, state, and private land ownerships and all land use situation will encounter additional influences that bring new challenges, previously unexplored situations, and additional implementation questions which potentially limit management.

Presentation Type: Oral Presentations ***Session Title:*** Fire Use/Policy
Track: 3 ***Session:*** 2

Evaluating Wildland Fire Use Fires: Beyond Ecological Benefits, Measuring Their Contribution to Fuel Hazard Reduction

Jo Ann Fites, Erin Noonan and Carol Ewell

Abstract

There has been a recent increase in the National Forests in California that have allowed wildland fire use (WFU) fires. These fires can be particularly scrutinized or limited in California because of air quality concerns. This leads to careful questioning of the purpose and value of WFU fires. To date, emphasis of objectives for wildland fire use fires has been on ecological value and benefits of restoring fire as an ecosystem process. There are other benefits to WFU fires that have had less attention, especially in California, namely the reduction in fuel hazard. Three WFU fires in the central and southern Sierra Nevada in 2003 illustrate the scope and extent of hazardous fuel reduction benefit of WFU fires in California. These benefits include: 1) reduced hazard in a watershed that is a key muncipal water supply; 2) reduced likelihood of large, difficult to control wildfires reaching extensive wildland urban interface areas during extreme fire weather conditions (east-wind events); and 3) reduced hazard across extensive areas of old growth and key habitat. Based on pilot WFU monitoring in 2005, some monitoring approaches are suggested to quantify these benefits.

Author Biographies

-Jo Ann has worked for the USFS for 19 years as an ecologist and fire ecologist in California. She has a PhD in Forest Resources from the U. of Washington. She leads a 25 member enterprise team emphasizing fuels, fire ecology and fire management services in the west.
-Erin is a fire ecologist and fire GIS specialist with an M.S. from the U. of Nevada at Reno. She has worked for Southern Pacific Timber Industry, the National Park Service and currently the Forest Service.
-Carol is a fire ecologist completing her M.S. at Humboldt State University. She has worked for the National Park Service and currently the Forest Service.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Mapping
Track: 3 ***Session:*** 3

Assessing Ecological Departure from Reference Conditions with the Fire Regime Condition Class (FRCC) Mapping Tool

Stephen W. Barrett, Thomas DeMeo and Jeffrey L. Jones

Abstract

Knowledge of ecological departure from a range of modeled reference conditions provides a critical context for managing sustainable ecosystems. Fire Regime Condition Class (FRCC) is a qualitative measure characterizing possible departure from natural fire regimes. Recently, the FRCC Mapping Tool was developed as an ArcMap tool utilizing protocol identified by the Interagency Fire Regime Condition Class Handbook to derive spatial depictions of vegetation departure. The FRCC Mapping Tool requires a biophysical setting layer, a succession class layer, and a landscape layer as input data. The tool then compares existing vegetation composition for each biophysical setting to pre-modeled reference conditions for those types. As described in this paper, spatial outputs characterizing vegetation departure at the succession class, biophysical setting, and landscape levels can be used by land managers to identify restoration objectives and priorities.

Author Biographies

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Changing Fuels Spatial Data using the Contextural Raster Editor

Jeffrey L. Jones, Lee C. Hutter and Wendel J. Hann

Abstract

Geographic Information Systems (GIS) are more commonly being used by fuel and wildland fire managers to develop strategic plans pertaining to fuels and fire behavior. Deriving adequate estimates of fire behavior require that the fuels data accurately reflect those conditions being modeled. Since ecosystems are dynamic, vegetation and fuels spatial data must be continually updated to reflect current conditions. In addition, many fuel managers must be able to change fuel layers so that they can evaluate the effects of their proposed treatment on potential fire behavior. Unfortunately, editing spatial data must be conducted within a GIS environment, and many fuels and wildland fire managers do not have the technical skills to efficiently modify spatial data. The Contextural Raster Editor (CRE) is an ArcMap tool that facilitates the editing process of ArcGRID data by automating the many steps involved to update existing layers. Users simply edit tables representing a value attribute table, and then output a new raster layer containing the updated values. Fuel attributes are commonly assigned to unique combinations of multiple layers representing biophysical settings and vegetation characteristics (e.g., potential vegetation type, cover type, size class, and canopy cover). Furthermore, changing the value of one fuel variable (e.g., fire behavior fuel model) often must coincide with changes in other fuel variables (e.g., canopy base height, canopy bulk density, and canopy cover). Thus, the CRE will combine multiple raster layers into a single layer, thereby allowing users to edit multiple attributes simultaneously, and then output revised layers for those attributes of interest. This paper will demonstrate an application of the CRE for changing the fuels layers required to run FARSITE and FlamMap2 for a hypothetical fuel treatment project in southern Utah.

Author Biographies

-Jeffrey L. Jones: Landscape Ecologist; USDA Forest Service; National Interagency Fuels Technology Team; Kalispell, MT.
-Lee C. Hutter: Software Engineer; Systems for Environmental Management; National Interagency Fuels Technology Team; Missoula, MT.
-Wendel J. Hann: Fire Ecologist; USDA Forest Service; National Interagency Fuels Technology Team; Silver City, NM.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Mapping
Track: 3 ***Session:*** 3

Evaluation of Hazardous Fuel Reduction Treatments Using LIDAR Measurements in the Pine Barrens of New Jersey

Nick Skowronski, Kenneth Clark, John Hom, Ross Nelson and Robert Somes

Abstract

Ladder fuels and horizontal fuel continuity are major factors in the transition of ground fires to the canopy, where they are much more difficult and expensive to suppress. We used LIDAR (Light Detection and Ranging System) measurements made by helicopter, extensive fuel loading measurements made in the field, and a GIS map of prescribed fires conducted from 1993 to 2005 (155 prescribed fires, range of 50 to +1000 acres) to evaluate the effectiveness of fuel reduction treatments conducted by the New Jersey Forest Fire Service and other wildfire managers in the Pine Barrens of New Jersey. Understory vegetation height and ladder fuels were mapped by binning LIDAR data into discrete height classes, and field measurements were used to quantify fuels loads. Sites with very high fuel loads (10 to +15 tons/acre), dense fuel bed depths < 3 feet, and/or high horizontal continuity (40-100% shrub cover) were detected easily with LIDAR measurements. Sites where repeated prescribed fires had been conducted over a number of years also were detected easily, but LIDAR measurements could not be used to differentiate between prescribed fires conducted on consecutive years. The combination of LIDAR and ground measurements can be used to help guide decisions for prioritizing fuel reduction treatments, and can contribute to the selection of appropriate fuel models to simulate fire behavior.

Author Biographies

-Nick Skowronski, Kenneth Clark, John Hom and Robert Somes work for the Northern Global Change Program of the USDA Forest Service in Newtown Square, PA
-Ross Nelson works for NASA's Biospheric Sciences at Goddard Space Center, Greenbelt, MD

Presentation Type: Oral Presentations ***Session Title:*** Fuel Mapping
Track: 3 ***Session:*** 3

Analysis of fuel variability within the landscape-scale of Rocky Mountain Region: Integration of Field Data, Geospatial Information, and Spatial Statistics

Mohammed A. Kalkhan, Karl E. Brown, Cory B. Bolen and Diane C. Abendroth

Abstract

The integration of spatial information (remotely sensed data, GIS, GPS) and spatial statistics are effective tools for modeling and mapping coarse-scale and fine-scale ecological variability and for the prediction of fuel loading, variability, and vegetation characteristics. In our objective, we proposed new techniques to conduct fuel-vegetation surveys based on pixel nested sampling (20 x 20 meters) designs at different landscape-scale levels at Grand Teton National Park - Bridger Teton National Forest (BTNF), Wyoming and (15 x 15 meters) at Rocky Mountain National Park (ROMO), Colorado, USA. Through geospatial statistical modeling and mapping, fuel loadings will be forecast across the landscape. To predict the fuel parameters and forest characteristics at GRTE/ BTNF, we will use a new geospatial statistics model using spatial autocorrelation and cross-correlation statistics, trend surface analysis, and stepwise regression. This process is based on the ordinary least squares (OLS) or spatial autoregressive (SAR), generalized least squares (GLS) estimates, and generalized linear models (GLM). Field data, environmental characteristics, remote sensing, and GIS data will be integrated with spatial statistics to estimate coarse-scale variability in vegetation, fuel parameters and forest characteristics. Modeling of the spatial continuity of fine-scale variability will be based on binary regression classification trees (RCT), Kriging, and co-Kriging. Semi-variogram models will be selected for the lowest values of AICC statistics when Kriging is used. The geospatial statistical model-mapping will be integrated to a fire area simulator model (FARSITE) to predict the potential fire growth and behavior across the landscape under a variety of weather scenarios. Using these methods, we hope to define a new protocol for fuel modeling and mapping within GRTE- BTNF. The new approach will also provide a cost-effective tool for identifying areas currently affected or vulnerable to invasion by exotic species as well as assist with other issues of landscape management (i.e., forest fuel loading, wildfire in relation to weeds occupying the landscape, and other factors of concern to resource management teams at GRTE -BTNF and ROMO).

Author Biographies

-Dr. Mohammed A. Kalkhan is a Research Scientist Faculty at Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO, USA. Dr. Kalkhan's research interest is the integration of biometrics, spatial statistical modeling and mapping, geospatial information, sampling methods and designs to landscape scale assessment, fire ecology and fire behave, fire modeling and mapping, plant diversity and invasive species.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Mapping
Track: 3 ***Session:*** 3

Mapping fuels on the Okanogan and Wenatchee National Forests

Crystal L. Raymond, Lara-Karena B. Kellogg and Donald McKenzie

Abstract

Resource managers need spatially explicit fuels data to manage fire hazard and evaluate the ecological effects of wildland fires and fuel treatments. Ideally, these data would be extensive enough to enable managers to develop strategic plans at the scale of entire forests and evaluate treatment effectiveness at the same scale. We developed a method for mapping fuels on the Okanogan-Wenatchee National Forest (OWNF) using the Fuels Characteristic Classification System (FCCS) in combination with GIS layers of vegetation cover and structure, disturbance history, and management activities. The FCCS classifies fuels into 16 categories based on their combustion properties, producing unique fuelbeds, each of which represents a distinct fire environment. A fuelbed is scale-independent, allowing for classification and mapping from local to continental scales. Managers on the OWNF identified 180 fuelbeds based on vegetation form (forest vs. non-forest), species composition, and structural stage. For the initial classification, we consolidated them into 40 general fuelbeds representing the major vegetation forms and species groups. We developed decision rules to map the general fuelbeds across the forest, using vegetation polygons interpreted from aerial photographs, modeled potential vegetation, and a raster layer of species cover derived from satellite imagery. We assigned a general fuelbed to each vegetation polygon based on the proportions of individual species that compromised each polygon. These fuelbeds can then be subdivided from the general fuelbed layer into specific structural types using spatial data on canopy cover, quadratic mean diameter, and past disturbances (fires, insects, and management). Our rule-based approach allows for the incorporation of highly specific data if available or a more general classification if they are unavailable, and for reclassification when new data become available. Key uses of the fuels map include spatially explicit modeling of fire effects and assessment of spatial patterns of fire hazard under different management strategies.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Metrics and Evaluation
Track: 3 ***Session:*** 4

Quantifying the effectiveness of fuels management in modifying wildfire behaviour - an Australian perspective

Lachlan McCaw, Jim Gould and Phil Cheney

Abstract

Prescribed fire has been used extensively for fuel hazard management in the eucalypt forests of southern Australia since the 1960s. Implementation of prescribed fire programs has been closely linked with, and dependent upon, the development of burning guides for particular forest types through experimental research. The effectiveness of prescribed fire programs in reducing the overall impact of wildfires has been examined using a variety of methods, and at a range of scales. At the local scale case studies have proven useful in illustrating the effects of different fuel conditions on fire behaviour, and the resulting impacts on natural resource values and fire suppression difficulty. Remote sensing is being used increasingly to monitor the effects of fuel management at the landscape scale with promising advances in the ability to detect fires under a dense forest canopy. Assessment of program effectiveness at the regional scale is generally based on statistical trends in fire occurrence and size. The effect of fuel conditions on fire behaviour has also been studied experimentally, most recently in the Project Vesta study. In this paper we present examples of these different approaches, and discuss the strengths and limitations of each. Fuels management can have important benefits to fire suppression that are difficult to quantify, such as reducing the risk and difficulty of implementing backburning operations during indirect attack. In this situation the lack of fuel management could be regarded as an opportunity cost. We conclude that an integrated approach that draws on a broad range of information offers the best way of quantifying the effectiveness of fuels management programs.

Author Biographies

-Lachlan McCaw is a Principal Research Scientist with the Department of Conservation and Land Management based at Manjimup in Western Australia.
-Jim Gould is a Senior Research Scientist with CSIRO/ENSIS Forest Biosecurity and Protection based in Canberra, Australian Capital Territory.
-Phil Cheney is an Honorary Research Fellow with CSIRO/ENSIS Forest Biosecurity and Protection based in Canberra, Australian Capital Territory

Presentation Type: Oral Presentations ***Session Title:*** Fuel Metrics and Evaluation
Track: 3 ***Session:*** 4

The Fire Behavior Assessment Tool: Integrating Multiple Fire Behavior Variables into a Stand-level Metric Characterizing Fire Behavior

Jeffrey L. Jones and Dale A. Hamilton

Abstract

One of the primary issues confronting land managers today is that historical fire suppression efforts, silvicultural treatments, and grazing practices have changed the fuel characteristics of wildland settings; subsequent fire behavior is now believed to be uncharacteristic relative to historical conditions. Furthermore, the problem is exacerbated by the encroachment of human settlements into wildland settings, increasing the risks to communities from wildland fires. Land managers charged with designing fuel treatments to alter fire behavior have requested an assessment tool that would synthesize various fire behavior attributes (e.g., flame length, rate of spread, fireline intensity, crown fire activity) into a single metric that would facilitate the design and evaluation of their proposed projects. The Fire Behavior Assessment Tool (FBAT) provides an interface between ArcMap and FlamMap2. ArcMap is a geographic information system (GIS) that is commonly available to land managers, whereas FlamMap2 is a fire behavior mapping and analysis program that computes potential fire behavior characteristics. FBAT requires 8 input layers: elevation, slope, aspect, fire behavior fuel model, canopy base height, canopy height, canopy bulk density, and canopy cover. FBAT processes these data layers into the format required by FlamMap2 prior to running FlamMap2 in the background. Three fire behavior variables (i.e., flame length, crown fire activity, and rate of spread) output by FlamMap2 are then integrated into a single metric that characterizes fire behavior. Managers can use the tool to locate potential fuel treatment units, develop a prescription for those units, and lastly evaluate the effect of their proposed treatment on potential fire behavior. This paper demonstrates the use of FBAT for a sample landscape in southern Utah.

Author Biographies

-Jeffrey L. Jones: Landscape Ecologist; USDA Forest Service; National Interagency Fuels Technology Team; Kalispell, MT.
-Dale A. Hamilton: Software Engineer; National Interagency Fuels Technology Team; Systems for Environmental Management; Missoula, MT.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Metrics and Evaluation
Track: 3 ***Session:*** 4

Measuring Success in Your Fuels Program: From the Report Card to Valuable Learning

Paula A. Nasiatka and David Christenson

Abstract

How can your unit learn in everyday fuels programs and from program reviews? How can your unit move from living in the report card culture to more effective ways to improve what your unit knows and how it learns? Six specific tasks are critical to organizational learning. By engaging in these tasks your unit will significantly improve both its programs and its learning. 1. Continually collect intelligence about the fuels environment. Collect information and regularly incorporate it in your planning and implementation. 2. Learn from the best practices of other organizations. Look at successful processes another fuels or fire management program is using and see how you may apply them in your unit. 3. Learn from your own experiences and past history. Continually look at what has happened in the past at your unit. Use the AAR process to learn from each project. 4. Experiment with new approaches. Try a different approach especially if what you have been doing hasnâ€™t worked the way you want. Listen to unit members who have a different perspective. 5. Encourage systematic problem solving. Follow a systematic path while trying to solve a problem by looking at what was planned, what happened, and why it happened. 6. Transfer knowledge throughout the organization. Share your knowledge with your fuels and fire management programs as well as other units. The Lessons Learned Center is your resource center for sharing what you have learned beyond the scope of your own unit. An organizational learning tool has been recently developed by the Harvard Business School in cooperation with the Lessons Learned Center. Such a tool is designed to measure how your unit is doing with respect to learning. By looking at your learning environment, learning processes and leadership you can measure your unit level of learning and improvements over time.

Author Biographies

Paula Nasiatka is Center Manager, Wildland Fire Lessons Learned Center, National Advanced Fire and Resource Institute, Tucson, AZ. She received her B.S. in Park Administration from Springfield College in Massachusetts in 1981.

Fuel Treatment Success: What are the Metrics?

Elizabeth D. Reinhardt

Abstract

Measuring success in fuel treatment - the theme of this conference - implies that metrics of success exist. This paper reviews and evaluates some possible metrics that might be used to evaluate a fuels treatment program. These include, among others, acres treated, acres protected, acres restored, change in probability of catastrophic wildfire, change in acres burned in catastrophic wildfire, change in the expected present value of resources in an area of concern, and many others. Implications of these metrics are discussed.

Author Biographies

Elizabeth Reinhardt is a Research Forester at the Forest Service Rocky Mountain Research Station's Missoula Fire Lab. She studies fire ecology and fuels. She has a PhD in Forestry from the University of Montana.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Metrics and Evaluation
Track: 3 ***Session:*** 4

Performance Measures in Fuels Management

Douglas B. Rideout, Andrew G. Kirsch and Stephen J. Botti

Abstract

Selection of an appropriate performance measure crucially affects program success. While a well constructed measure can promote program growth and acceptability while the wrong measure can wreak havoc and produce unintended side-effects. Performance measures in wildland fire management must be clearly linked to desired program outcomes as expressed in land management plans. Where these outcomes are ambiguous or difficult to measure, program outputs (units of production) have been used to define performance. This introduces inefficiency and an inability to measure the benefits of fuels programs. Therefore, extreme care is required when applying performance measures. Here, we identify the key ingredients necessary for measuring performance in a fuels program. We draw on previous work form the medical, education and defense fields to illustrate the approach and ingredients required for a successful performance measure. We show how some traditional performance measures in fire management and other fields have the potential to promote unwanted effects. For example, we review performance measure such as acres treated, initial attack success rate and firefighter production capability. We show how selection of performance measure is sensitive to the level of analysis. For example, measuring performance at the fuels project level may differ from measuring performance at the program level. In addition, we highlight the need for scalability of performance measures to facilitate broad scale implementation. Performance measures that are not scaleable, pose additional issues.

Author Biographies

Authors are, respectively, Professor and Director of the Fire Economics and Economics Laboratory, Department of Forest, Rangeland and Watershed Stewardship, College of Natural Resources at Colorado State University; Program Analyst, Fire Program Analysis Project at the National Interagency Fire Center, Boise Idaho, and Fire Program Planning Manager, National Park Service, National Interagency Fire Center.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Treatments
Track: 3 ***Session:*** 5

Roadside Thinning at Yosemite National Park: Monitoring effectiveness and other resource concerns

Kara J. Paintner, Monica S. Buhler and Jennifer S. Hooke

Abstract

Roadside thinning has occurred at Yosemite National Park, California since 2003. High visibility, increased treatment acreage and use of new fuel reduction techniques raised questions about the effectiveness of the treatments. Monitoring was designed to evaluate if thinning and subsequent treatments modify potential fire behavior, reduce ground fuels, reduce canopy cover, increase exotic species, and cause unacceptable soil disturbance. The thinning prescription removes all shade tolerant conifers less than 6 inches dbh. Cut trees are hand piled and burned. 28 rapid assessment plots are installed in roadside thinning units. Data was collected before the area was thinned, within 1 month after pile burning & at the peak of the growing season following the pile burning. Dead and down fuel loads did not decrease until after pile burning. Understory tree composition fell within target range. Fire behavior changes were modeled in CrownMass, & showed a change from active crown fire to torching under the high end of prescribed fire prescription. Measured height to live crown showed very little increase due to the limits of hand limbing. Modeled height to live crown increased. No exotic plant species of management concern were observed either before or after thinning. Soil disturbance varied, but showed the largest change when individual piles were lined. Monitoring is helping the park make better decisions about treatments & on the ground practices in a timely manner.

Author Biographies

-Kara Paintner, is a fire ecologist for the National Park Service, Fire Program Center, Boise, Idaho. She was fire ecologist at Yosemite from 2000-2005.
-Monica Buhler, is the lead fire effects monitoring at Yosemite. She has led the field crews at the park since 2001.
-Jen Hooke is fire ecologist at Yosemite NP. She has also worked at Grand Teton NP, Redwoods N&SP, and Everglades NP.

Measuring Effectiveness of Fuel Treatments Across National Forests in California: a Practical, Programmatic Approach

Jo Ann Fites, Carol Ewell and Erin Noonan

Abstract

For the past 6 years, we have conducted fuel treatment effectiveness and effects monitoring across 17 National Forests in California. Initial goals were an approach that would be low cost, yet yield useful results for managers and facilitate data sharing with other agencies such as the National Park Service (NPS). To date, 46 projects and a total of 184 plots have been measured pre-treatment with 50 plots measured 1 year and 27 plots measured 2 years post-treatment. A report has been completed annually as well as an interactive CD every other year. Additional important questions regarding measurement and calculation of fuels for potential fire behavior analysis have also been addressed including: 1) supplementing the Brown's planar intercept to adequately measure 1-hour fuels; and 2) use of allometric equation based average canopy fuel loading vs loading weighted by actual canopy base and tree heights. The total cost of the program has ranged from $150,000 to $200,000 per year. While data are insufficient to evaluate the effectiveness of individual fuel projects, they are useful for evaluating results of fuel treatments by major vegetation and treatment types across California. Further, the data has provided quantitative information to support or modify key underlying assumptions used in project planning, NEPA and fireshed analysis. A GTR publication is in progress that will provide a credible citation for managers on the findings.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Treatments
Track: 3 ***Session:*** 5

FIRE SEVERITY AND INTENSITY IN NATURAL AND MANIPULATED FUELS DURING SPRING BURNING IN MIXED SHRUB WOODLANDS

Tim Bradley, Jennifer Gibson and Windy Bunn

Abstract

Whiskeytown National Recreation Area has applied a variety of alternative fire risk reduction methods, which expand the options for fire managers but have unknown ecological impacts and long-term effects. This research project examined fire severity and behavior in masticated and unmanipulated fuels during a spring burn. Pre and post fire measurements of surface fuels (litter, duff, 1, 10, 100, 1000 hr TLFM) and on-site estimates of fire behavior (flame length, flame zone depth, and rate of spread) were used to characterize the differences in burning conditions in the various fuel types. In addition, maximum temperature was measured using pyrometers placed in three strata: 0.5 meters above the ground, on top of the litter, and at the interface between duff and soil layer. Fire severity was characterized by measuring the scorch height and mortality of overstory trees and shrubs. The mastication treatment significantly altered the fuel profile, converting live and dead standing materials into downed woody debris and resulting in an approximate 200% average cover increase in woody fuel loading for 1 and 1000 hr TLFM size classes, and greater than 300% average cover increase in 10 and 100 hr TLFM size classes. The mean flame length (28.28 inches) and flame zone depth (19.15 inches) were significantly greater ($P<0.001$) in masticated plots than the mean flame length (10.12 inches) and flame zone depth (6.27 inches) in the unmanipulated plots. Similarly, the mean temperatures for litter (657.24°F) and aerial (277.33°F) tags in the masticated plots were significantly greater ($P<0.001$) than temperatures recorded for litter (218.55°F) and aerial (58.87°F) tags in unmanipulated plots. These indices lead to an increase in mortality of overstory (>8 dbh) and pole-sized (<8 dbh) oaks and conifers. These results highlight the complexity of burning in masticated fuels when the objective is to retain overstory trees and some vegetation.

Author Biographies

Tim Bradley is a fire ecologist with the National Park Service at three parks in Northern California. He currently serves as the program coordinator for a DOI/USAID fire and pest management program for Central America and Mexico.

Presentation Type: Oral Presentations ***Session Title:*** Fuel Treatments
Track: 3 ***Session:*** 5

Impacts of thinning and prescribed burning treatments on predicted wildfire behavior and tree health in an old-growth ponderosa pine and western larch stand

Michael G. Harrington, Anna Sala and Carl Fiedler

Abstract

Western forests with numerous multi century-old trees are rare compared to the pre-20th century landscape, primarily due to past heavy cutting and, most recently, to severe wildfires, insects, and disease. Several conifer species, notably ponderosa pine and western larch, were able to achieve old-age status and maintain long-term presence and dominance primarily because of their adaptation to a regular disturbance regime, especially relatively frequent fire. In fact, two key elements for a successful regeneration strategy for these conifers on many sites are frequent fire and tree longevity. Since the early 20th century, wildland fire suppression activities have been quite successful, often resulting in significantly altered conditions in stands with remnant old-growth pine and larch. These conditions include high density of young, shade-tolerant conifers, increased competition for site resources leading to tree stress and susceptibility to pathogens, poor site conditions for establishment of disturbance-adapted species, and increased risk of uncharacteristically severe fire. Land managers are challenged to select appropriate treatments that reduce the live fuel buildup without furthering the health decline of the old trees. As indices of treatment success, this study compares the impacts of several activities designed to reduce the 20th century fuel buildup on potential wildfire behavior and stand resilience, and on the physiological status of the old trees. This study site, dominated by 300-year-old ponderosa pine and western larch, had experienced fire at an average interval of 20 years (range 17-34 years) prior to 1920. Since then, with fire exclusion and no tree harvesting, several hundred small trees per acre, mostly Douglas-fir, have established in the understory. We tested five restoration treatments: cutting understory trees and pile burning or broadcast burning slash; cutting understory trees, thinning overstory trees and pile burning or broadcast burning slash; and control. Results showed a relatively small dissimilarity in surface fuels among the five treatments, but an obvious difference in ladder fuels. This led to similar modeled surface fire intensity values among treatments, but a higher probability for stand replacement fire in the control. In addition, tree physiology evaluation revealed higher water use, higher foliage production, and higher radial wood increment for larch and higher sap flow rates increased foliage production and bud size, higher leaf nitrogen content, and higher radial increment for ponderosa pine in treated stands than those in the control. Therefore, success of fuel treatments was documented not only by reduced probability for stand replacement fire, but also by a general increase in physiological performance of the old trees. This suggests a status more resilient to biotic (insects) and abiotic (fire) disturbances, while increasing the opportunities for perpetuation of long-term presence and continued dominance by these favored species.

Author Biographies

-Michael Harrington is a research forester in the Fire Ecology and Fuels project at the Missoula Fire Sciences Laboratory, Rocky Mountain Research Station Missoula, MT
-Dr. Anna Sala is an associate professor of ecophysiology in the Department of Bioloical Sciences at the University of Montana, Missoula, MT
-Dr. Carl Fiedler is a research professor of forestry in the College of Forestry and Consevation at the University of Montana, Missoula, MT

Presentation Type: Oral Presentations ***Session Title:*** Fuel Treatments
Track: 3 ***Session:*** 5

Assessing Mitigation of Wildfire Severity by Fuel Treatments

Erik J. Martinson and Philip N. Omi

Abstract

Treatments to mitigate fuel accumulation and fire hazard have long been advocated, but there is surprisingly little empirical evidence that demonstrates the effectiveness of these activities. We evaluated the severity of 9 fires that burned over fuel treatments in dry conifer forests of the Western US. Our results indicate that fuel treatments generally reduce both canopy damage (t-test p-values range from <0.0001 to 0.06 with median 0.02) and depth of ground char (median p-value = 0.05, range = 0.003 to 0.19). Sources of variability in fuel treatment effect sizes were explored with meta-analysis. Explanatory variables considered were the type, age, and intensity of treatments, weather conditions, and historic fire regime of the treated ecosystems. Two of three measures of treatment intensity were found to be significant predictors of fuel treatment effect size: the degree to which height to canopy was raised (p=0.02, r2=0.39) and the degree to which tree density was reduced (p=0.08, r2=0.23). However, we found that the strongest predictors of treatment effectiveness were historic fire frequency and weather severity, as measured by the energy release component of the National Fire Danger Rating System. Treatments were most effective in ecosystems where fire was relatively frequent prior to Euro-American settlement (p=0.03, r2=0.44) and when weather conditions were of intermediate severity (p=0.02, r2=0.59).

Author Biographies

Erik Martinson is a research associate at Colorado State University's Western Forest Fire Research Center and an instructor of wildland fire measurements. He holds an M.S. in fire science from Colorado State University and a B.A. in biology and environmental studies from Macalester College.

Presentation Type: Oral Presentations ***Session Title:*** Fire Surrogate Study/Biomass

Track: 3 ***Session:*** 6

The National Fire and Fire Surrogate Study - Effects of alternative fuel

Jon E. Keeley and Dylan Schwilk

Abstract

The Fire and Fire Surrogate Study (FFS) investigates management options in forests that have experienced nearly a century of fire suppression. The nationwide study is composed of a network of 13 seasonally dry forest sites across the U.S. that experienced frequent low-severity fire prior to fire suppression. Concern that these forests now have a high risk of severe wildfire has led forest managers to attempt to reduce fuels, but there is very
little comparative information on the ecological consequences of the alternative methods available, principally prescribed fire and mechanical treatments. The FFS study experimentally examines the consequences of four management treatments: 1) mechanical thinning, 2) prescribed fire, 3) mechanical thinning + fire, and 4) untreated control. The wide range of sites in the study, from Southeastern longleaf pine forests to ponderosa pine
forests of the Pacific Northwest, provides an opportunity to gauge generalizable vegetation responses to these fuel reduction treatments. We report the network-level results of these treatments on tree stand structure and vegetation composition.

Author Biographies

-Dr. Keeley earned his Ph.D. in botany and ecology from the University of Georgia in 1977. He is currently a research ecologist with the U.S. Geological Survey, stationed at Sequoia National Park and is an adjunct professor in the Department of Ecology and Evolution at the University of California, Los Angeles.
-Dr. Schwilk earned his Ph.D. in biology from Stanford University in 2002. He is currently a research ecologist with the U.S. Geological Survey, stationed at Sequoia National Park.

The Effects of Fire and Fire Surrogate Treatments on Vegetation, Surface Fuels, and Potential Fire Behavior in Western Coniferous Forests

Scott L. Stephens and Jason J. Moghaddas

Abstract

Modification of potential fire behavior is a central management focus in western coniferous forests. Managers must manage vast forested landscapes effectively within complex financial, political, and social frameworks while concurrently providing for ecosystem values. The principles of fuel reduction which can modify fire behavior are recognized by managers and scientists, though quantitative desired conditions for fuel treatments are not readily available to planning teams for use in designing and evaluating different fuel treatments on both public and private lands. The Fire and Fire Surrogate Study has quantified the initial effects of fire and fire surrogate treatments on a number of response variables, including vegetation structure, fuel loading, and potential fire behavior. We will present results of the effects of mechanical, fire only, and a combination of these treatments on potential fire behavior from 5 western Fire and Fire Surrogate Study Sites. These sites include Blodgett Forest Research Station, embedded in the El Dorado National Forest, Sequoia and Kings Canyon National Park, the Goosenest Experimental Forest, adjacent to the Klamath National Forest, the Hungry Bob Site, within the Wallowa-Whitman National Forest, Oregon, and the Lubrecht Site, dominated by ponderosa pine near Missoula, Montana. Results from the Fire and Fire Surrogate Study treatments will help managers succeed in effectively implementing fuel treatments at a landscape level.

Author Biographies

-Scott Stephens is an Assistant Professor of Fire Sciences at the University of California, Berkeley. His work has focused on fire history, historical stand structure, and the effects of fuel treatments in mixed conifer forests and chaparral.
-Jason Moghaddas is a Fire Ecologist on the Plumas National Forest. He currently works with the Mt Hough ID Team planning large scale fuel treatments on the Mount Hough Ranger District

Presentation Type: Oral Presentations ***Session Title:*** Fire Surrogate Study/Biomass

Track: 3 ***Session:*** 6

The Effects of Fire and Fire Surrogate Fuel Treatments on the Abundance of Snags and Coarse Woody Debris in a Sierran Mixed Conifer Forest

Scott L. Stephens and Jason J. Moghaddas

Abstract

Fire managers today are confronted with conflicting goals of reducing surface fuels using prescribed burning while retaining adequate snag and coarse woody debris (CWD) levels across a range decay classes. Snags and coarse woody debris are important elements of the structure and function of mixed conifer forests in the Sierra Nevada. These forest components also contribute to long distance spotting, are spotting receptors, and can contribute to increased fire severity and spread during a wildfire. In this paper, we report on the effects of replicated fuel treatments including, prescribed fire, mechanical treatment, and mechanical treatment integrated with prescribed fire, and no treatment, on snag and CWD quantity and structure. Post-treatment, the density of snags greater than 15 cm DBH in decay class 1 (sound) significantly increased in fire only and mechanical plus fire treatments. Snag volumes (m3 ha-1) were not significantly different between treatments for all decay classes. CWD (density, percent cover, volume) in decay classes 1 and 2 was not significantly altered by any treatment when aggregated across all diameter classes. Density and volume of CWD in class 4 was significantly reduced in mechanical plus fire and fire only treatments when compared with the controls and mechanical only treatments. Snag and coarse woody debris retention levels should facilitate the reintroduction of fire at a landscape level.

Author Biographies

-Scott Stephens is an Assistant Professor of Fire Sciences at the University of California, Berkeley. His work has focused on fire history, historical stand structure, and the effects of fuel treatments in mixed conifer forests and chaparral.
-Jason Moghaddas is a Fire Ecologist on the Plumas National Forest. He currently works with the Mt Hough ID Team planning large scale fuel treatments on the Mount Hough Ranger District

Fuel structures created by commercial forestry in Finland

Heidi Tanskanen

Abstract

The impact of silviculture on fires has been little studied in Finland despite the fact that forestry is a major modifier of the landscape and its methods include many sorts of unintentional fuel manipulation. Modern intensive forestry started in Finland 1960-1970, including e.g. the adoption of mechanical scarification in site preparation and the introduction of heavy machinery to forest operations. Though practices since then have become less intense the impact types of the intensive forest management still apply. Finnish climate and soil conditions would support the formation of thick, extensive fuel layers of moss, humus, and litter but mechanical scarification by definition disrupts surface fuel coverage, additionally turning the remaining layers more compact and less prone to carry fire. The removal of understory trees, thinning, and pruning can facilitate surface fuel drying but seem to reduce fuel loads and crown fire potential. Forests are also being kept relatively young and healthy which prevents the accumulation of heavy fuels. Despite of a long period of strict fire suppression, there are no signs of increase in fire sizes or fire intensities. On the contrary, area burned and average fire size have been in steady decline during the past 50 years. Considering the wide range of fuel manipulation included in commercial silviculture it clearly is a factor to affect fire behavior, and a likely contributor to decreased fire impact in the region.

Author Biographies

Heidi Tanskanen is a research scientist and Ph.D. student with Dep. of Forest Ecology, University of Helsinki. She holds a M.Sc. in Forestry from the University of Joensuu (2001).

Presentation Type: Oral Presentations ***Session Title:*** Fire Surrogate Study/Biomass

Track: 3 ***Session:*** 6

Biomass utilization modeling on the Bitterroot National Forest

Robin P. Silverstein, J G. Jones, Dan Loeffler, Hans R. Zuuring, David E. Calkin and Martin Twer

Abstract

Utilization of small-sized wood from forests as a potential source of renewable energy is an increasingly important aspect of fuels management on public lands as an alternative to traditional disposal methods (i.e. open burning). We examined the potential for biomass utilization on the Bitterroot National Forest and surrounding areas. A variety of forest health treatments were developed in cooperation with forest silviculturalists. Initial stand conditions came from Forest Inventory and Analysis (FIA) data. We used the Forest Vegetation Simulator to simulate stand growth and development and ran the resulting stands through a harvest cost model to develop potential biomass volume and delivered cost estimates for individual stands over time. These data were integrated into MAGIS, a natural resources decision-support system. Temporal and spatial implications of utilization were examined through optimization modeling with MAGIS to identify sustainable quantities and associated costs based on accessibility, haul distance, flow, and quality and quantity of small-diameter material. This study enables land managers, investors, and policy-makers to make informed economic and environmental decisions regarding biomass as a renewable energy source in the Bitterroot National Forest area and will serve as a model for biomass utilization in other areas.

Author Biographies

-Robin Silverstein is a Landscape Modeling Analyst with Management and Engineering Technologies, Inc. working with the Economic Aspects of Ecosystem Management on Forest Lands research unit of the USDA Forest Service, Rocky Mountain Research Station.
-Greg Jones is project leader with the Economic Aspects of Ecosystem Management on Forest Lands research unit of the USDA Forest Service, Rocky Mountain Research Station.
-Dan Loeffler is an Economist, College of Forestry and Conservation, University of Montana.
-Hans Zuuring is chair of Forest Management Department, College of Forestry and Conservation, University of Montana.
-Dave Calkin is Economist with the Economic Aspects of Ecosystem Management on Forest Lands research unit of the USDA Forest Service, Rocky Mountain Research Station.
-Martin Twer is a PHD student at the College of Forestry and Conservation, University of Montana.

Presentation Type: Oral Presentations ***Session Title:*** FTM west
Track: 3 ***Session:*** 7

Estimation of potential woody biomass supply from treatments to reduce fire hazard in the U.S. West

Kenneth E. Skog and Jamie Barbour

Abstract

An analysis was conducted to estimate how much wood could be removed and costs of wood removal via hazardous fuel reduction treatments in 12 Western states. The analysis used USFS FIA timberland plot data. Plots were screened for treatment by excluding plots with low fire hazard, plots with wetter climate, plots in roadless areas, and plots with high severity fire regime forest types except in WUI areas. Two alternate types of silvicultural thinning treatments were applied to eligible plots in uneven aged (thin all age classes) and even aged (thin from below). Trees were removed until predicted fire hazard was reduced below target levels. Of 127 million acres of timberland in 12 western states 23 million acres were thus identified as treatable. Sixty to seventy percent of treatable acres were in California, Idaho and Montana. Depending on the type of treatment and economic conditions, the actual number of acres treated and volume of wood removed could be highly variable, but on average more than half of wood removals would be from sawtimber trees 9 inches dbh or more. For each type of silvicultural treatment, harvest costs were computed for each plot treated and average harvest cost per ton of wood removed was estimated for each plot. From this information we derived estimates of regional volumes of harvestable wood by diameter class and average harvest costs by region, which were used in FTM-West to represent supply of wood from future fuel treatment programs.

Author Biographies

-Ken Skog is Project Leader for the Timber Demand and Technology Assessment research project at the USDA Forest Service's Forest Products Laboratory, in Madison, Wisconsin. Ken's areas of research in recent years have included collaborative development of the Fuel Treatment Evaluator (FTE 3.0) and carbon accounting in forest products.
-Jamie Barbour is Program Manager for the Focused Science Delivery Program at the USDA Forest Service's PNW Research Station.

Presentation Type: Oral Presentations ***Session Title:*** FTM west
Track: 3 ***Session:*** 7

Design and Objectives of FTM-West Model

Peter J. Ince and Henry Spelter

Abstract

The FTM-West (Fuel Treatment Market model for U.S. West) is a dynamic partial market equilibrium model of regional softwood timber and wood product markets, designed to project future market impacts of expanded fuel treatment programs that remove trees to reduce fire hazard on forestlands in the U.S. West. The model solves sequentially the annual equilibria in wood markets over a historical period from 1997 to 2004, and projects annual equilibria from 2005 to 2020 using detailed assumptions about future thinning programs and future market trends. This paper explains how FTM-West was designed specifically to account for economic complexities that stem from unconventional size distributions of trees and logs removed in thinning operations as compared to conventional timber supply in the West. Tree size directly influences market value and harvest cost per unit volume of wood, while log size influences product yield, production capacity and processing costs at sawmills and plywood mills. The objective that has been achieved through development of FTM-West is to provide a tool to evaluate future market scenarios for large-scale fuel treatment programs with various thinning regimes that may have varying costs and may yield wood with divergent size class distributions. The model provides a capability to analyze and project how much harvestable wood the markets can absorb from thinning programs over time and the regional timber price and timber harvest impacts of expanded thinning under varying assumptions about fuel treatment program subsidy or administrative costs, variations in thinning regime, or alternative projections of future product demands across the spectrum of products ranging from wood fuel to lumber, plywood and wood fiber products.

Author Biographies

-Dr. Ince is a research forester with USDA Forest Service at the Forest Products Laboratory in Madison, Wisconsin. He has been involved for many years in economic modeling and analysis of regional markets for timber and wood products. He designed and coordinated development of the FTM-West model.
-Henry Spelter is an economist with USDA Forest Service at the Forest Products Laboratory in Madison, Wisconsin. He has studied the lumber and wood panel industries for many years. He contributed important features to the FTM-West model related to modeling mill capacity, production costs and product recovery as a function of variable log size.

Tree-to-Sawlog Ratios for the FTM-West Model

Dennis P. Dykstra

Abstract

The FTM-West (Fuel Treatment Marketâ€ model for U.S. West) developed by scientists at the US Forest Products Lab required detailed information on expected sawlog production factors for each of the model's eight regions. Required information included expected volume of woods-length sawlogs that would be produced per unit of standing tree volume for each of the model's two species classes and for seven tree-diameter classes and seven sawlog-diameter classes. Estimates were also needed for the volumes of residual chips that could potentially be recovered from trees harvested in each species and diameter class. Given this type of information, the FTM-West model can be used to predict product volumes that might economically be recovered when small-diameter trees are harvested (for example, in an effort to reduce wildfire hazard). This presentation summarizes a methodology that was developed for quickly providing the needed information from a database of more than 100 product-recovery studies compiled over a period of almost 50 years by researchers at the Forest Service's Pacific Northwest Research Station. The database includes tree, log, and product data from recovery studies carried out in 11 of the 14 Western states where significant forest industries exist or have existed since the late 1950s. Only the tree and log data from the recovery studies were used for the FTM-West model (not product recovery data) because the Forest Products Lab had its own updated estimates of product recovery (e.g. lumber recovery) for the regions of interest.

Author Biographies

Dennis Dykstra is a research scientist with the Pacific Northwest Research Station of the USDA Forest Service. He is a member of the timber quality research team at the Portland Forestry Sciences Laboratory and works primarily on issues related to improved utilization of small-diameter timber.

Presentation Type: Oral Presentations ***Session Title:*** FTM west
Track: 3 ***Session:*** 7

FTM-West Model Results for Selected Fuel Treatment Scenarios

Andrew Kramp and Peter J. Ince

Abstract

This paper describes results of FTM-West model solutions for a set of hypothetical future fuel treatment scenarios, which include stand-density-index (SDI) and thin-from-below (TFB) treatment regimes at alternative levels of harvest administrative fees or subsidies. The paper briefly describes estimates of harvestable wood (upper bounds) and acreage treatable under the different thinning regimes. The paper also discusses projected effects that thinning regime, cost assumptions and subsidy levels have on wood removal volumes absorbed by the market, thinning program net costs, and broader impacts on regional forest product markets and timber revenues. Results show that even with industry bearing the assumed administrative costs of thinning programs, substantial volumes of wood could be thinned, but more so in coastal regions than inland regions of the West. Also, replacing administrative fee assumptions with hypothetical removal subsidies increases the proportion of harvestable wood removed; a sensitivity observed primarily in the inland regions. Results show also that wood removals from fuel treatment programs could displace a large fraction of timber supply from conventional sources, reducing regional timber harvest and timber revenues that would otherwise be projected to increase for state and private timberland managers in the West.

Author Biographies

-Andrew Kramp has been a statistical assistant at the US Forest Products Laboratory (FPL) in Madison, Wisconsin. Andrew is a graduate in economics from University of Wisconsin-Madison. At FPL he has assisted in running PELPS-based economic models, including FTM-West and the Global Forest Products Model (GFPM), and was instrumental in development of FTM-West.
-Dr. Ince is a research forester with USDA Forest Service at the Forest Products Laboratory in Madison, Wisconsin, USA.

Poster Presentation Abstracts

Presentation Type: Poster Presentations ***Session Title:*** Biomass Utilization

Fuel Type Classification and Fuel Loading in the Central Interior, Korea: Uiseong-gun

Myoung S. Won, Kyo S. Koo and Myung B. Lee

Abstract

This study has an object for classification of fuel type and calculation of fuel loading to assess forest fire hazard by fuel characteristics at Uiseong-gun, Gyeongbuk located in the central interior. There was constructed database of eight factors such as forest type and topographical map using ArcGIS 9.1 GIS programs. Then there conducted on-site survey for investigating vegetation and fuel loading. Forest distribution of Uiseong-gun is composed of most mixed forest, about 43.7% of the whole of forest tree. As well as coniferous trees such as Pinus densiflora Sieb. Et Zucc are distributed approximately 43.5%, broad-leaved trees like Quercus variabilis occupy with 8.7%. The most of trees, in order of age class, are II-class(11~20 years) 57.6%, III-class(21~30 years) 25.1% and I-class(1~10 years) 14.4%. By diameter at breast height(DBH) small diameter, 6~16cm is distributed with 82.5% and young tree of under 6cm diameter take about 14.9%. The most of trees are DBH 16cm below. Considering Korean forest characteristics this study was classified with total ten fuel types. The fine trees which fire hazard is very high distinguish dense fine tree from sparse by layer structure. Forest fire hazard was greater extreme than sparse stands at the dense fine trees areas where the height of the base of the live fuels in the crown is most low. At the understory layers, total combustion fuel loading(ton/ha) showed that broad-leaved forest was on the average 11.64 ton/ha, dense fine tree stands 10.67 ton/ha, mixed forest 9.39 ton/ha and sparse fine tree stands covering the smallest fuel loading averaged 8.63 ton/ha separately.

Author Biographies

-Myoung Soo Won, Kyo Sang Koo and Myung Bo Lee work for the Korea Forest Research Institute.
- Si Young Lee works for Samcheok National University.

Woody Biomass Utilization: One Measure of Success for Sustainable Fuels Management

Marcia Patton-Mallory and Sue Stewart

Abstract

The overarching goal is to increase the utilization of woody biomass from hazardous fuel reduction, restoration, and other vegetation management activities on public and private lands to help offset the costs of these activities, provide economic opportunities to rural communities, and enhance environmental benefits for the American public. This begins with:
-Increasing the reliability of an accessible and sustainable supply of woody biomass from National Forests and other federal, tribal, state, and private lands.
-Improving utilization through maintaining and enhancing local infrastructure and developing new technologies, businesses, and markets capable of using low-value woody biomass.
An integrated woody biomass strategy is identified through a Department of Energy, Department of Interior, and Department of Agriculture Interagency Memorandum on Woody Biomass Utilization, signed by the Secretaries in 2003. Additional key partners in this effort are the Western Governors, State forestry organizations, the Natural Association of Conservation Districts, and local governments. Success stories include increased use of biomass for heating schools, federal facilities, and municipal buildings; changing economics of biomass power generation with renewable energy credits; and diversification of wood products industries to right-size the solution to meet the resource options.

Author Biographies

-Marcia Patton-Mallory, PhD, Woody Biomass and Bio-energy Coordinator, USDA Forest Service, Fort Collins, CO
-Sue Stewart, Fuels Coordinator, Fire and Aviation Management, USDA Forest Service

Presentation Type: Poster Presentations ***Session Title:*** Biomass Utilization

Biomass consumption in big sage ecosystems

Clinton S. Wright and Susan J. Prichard

Abstract

Big sage ecosystems (Artemisia tridentata) typically experience stand replacing fires during which some or all of the ignited biomass is consumed. Biomass consumption is an important fire effect as it is directly related to the emissions and energy released during the fire. Consumption of aboveground biomass (fuel) was evaluated for a series of operational prescribed fires in big sage throughout the interior West. Pre-burn fuel characteristics (composition, amount, and structure), fuel conditions (live and dead fuel moisture content), and environmental conditions (weather and topography) affected fire behavior and subsequent fuel consumption. Total aboveground biomass consumption varied from 1.6 to 22.3 Mg/ha-1 (18 to 99 %) among the 17 experimental areas. Multiple linear regression and generalized linear modeling techniques were used to develop equations for predicting fuel consumption during these prescribed fires. Pre-burn fuel loading, which is influenced by, among other things, season of burn, site productivity, time-since-last-fire, and grazing is the most important variable for predicting fuel consumption. Removal or reduction of big sage is desirable for several reasons, including wildlife habitat improvement, livestock range improvement, fire hazard abatement, and ecosystem restoration.

Mulching/Small Wood Utilization: Prevention, Supression, Rehab

John W. Orban

Abstract

The purpose of this presentation is to offer information on the use of mulching, and small wood utilization equipment in fuel reduction, urban interface, and timber stand improvement. Also discuss the use of mulching equipment in fire supression, and rehab operations. Topics will cover small wood harvesting, and utilization techniques. Fire line construction techniques, saftey, and economics. Also cover the benifits of mulching in burn areas as a means of rehab.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

The Northwest and Alaska Fire Research Clearinghouse (FIREHouse)

Diana L. Olson, David L. Peterson, Jennifer Pollock and Jennifer L. Allen

Abstract

FIREHouse provides user-friendly, web-based information about fire science and technology relevant to Washington, Oregon, Idaho and Alaska. For each project posted, the goal is to provide, as applicable, online, searchable access to: 1) project and tool descriptions, contact information and links; 2) on-line publications; 3) proposals, and study plans; and 4) metadata. When possible, each project and management tool includes a section devoted to technology transfer and applications in resource management, as well as an educational component that uses common language and graphics to explain important findings. FIREHouse also offers server space, web and database support for researchers who choose to post their primary data on FIREHouse. FIREHouse is a collaboration between the Fire and Environmental Research Applications Team of the USDA Forest Service Pacific Northwest Research Station, Pacific Wildland Fire Sciences Laboratory; the University of Washington; the National Park Service; the Bureau of Land Management â€“ Alaska Fire Service; the US Fish and Wildlife Service; and the National Biological Information Infrastructure (NBII). Funding for FIREHouse has been provided by the Joint Fire Science Program and NBII. FIREHouse is coordinating efforts with the Fire Research and Management Exchange System (FRAMES) project team. Visit FIREHouse at: http://www.fs.fed.us/pnw/fera/firehouse/index.html.

Author Biographies

Diana Olson is a forester at the USDA Forest Service Pacific Wildland Fire Sciences Laboratory in Seattle, Washington. She has a M.S. from the University of Washington College of Forest Resources and a background in fire history, fuels research, and wildlife biology.

Real vs. simulated fire effects at McDonald Ridge

Susan S. Hummel and Gail Bouchard

Abstract

Fuels management programs rely on information gathered from different sources. Fire models are one key source. Knowledge about the strengths and limitations of information from different fire models helps managers assess options, implement decisions, and evaluate outcomes. In this presentation, we focus on using models to characterize fuels and simulate fire effects at differing spatial scales. The 2004 McDonald Ridge complex on the Gifford Pinchot National Forest (Washington) provides a case study for comparing actual post-fire conditions against those modeled with pre-fire data.

We first simulated post-fire conditions by entering pre-fire (2001) sample plot data and fire weather at the time of ignition into the east Cascades variant of the Forest Vegetation Simulator Fire and Fuels Effects (FVS-FFE), a stand-level model. Estimates of pre-fire fuel loads were derived from photo series records and transect data. To compare the simulated effects with actual fire effects at McDonald Ridge, we next re-measured all live or dead trees and fuels on burned and unburned plots in 2005 and entered this post-fire data into FVS-FFE. We then compared the measured post-fire effects with those we had simulated by using the 2001 data. Preliminary results suggest that key differences between measured and simulated values existed for down logs per acre, but the differences were not as great for canopy closure. Obvious differences in fire effects existed at the plot vs. the stand level. By using FARSITE, a landscape-level model, we further examined the potential influence of spatial scale on simulating fuel dynamics and fire effects. Although FARSITE does not calculate consumption directly, we developed indirect ways to compare stand vs. landscape results at McDonald Ridge by determining fire intensity level, flame length, and rate of spread and then using them to estimate consumption.

Author Biographies

Hummel is Research Forester, PNW Research Station USDA Forest Service and Bouchard is Mt. Adams AFMO, Gifford Pinchot National Forest USDA Forest Service.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

Interagency Fire Effects Monitoring Across Diverse Landscapes

Wendy Joslin, Amy Waltz and Geoff Babb

Abstract

Establishing standardized data collection procedures is a vital component to multi-ownership landscapes. Central Oregon Fire Management Service (COFMS), an interagency organization created to manage fuels and fire across Forest Service and BLM land in Central Oregon, has initiated a fire effects monitoring protocol to increase the ability of fire and resource managers to exchange information across agency, district, and division lines. This collected data will provide a historical record that will be useful in future fire and resource programs specific to the COFMS area. Protocols suggested by this plan are based on FIREMON sampling and compatible with other agency protocols (specifically the National Park Service Fire Monitoring Handbook). This protocol is objective driven and designed to be adaptive depending on fuels treatment and vegetation type. Lessons learned from this monitoring will be used to assess treatment objective success or failure, to improve burn strategies to better reach objectives and to educate the public about the effects of fire on ecosystems. Examples from case studies demonstrate collaboration among agencies and private land owners and highlight the success and challenge of interagency collaboration.

Applying National Burn Severity Mapping methodology to National Wildlife Refuge Lands in Alaska: an assessment

Karen A. Murphy and Joel H. Reynolds

Abstract

2004 was a record-breaking fire season in Alaska with over 6.6 million acres burned, approximately 2.1 million of which were on National Wildlife Refuge lands. Many fires burned through September, driven by unusually warm and dry temperatures throughout the summer. Fire managers and the public have questioned whether these fires burned with a higher than normal severity. In 2002 the US Fish & Wildlife Service in Alaska had begun investigating a remote sensing method of estimating burn severity developed by the National Park Service and U.S. Geological Survey: using the change in the remotely sensed normalized burn ratio (dNBR) to estimate the composite burn index (CBI). The 2004 fires provided an opportunity to assess the methodology across several fires from the same season, with the goal of identifying whether the methodology could be directly applied on Refuge lands or required modification. Field work was conducted by a four person crew contracted through the Student Conservation Association. At least one local refuge staff member accompanied the crew during sampling. Five fires from 2004 were sampled, and one from 2003 whose sampling had been interrupted by the 2004 fires was completed. The six fires spanned 813,689 acres on five boreal forest refuges. In total, 342 plots were sampled for vegetation composition and ground-based burn severity estimates. These data were used with LANDSAT-derived burn severity estimates to assess adequacy of the assumed linear CBI~dNBR relationship for each fire, constancy of the CBI~dNBR relationship calibration coefficients across fires, and impact of LANDSAT scene selection on the estimated CBI~dNBR relationship. The data will also be used to develop recommendations for improving sampling efficiency. Preliminary results will be presented.

Author Biographies

-Karen Murphy has worked as the Regional Fire Ecologist for the National Wildlife Refuges in Alaska since 2001. She has over 20 years of Alaskan experience as a wildlife biologist, restoration ecologist, and natural resource planner. She has a Master's degree in Resource Ecology.
-Joel Reynolds is Regional Refuge Biometrician for National Wildlife Refuges in Alaska. His 14 years of statistical consulting includes positions as Statewide Genetics Biometrician for Alaska Department of Fish and Game and faculty in the Department of Statistics, University of Washington. He has a Ph.D. in Quantitative Ecology & Resource Management.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

Whooping Crane use on Prescribed Fires

Kristen Maxfield and Brent Woffinden

Abstract

The endangered Whooping Crane (Grus americana) provides an immediate and obvious positive response to prescribed burning in its wintering habitat at Aransas National Wildlife Refuge Complex. Although the birds maintain a steady diet of blue crab (Callinectes sapidus) and various clam species during the winter, they also use upland sites for fresh water and alternate food sources. The intrusion of running live oak brush (Quercus virginiana) onto the coastal savannah at the refuge provides acorns as an alternate food source, but the savannah will become unusable to whooping cranes when the brush reaches a height of about 1 meter.

Fifteen burn units totaling 5,199 hectares on the Blackjack Peninsula are managed for Whooping Cranes. Prescribed burns usually top kill the oak brush, allowing it to resprout from the roots and controlling its height. These units are burned on a three-year rotation to allow resprouted oak brush to produce acorns and to improve coastal savannah habitat. The reduction of grass cover and density also makes insects, crayfish, and snails more visible. The bay side of Matagorda Island is also burned for whopping cranes during winter. Surveys in winter of 2003 and 2004 have shown whooping cranes on burn units the following day and over four months later.

Author Biographies

-Kristen Maxfield -Biological Technician Aransas National Wildlife Refuge Complex
-Brent Woffinden - Fire Management Officer Aransas National Wildlife Refuge Complex

The Use of Landscale-Scale Ecological Units to Plan and Prioritize Vegetation and Fuel Treatments in the Umpqua Cascades.

Don Morrison

Abstract

The Landscape Areas of the Umpqua Cascades are landtype/vegetation associations of the Cascades Ecoregion (USEPA, 1996). They were mapped for the Umpqua National Forest vicinity using a Digital Elevation Model together with local interdisciplinary knowledge of the associations between vegetation, climate, topography and fire regimes. On a forest-scale, these landscape areas were developed as a framework for Forest Plan revision, Fire Regime Condition Class reporting, and Five-Year Action Planning for vegetation management. At the landscape and project scales, these landscape areas were also used to support an Environmental Assessment for a 2000-acre vegetation/fuel reduction project. The Wapiti Timber Sale Project (Umpqua National Forest, 2005) is used as an example application to explain the process of mapping landscape areas and to apply landscape area concepts to regional, forest, landscape and project scale problems. The application of landscape areas includes interpretations important to at least four forest resource disciplines including fire management, wildlife, silviculture and watershed restoration.

Author Biographies

B.A. Botany, Calif. State Univ., Humboldt, 1979. Post-baccalaureate studies in soil science and silviculture. Soil Scientist and Silviculturist, Umpqua National Forest, 1991 to present. Special interests in forest inventory, remote sensing and landscape ecology.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

2003 FIRES IN SOUTHERN CALIFORNIA: IMPACT OF FUEL AGE ON FIRE SEVERITY AND VEGETATION RECOVERY

Teresa Brennan and Jon E. Keeley

Abstract

Field studies have investigated the relationships between fuel age, fire severity and postfire vegetation recovery. Our primary hypothesis is that as fuel age increases, fire severity increases and leads to reduced vegetative recovery by increased mortality of seed banks and mortality of resprouters. These data are also important for understanding how stand age affects natural regeneration of shrubland species and the necessity for different post-fire rehabilitation treatments. We have completed 2 years of field work, establishing and intensively sampling 250 tenth ha sites distributed across the Cedar Fire, Otay Fire, Paradise Fire and Old Fire. At each site we have detailed measures of cover and species lists at three different spatial scales for both the first and second postfire years. Fine scale fire severity estimates have been made using shrub skeletons and measures of biomass consumption. These sites span a substantial range in prefire age and fire severity and demonstrate rather complex patterns of interaction between fuel age, fire severity and postfire recovery.

Author Biographies

-Jon Keeley is a research ecologist with a Ph.D. in botany and is currently with the USGS, Western Ecological Research Center, stationed in Sequoia National Park.
-Teresa Brennan is an ecologist with a master's degree from UCLA and currently employed by USGS and stationed at Sequoia National Park.

20 Years of Prescribed Burning and Fire Effects Monitoring in the Big Creek Unit, Yosemite National Park

Jennifer S. Hooke and Monica S. Buhler

Abstract

The 100-acre Big Creek unit in Yosemite National Park was treated with prescribed fire in September of 1985 and again in May of 2004. Park resource managers installed 20 fire effects monitoring plots in July of 1985 to assess whether prescribed fire objectives were being met. Plots were read sporadically over the years, abandoned, and resurrected in 2001. Despite the sampling irregularity, this long-term data set serves as a means to follow trends in fuel loading, tree density and composition, tree regeneration, and the vegetation community over a 20-year span and through two prescribed fire treatments. These data were used to measure whether burn objectives were met and to assess prescribed fire program efficacy. Additionally, the two seasons of treatment allow for the immediate postburn comparison of fall vs. spring burning.

Author Biographies

-Jennifer S. Hooke is the Fire Ecologist at Yosemite National Park.
-Monica S. Buhler is a Restoration Biologist at Yosemite National Park.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

Successful Fuels Management at The Caribbean Islands National Wildlife Refuges

Boyd Blihovde, James Padilla, Josh O'Connor and Jim Durrwachter

Abstract

The Caribbean Islands National Wildlife Refuges (CINWR) are a complex of nine refuges in Puerto Rico, the U.S. Virgin Islands and the Jamaica Passage. The nine refuges are Cabo Rojo, Culebra, Desecheo, Buck Island, Green Cay, Sandy Point, Laguna Cartagena, Navassa and Vieques. These refuges combine to total approximately 22,780 acres of a variety of sub-tropical plant communities. Most of the native plant communities located in CINWR are not fire adapted and therefore wildfires are suppressed and many areas don't require prescribed fire. However, due to human introduction of non-native vegetation, there is a need for fuels management near the wildland urban interface. Following National Fire Plan guidelines the USFWS has attempted to partner with local firefighting agencies to improve suppression capabilities and reduce fuels near urban developments. To facilitate partnering efforts the USFWS has promoted the establishment of an interagency MOU. Since 2003 the USFWS has trained 110 structural firefighters and 21 other personnel in basic NWCG wildland fire courses. In 2005 CINWR staff constructed 23 miles of fireline improvements, grazed approximately 1,000 acres, and contracted fireline construction on 5 miles of road at Vieques NWR. The USFWS purchased 38,000 and 33,000 dollars of Personal Protective Equipment, training, and other supplies in 2004 and 2005 respectively. The equipment and training were purchased to loan to five fire stations located adjacent to CINWR. Also through the Rural Fire Assistance (RFA) program, the USFWS loaned a type 2 structural engine to the town of Boqueron, PR. Much more work is being done to train the local fire personnel and create partnerships to reduce hazardous fuel build-up in the Caribbean Islands.

Author Biographies

Boyd is currently a Fire Management Specialist coordinating Wildland Urban Interface and Rural Fire Assistance projects in Florida and the Caribbean National Wildlife Refuges (NWR). He started his fire management career in 1997 on the Carolina Sandhills NWR. He has worked for the Florida State Parks at Wekiva State Forest. He holds a M.S. degree from the University of Central Florida.

Measuring Success - A Historical Overview of Fuels Treatment Projects in the U.S. Fish and Wildlife Service, Southeast Region

Peter W. Kubiak

Abstract

We look at - Doing the Right Thing for Wildlife, the Habitat, and People. Going back to the 1930's, we look at a long history of using prescribed fire to mange the landscape. We begin with the application of fire on the St. Marks National Wildlife Refuge for wildlife and its multi beneficial relationship to wildfire. The National Wildlife Refuge system in the Southeast has learned and measured their fuels program through cooperation and coordination with a host of other federal, state and private groups. We share with you a timeline of various successes and failures and the impacts we are faced with today in order to sustain the use of a most valuable land management tool: prescribed fire.

Author Biographies

Peter Kubiak began his Government career on the Apalachicola National Forest in 1980, as a Timber Fire Technician. He has worked in timber, fire management and aviation positions throughout his career. He works as the Regional Prescribed Fire Specialist position for the Southeast Region, US Fish and Wildlife Service, Atlanta, GA. Pete has an AS degree from Lake City Community College in Forestry, and completed the Technical Fire Management Course offered by Washington Institute in 1996. Pete enjoys his family time with wife Katie and there three children.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

Integrating fuels mitigation and wildfire planning in Skamania County, WA

Ole T. Helgerson, Rob Thysell and Jeremy Boyer

Abstract

Skamania County, WA is located in the heart of the south Washington Cascades. Wildfires in this region fed by strong east or west winds can consume several thousand acres per hour. Increasing wui development has increased risk to human structures and natural ecosystems. Wildfire planning started as a 4-county, two-state project locating and rating WUI structures (NFPA299) as part of a GIS data base for fire fighters and emergency responders. The next phase in two counties is identifying and ranking forest stands posing wildfire risk to dwellings, infrastructure and other areas needing protection. Selected stands will be cruised and risk estimated with software such as FLAMMAP and the Fuels and Fire Extension of the University of Washington Landscape Modeling System. Coordination and communication between local, county, state and federal officials has proven to be essential for successful planning and wui surveying.

Author Biographies

-Ole T. Helgerson, WSU Extension, Skamania County, WA, County Extension Director and 5-county Extension forester
-Rod Thysell, Skamania County Wildfire Planning Coordinator
-Jeremy Boyer, USDA Plant Ispection Service

Right Place, Right Time--An Interagency Approach to Prioritizing Fuel Treatments

Paul Briggs, Dana Cohen, Brett Fay, Bruce Fields, Taiga Rohrer, John Schmidt, Cyndi Sidles, Scott Tobler, David Eaker and Anne Stanworth

Abstract

Beginning in 2000, the Color Country Interagency Fuels Committee undertook an intensive assessment of the 148 identified communities at risk in the Color Country fire management response area, located in Southwest Utah. This included standardized internal and external risk assessments, digital photos, maps, and other information. The communities were ranked according to total assessed risk. Treatments have been prioritized using these rankings, balanced with community interest and involvement. Since this process began, two high-risk communities have received their trial by fire. The communities are New Harmony and Central, UT and in each case the fuels treatments and the CWPPs were effective in protecting the communities. This poster highlights the value of local interagency and community cooperation.

Author Biographies

The Color Country Fuels Committee (CCFC) is made up of representatives from state and federal fire management programs administering 14 million acres in Southwestern Utah and Northwestern Arizona. The purpose of the CCFC is to serve as an interagency forum for identifying and resolving wildland/urban interface, hazardous fuels and vegetation management issues which directly impact firefighter and public safety. Effective management of the Color Country's ecosystems, in accordance with the National Fire Plan, the National Cohesive Strategy, and local land management plan objectives, is the mission of the Committee.

Presentation Type: Poster Presentations ***Session Title:*** Case Studies

A Case Study: Using Fuel Reduction Techniques to Enhance the Military Mission

Tamala DeFries

Abstract

A series of hazard fuel reduction projects were developed and implemented by the Alaska Fire Service in collaboration with United States Army Alaska to aid in mitigating the wildland fire risk to the adjacent communities. The effectiveness of these efforts will be showcased by looking at three mitigation projects within the Alaska Fire Service Military Zone. This presentation focuses on an inter-governmental collaborative venture as well as offers additional indicators of success to include; increase in Military training days, reduction in wildfire response costs, enhanced interagency training opportunities and improved community relations.

Stanislaus Stewardship and Fireshed Assessment Case Study: Measuring Landscape Performance

Bernie Bahro, K. Barber, J. Sherlock, A. Taylor, D. Yasuda, N. Amboy and T. Kohler

Abstract

Fireshed assessment is an interdisciplinary and collaborative process for designing and scheduling fuels and vegetation management treatments across broad landscapes to meet goals for changing outcomes associated with large, severe wildland fires. The fireshed assessment process is based on the premise that management actions (in the form of fuels treatments located to modify fire behavior) can affect the outcome of a wildland fire (how large it gets, where it burns, and how severely it affects communities, habitats and watersheds). During the summer of 2005, the SFA Cadre assisted the Stanislaus National Forest in developing a performance based program of work using the Stewardship and Fireshed Assessment process. An interdisciplinary natural resource team, working with partners from government agencies, stakeholders, and other collaborators, used this problem solving approach to design fuels treatments and assess their performance in changing fire behavior, cost off-set opportunities from timber, watershed effects, acres of habitat affected and WUI treatments over time.

Author Biographies

Berni Bahro, Regional Fuels Specialist, Pacific Southwest Region, USDA Forest Service

Presentation Type: Poster Presentations ***Session Title:*** Decision Support Systems

CRAFT: A framework for predicting effects and measuring success

Steven P. Norman, Danny C. Lee, Sandra L. Jacobson and Jeffrey G. Borchers

Abstract

The tradeoffs that surround fuel treatment projects may slow or impede project implementation. From an ecosystem management perspective, the success of a fuel treatment project depends on how proposed activities are likely to affect a broad suite of social, ecological and watershed objectives across spatial and temporal scales. Because effects can never be known with certainty before project implementation, analyses must be conducted in a socially transparent and scientifically credible way. We present an online framework, called CRAFT (Comparative Risk Assessment Framework and Tools), that allows managers to conduct more transparent and credible tradeoff analyses. CRAFT provides tools to focus objectives, develop robust alternatives and compare the effects of alternative actions using Bayesian probability networks. To illustrate the applicability of this framework for fuels management, we demonstrate how existing fire behavior software, databases and expert opinion can be melded to improve decisions involving expected fire behavior and changes in wildlife habitat.

Author Biographies

Steven P. Norman is a Research Ecologist with the USDA Forest Service Southern Research Station. His interests are in understanding fire and climate effects on vegetation. Danny C. Lee is Director of the Eastern Forest Environmental Threat Assessment Center of the USDA Forest Service's Southern Research Station in Asheville, NC. He previously worked as a Research Ecologist at the Pacific Southwest Research Station. Sandra L. Jacobson is a wildlife biologist for the Pacific Southwest Research Station of the US Forest Service. She has planned and worked on numerous prescribed fires as well as wildfire incidents in several overhead, ground and aviation capacities. Jeffrey G. Borchers was formerly a Research Forester for the Pacific Southwest Research Station. His research interests are in the scientific and social aspects of sustainable forest management.

Tapping the forest inventory for spatially continuous estimates of fuels and fire potential: the GNNfire approach

Jeremy S. Fried, Janet L. Ohmann, Michael C. Wimberly, Kenneth B. Pierce and Matthew J. Gregory

Abstract

Spatially continuous estimates of potential fire hazard in terms of surface and crown fuels, and crown fire potential have been developed for prototypical and contrasting landscapes in California, Oregon and Washington using the Gradient Nearest Neighbor (GNN) method to impute data measured and modeled from forest inventory plots to 30-m pixels. The GNN method used for this Joint Fire Sciences Program funded project relies on multivariate, direct gradient analysis to link inventory plots, satellite imagery (e.g., LANDSAT), and maps of environmental variables in a raster GIS database. Individual pixels are associated with forest inventory plots that have the most similar spectral and environmental characteristics. A suite of several hundred plot variables is then imputed to each pixel, allowing simultaneous and consistent predicting of a wide range of vegetation attributes, including many instrumental for assessing fuels and fire potential. For example, model output can be used as input to crown fire potential evaluators such as NEXUS and FLAMMAP to facilitate analysis of fuel treatment effectiveness or to locate areas of high hazard. Predicted fuel attributes can be viewed at the 30-m pixel scale, or binned into larger collection units such as sub-watersheds for landscape-scale evaluation and comparison. This georeferenced data can also be combined with other spatial layers, such as wildland-urban interface class, to quantify co-occurrence of fire potential and assets at risk

Author Biographies

USDA Forest Service (1, 2, 4)

South Dakota State University (3)

Oregon State University (5)

Presentation Type: Poster Presentations ***Session Title:*** Decision Support Systems

CEFA Program Products for Fuels Management

Timothy J. Brown, Beth L. Hall, Crystal A. Kolden and Hauss J. Reinbold

Abstract

The Climate, Ecosystem, and Fire Applications (CEFA) Program at the Desert Research Institute in Reno, Nevada provides a wide array of support for fuels and fire managers. The National Interagency Fuels Coordination Group is the national oversight body for CEFA. Several projects highlight CEFA support resources. The California and Nevada Smoke and Air Committee (CANSAC) MM5 project provides experimental forecast products of fire weather, smoke dispersion/transport, and fire danger to California and Nevada (fire behavior products are in development). The CAVE Automatic Virtual Environment is being designed and implemented to allow fire managers to visualize the impacts of fuels treatments on fire behavior in a 3-dimensional virtual environment. CEFA co-organizes the national seasonal assessment workshops to produce seasonal fire potential outlooks. Hourly fire danger monitoring provides fire managers in California information about rapidly changing conditions for the state's fire danger rating areas. An experimental system in development to monitor and predict optimal burn windows will give prescribed fire managers a hand in deciding when to burn. A model-output statistics (MOS) product for 7-day significant fire potential provides decision support for Predictive Services at the western (and soon national) GACCs. CEFA is processing over 1300 RAWS and other weather stations for the Fire Program Analysis project by performing data quality control and data estimation. CEFA is researching seasonal climate prediction directly applicable to national fuels treatment planning and budgeting. CEFA also addresses social science and policy issues related to fire and fuels management. Most of CEFA's research work centers on climate and global climate change as a driving force of fuel loading and availability. CEF's mission and goal is to provide relevant decision-support tools and information to help land managers and policymakers in their planning processes for fuels management.

Author Biographies

Tim Brown, PhD., is the Director of the Climate, Ecosystem, and Fire Applications Program at the Desert Research Institute in Reno, Nevada. Beth Hall is the Deputy Director of CEFA. Crystal Kolden is a Research Assistant with CEFA. Hauss Reinbold is a Research Assistant with CEFA.

Presentation Type: Poster Presentations ***Session Title:*** Decision Support Systems

The Fire Research And Management Exchange System (FRAMES) and the USGS National Biological Information Infrastructure (NBII): Developing Information Technology in Support of Wildland Fire Research and Management

Greg E. Gollberg

Abstract

Research helps provide the scientific and technological foundation for reducing the risk of wildland fire. However, there has been no system to organize, synthesize, and prioritize research deliverables for managers and field practitioners that also address their operational needs. The Fire Research And Management Exchange System (FRAMES) is being designed to meet these needs by helping address science delivery and technology transfer for the wildland fire and natural resource communities. FRAMES is being developed by the University of Idaho and the US Geological Surveyâ€™s National Biological Information Infrastructure (NBII) program with support from other federal, state, and private agencies and organizations. NBII is an electronic information network that provides access to biological data and information on our nationâ€™s plants, animals, and ecosystems. Like FRAMES, NBII provides common access to data and information that is maintained by and resides with a variety of agencies and organizations. FRAMES and NBII are using cutting edge enterprise portal technologies that are employed by many Fortune 500 companies to meet their corporate information needs. The FRAMES and NBII partnership is an excellent opportunity to share expertise, leverage technical capabilities, and demonstrate the value of connecting tools, information, and people. With the help and support from wildland fire and natural resource communities, these technologies can help eliminate redundancy, reduce costs, and promote increased productivity and efficiency.

Author Biographies

Greg Gollberg is the FRAMES Project Manager and is in the Forest Resources Department of the College of Natural Resources at the University of Idaho. Greg has a BS in Natural Resource Ecology and an MS in Fire Ecology from the University of Idaho. He was a guest editior for the IJWF special edition, "Integrating spatial technologies and ecological principles for a new age in fire management" Sept. 2001.

Costs and benefits of chaparral fuel modifications in southern California

Jon E. Keeley and Richard W. Halsey

Abstract

Here we evaluate the full costs, both economic and ecological costs to fuel modification in these chaparral shrublands and match these with the benefits resulting from these treatments, with the purpose of developing a more strategic approach to treatment application on these landscapes. Potential benefits of fuel modification include barriers to fire spread and defensible space for suppression activities. Whether or not these benefits are realized is a function of weather conditions associated with the fire event and geographical placement of fuel modification treatments. Resource benefits may also arise by providing corridors for wildlife movement. Costs include funds for installation and maintenance and resource impacts such as providing sinks for alien plant populations and encouraging their spread into wildland areas, as well as contributing to erosion and slope instability, and swapping hazardous fuels for highly combustible grasses that enhance the risk of ignition. In southern California chaparral fires that ignite under moderate weather conditions behave differently from fires driven by severe autumn Santa Ana winds. Under the former conditions, a chaparral fire might well lay down upon reaching young fuels. However, the massive 2003 Cedar Fire clearly showed that even a landscape-scale mosaic of stand age classes, including many young stands,some from recent fuel manipulations, cannot stop a chaparral fire under severe weather conditions, at least not until the weather changes. Cedar Fire behavior relative to fuel age will be evaluated at several critical junctures of that fire.

Author Biographies

-Jon Keeley is research ecologist with the USGS stationed in Sequoia National Park. He has authored over 250 scientific publications.
-Richard Halsey is a science writier and director of the California Chaparral Field Institute and author of the recent book Fire, Chaparral and Survival in Southern California.

Presentation Type: Poster Presentations ***Session Title:*** Ecosystem Management

Fire in Wilderness--Managing for Resource Benefits in Alaska

Mary Kwart and Brian Anderson

Abstract

During 2003 and 2005, lightning fires on the Tetlin and Kenai National Wildlife Refuges were among the first in Alaska to be managed under national guidelines for Wildland Fire Use, a term used to describe fires managed for resource benefit. Wildland Fire Use strategies allow managers to help fire play its natural role in the environment. Under a Wildland Fire Use strategy, fires are continuously monitored and suppression actions are implemented only to protect people, their homes and communities. The physical and behavioral parameters of a fire, pertinent environmental conditions, and potential threats are assessed daily and used to develop management strategies and contingency plans to protect values at risk.

In 2003, the Black Hills Fire on the Tetlin Refuge eventually burned 42,800 acres, entirely on federal lands managed by the Refuge and the Wrangell St. Elias National Park and Preserve. Although contingency plans were in place to protect private property, the results of predictive analyses proved correct and the fire never posed a threat to public or private values. No direct suppression action was ever required. In 2005, the Fox Creek Fire on the Kenai Refuge grew to over 26,000 acres in less than two weeks. It was successfully managed within US Fish and Wildlife Wilderness land during a period of high fire danger while being in close proximity to values at risk.

Author Biographies

-Mary Kwart graduated from Colorado State University in 1987 with a degree in Fire Management. She has worked since 1977 in the field of fire management from Interagency Hotshot Crew to Prescribed Fire Specialist. She is currently the US Fish and Wildlife Service Alaska Region Fuels Specialist in Anchorage.
-Brian Anderson has worked for 22 years with the US Fish and Wildlife Service in Anchorage, Alaska, and presently serves as the Alaska Regional Wilderness Coordinator. Brian was raised in Denver, Colorado, and graduated from Colorado State University with a bachelor of science degree in wildlife biology.

Alternatives to thinning in the silvicultural management of canopy fuels

Christopher R. Keyes

Abstract

Using existing fire behavior models in conjunction with available stand information, it is possible to quantify structural characteristics of the canopy fuel layer (canopy base height, canopy bulk density) that impart crown fire resistance. To achieve resistance to crown ignition or crown fire spread, thinning is commonly practiced on a stand level or in the establishment of linear shaded fuelbreaks. Yet thinning canopy fuels may have unintended negative consequences on fuels dynamics that serve to undermine these efforts. The subject of this paper is silvicultural practices available in canopy fuels management that warrant greater consideration and under some circumstances are preferable to thinning. The quantitative relationship of stand structure to crown fire potential is summarized in the context of forest stand dynamics, and the limitations and potential drawbacks of thinning as a fuels management tool are discussed. Pruning, girdling, and herbicide stem injection are contrasted with thinning in terms of their immediate and temporal effects on the aerial and surface fuel layers. Examples are drawn from western forests, but the discussion is applicable to all conifer forests in which crown fire is threat.

Author Biographies

Dr. Christopher R. Keyes is Assistant Professor of Silviculture at Humboldt State University in Arcata, California. His research program includes specialized study forest fuel dynamics and the silvicultural management of canopy fuels. Dr. Keyes received degrees from Oregon State University, the University of Montana, and Holy Cross College.

Presentation Type: Poster Presentations ***Session Title:*** Ecosystem Management

An ArcGIS Interface for Modeling Wildland Fuels Management

Alan Ager

Abstract

ArcFuels is a library of ArcGIS macros for developing and testing fuel treatment scenarios at the stand and landscape scale. The macros link a number of vegetation and wildfire behavior models used for fuels planning (e.g. FVS-FFE, SVS, FARSITE, FlamMap, Nexus) within ArcMap. The macros also provide linkages between fire models and desktop database and spreadsheet software. ArcFuels automates much of the data manipulation in the fireshed planning process used by the Forest Service to design fuel treatment projects. Key functionality of the system includes: (1) An interactive linkage between digital imagery, vegetation data, FVS-FFE, and SVS, providing a map-based tool for designing stand fuel treatments (2) Rapid scale-up of stand-specific treatments to simulate project-wide changes in vegetation and fuels, and; (3) Data linkages between FVS outputs and FlamMap/FARSITE to allow for simulation of landscape-scale fire behavior and evaluation of fuel treatment scenarios. The library is distributed as an ArcMap project file (.mxd) and is implemented on custom toolbars on the ArcMap interface. A beta version of ArcFuels can be downloaded at http://www.fs.fed.us/r6/uma/ager/arcfuels. Work is in progress on a 3D version of ArcFuels within ArcGlobe.

Author Biographies

Alan Ager is an Operations Research Analyst

Utilizing prescribed fire to restore endangered species habitat while managing potential negative effects to non-target endangered species

Russ Babiak

Abstract

The Buenos Aires National Wildlife Refuge in southern Arizona was established to provide habitat for threatened and endangered plant and wildlife species, with an emphasis on the endangered masked bobwhite quail (Colinus virginianus ridgwayi). Naturally occurring fire is believed to have played a significant historical role in shaping the Sonoran semi-desert grasslands that once provided adequate habitat for the quail at the Refuge. Prescribed fire has become a cornerstone for the Refugeâ€™s habitat restoration efforts and now includes landscape-scale fire management (i.e., 15,000 acres per year) designed to emulate past fire regimes and ecological processes. Prescribed fire implementation here requires considerable measures to prevent negative effects to species such as the endangered Pima pineapple cactus (Coryphantha sherri robustispina) and the endangered cactus ferruginous pygmy owl (Glaucidium brasiliarium cactorum). Current efforts include extensive passive and active wildlife surveys, grid based vegetation ground searches, fire protection measures, firing techniques, burning season, and occasional cancellation or rescheduling of prescribed burns. Ongoing international research and interagency/private land planning efforts will better quantify the habitat requirements for these endangered species, and help guide fire prescriptions that enhance species-specific habitats across the greater landscape.

Presentation Type: Poster Presentations ***Session Title:*** Ecosystem Management

Reducing Hazardous Fuels And Restoring Desert Bighorn Sheep Habitat With Landscape-scale Prescribed Fire

Mara Weisenberger, Mark Kaib, Don Kearney and Kevin Cobble

Abstract

The San Andres National Wildlife Refuge (Refuge), is located in the southern third of the San Andres Mountains in south central New Mexico. This mountain range is one of the largest contiguous, relatively undisturbed Chihuahuan Desert landscapes in the United States. Since the Refuge's establishment in 1941, primary emphasis in resource management has been focused on restoring a remnant population of desert bighorn sheep (Ovis canadensis mexicana), a State-listed endangered species in New Mexico. Because there is restricted access and the lands remain relatively undisturbed, the future will continue to provide the Refuge with opportunities to serve as a natural laboratory in support of research on southwestern flora and fauna, Chihuahuan Desert ecosystems, hydrological status, and fire effects (prescribed and natural).

Australian Forest Fire Management - At the Crossroads

Tony Scherl

Abstract

Fire is often the most visible and effective disturbance mechanism in Australian and US forested landscapes. In recent decades, both countries have experienced increased areas of very large, high intensity wildfires. Whilst the area subject to wildfires has increased in south eastern Australia in recent years, the levels of fuels management and prescribed burning on public forested land has decreased.

Foresters and fire managers in the US are now recognising the detrimental effects of long-term fire exclusion, particularly exclusion of low-intensity fire in their fire-adapted ecosystems. Fire exclusion, as illustrated by the "Smokey Bear" policy over the past 70 years, has not been effective in preventing extensive high-intensity fires, and has had serious implications for the maintenance of forest and ecosystem functioning.

With increasing recognition of the problem, the US has begun to address these issues, with varying success. In contrast, many forest areas in south eastern Australia are heading towards fire exclusion (low and moderate intensity), largely by defaul rather than express policy. Many of the traditional land management activities in respect to fire management are being (not always intentionally) divested.

This project compares and contrasts current policies and practices regarding fire management with a focus on fuel management and the use of prescribed burning in the US Pacific Northwest and south eastern Australian states. The project is the result of individual research and interviews conducted with professionals, experts and academics during a 12 month period spent at the World Forest Institute in Portland, Oregon.

Author Biographies

Tony Scherl is currently employed as a Fire Services Officer in Forests NSW, Australia. He attended the World Forest Institute in Portland Oregon in 2004/05 under a fellowship sponsored by the Gottstein Memorial Trust and the Merlo Foundation.

Presentation Type: Poster Presentations ***Session Title:*** Ecosystem Management

The Effects of Fire Severity on the Regeneration of Douglas-fir

Jason Barker

Abstract

The McLure fire of 2003 affected 26,000 hectares in the interior of British Columbia. Within the larger area of the burn, the fire severity ranged from high to low. In the highest severity areas, all the living vegetation was killed and the organic horizon was largely consumed. Fire severity has the potential to greatly affect the degree and success of conifer regeneration because of its impact on vegetation and soils. In the past, fire was instrumental to the regeneration of Douglas-fir (Pseudotsuga menziesii var. glauca). In managed forests, clearcutting has replaced fire as the dominant mode of Douglas-fir regeneration, but some of its effects are analogous to high severity fires, such as the removal of overstory vegetation. Alternatively, combustion of the soil organic layer resulting from fires might lead to different conditions, such as nutrient availability and mycorrhizal inoculum, than would have resulted from clearcutting. This study consists of five treatments that allow for a comparison of the effects of fire severity and clearcutting on regeneration: high severity burn, low severity burn, clearcut, screefed clearcut, and undisturbed forest. In the summer of 2004, Douglas-fir seeds were sown at four replicate sites for each treatment; all located within the IDF (Interior Douglas-fir) biogeoclimatic zone. The aim of this study is to determine the impact of the treatments on the regeneration of Douglas-fir by assessing the survival, growth (photosynthetic rates and biomass), nutrient status, and mycorrhizal colonization of the germinated seedlings over the first three years following the fire.

Fuel Management and Ecological Management - A Balance

John Travers

Abstract

The purpose of this study is to demonstrate that fuel management prescriptions can be achieved at the same time as honouring ecological considerations. The study has undertaken a detailed quantified floristic assessment of all living and dead vegetation and then assessed the bushfire hazards that are able to be manipulated to achieve acceptable environmental and ecological retention. The intention was to qualitatively determine the ability of fuel management to retain ecological habitat whilst achieving prescriptive safety standards applied by the NSW Rural Fire Service with what is called asset protection zones. Typically these prescriptions require a clear fell approach. The alternative approach has potential widespread repercussions for the management of the asset protection zones where the maintenance of these areas is undertaken by a ongoing community management program. This program would ensure financial commitment to the program by way of contractual arrangement. This approach has been gaining acceptance in NSW over the past 5 years. A number of relevant matters have been found to result.

•The use of a percentage presence ‘rule’ for the management of the understorey vegetation can be used to design asset protection zones that adhere to the NSW prescriptive standard.

•The use of a percentage presence ‘rule’ for the management of the understorey vegetation can provide acceptable minimum fuel load within a bushfire prone area.

•Fuel management to the degree required for inner protection zones does not equate to ecological degradation through excessive vegetation or possible significant habitat loss in terrestrial ecosystems.

•The lessening of percentage cover in shrubs presence will not contribute in a measurable form to any loss of habitat protection.

•The nature of the landscape within the study area will see habitat remain insitu for fauna species both in the surface and aerial fuels.

•The removal of a high proportion of the litter layer in the surface fuel zone will not contribute in a measurable form any loss of habitat protection or foraging resources.

Presentation Type: Poster Presentations ***Session Title:*** Fire Environment

Climate drivers of fire & fuel in the Northern Rocky Mountains: Past, Present & Future

Penny Morgan, Emily K. Heyerdahl, Carol Miller, Lauren B. Shapiro, Carly E. Gibson and James P. Riser

Abstract

Regional fire years, like those that occurred in the northern Rockies in 1910, 1919, 1988, and 2000, threaten people and property and can overwhelm suppression capabilities. Ecologically, these years play a critical role in governing broad-scale ecosystem dynamics. Predicting the climate conditions under which these events occur, therefore, is important both socially and ecologically and would have major benefits for fire and fuels management in the US. We identified regional fire years in the northern Rockies and investigated the influence of climate on past (since 1650) and modern (i.e., 20th century) fires. To research the influence of climate on past fires, we reconstructed the occurrence of regional fire years from synchrony in fire-scar dates among 23 widely separated sites within the study region. To ascertain modern climate influences on fire, we digitally combined fire atlases from 12 National Forests and 2 National Parks in the region. Preliminary results indicate regional fire years are significantly dryer than other years (as indicated by the Palmer Drought Severity Index), and associated with positive Niño3 values, especially when the Pacific Decadal Oscillation is positive (i.e., in a warm phase). Additionally, we determined there is no significant climate effect of wet or dry antecedent years. We also determined climate influences on regional fire years in the northern Rocky Mountains differ from those of the southwestern US and are potentially more similar to results from studies of climate in the pacific northwestern US. To elucidate future climate influences on fire, we will parameterize the simulation model TELSA with past and present climate parameters derived from analysis of the fire atlas and fire scar records to simulate the future consequences of fire and fuels management for four different landscapes in the region. Increasingly, it is possible to predict fire season climate conditions in advance, so our information will help fire managers anticipate years when regional fire events are likely. This predictive ability will allow managers to more efficiently allocate suppression resources and prioritize fuel treatments.

Author Biographies

-Penelope Morgan, Professor, College of Natural Resources, University of Idaho, ID. -
Emily K. Heyerdahl, Research Forester, RMRS, Fire Sciences Laboratory, Missoula, MT.
-Carol Miller, Research Ecologist, Aldo Leopold Wilderness Research Institute, Missoula, MT.
-Lauren Shapiro, Research Assistant and M.S. candidate, Department of Forest Resources, University of Idaho, ID.
-Carly E. Gibson, Research Assistant and M.S. candidate, Department of Forest Resources, University of Idaho, ID.
-James P. Riser, Biologist, RMRS, Fire Sciences Laboratory, Missoula, MT

Presentation Type: Poster Presentations ***Session Title:*** Fire Modeling

Evaluation of a dynamic load transfer function using grassland curing data

Stuart A. Anderson, Patricia L. Andrews and Wendy Anderson

Abstract

Understanding and calculating fire behaviour in various fuel types, in particular potential rate of spread and fire intensity, is essential for effective fire management, including wildfire suppression and fuels management. Fire spread in grassland fuel is affected by the curing level, the amount of dead fuel expressed as a percentage of the total (live and dead fuel combined). The influence of live fuel is included in various fire models in different ways. U.S. fire behavior prediction systems are based on Rothermel's fire spread model, which uses the load of live and dead fuel and the moisture content of each. Dynamic fuel models include a transfer of fuel load from the live to dead class as a function of live fuel moisture. Australian and New Zealand grassland fire behavior models rely heavily on the curing level as a major determinant of the ability for a fire to develop and spread, and place greater direct emphasis on both the proportion and moisture content of the dead fine fuels. A joint Australian and New Zealand study under the Australian Bushfire Cooperative Research Centre (CRC) is addressing various methods of assessing curing levels in grasslands. Data from that study is used to evaluate the dynamic fuel load transfer function used in fuel models developed for the Rothermel spread model. An assessment of the influence of curing levels is also compared in terms of rate of spread calculations from the different fire models.

Author Biographies

-Stuart Anderson is a researcher with the Ensis Bushfire Research team in Christchurch, New Zealand. He also leads a project on grassland curing in the Australian Bushfire Cooperative Research Centre (CRC).
-Dr. Pat Andrews is a research physical scientist with the US Forest Service at the Rocky Mountain Research Station, Missoula Fire Sciences Laboratory.
-Dr. Wendy Anderson is a mathematician and statistician with the Australian Defence Force Academy at the University of New South Wales, and is actively involved in research projects in the Australian Bushfire Cooperative Research Centre (CRC).

Employing Numerical Weather Models to Enhance Fire Weather and Fire Behavior Predictions

Joseph J. Charney and Lesley A. Fusina

Abstract

This paper will present an assessment of fire weather and fire behavior predictions produced by a numerical weather prediction model. We will produce simulations of the weather conditions associated with three episodes in June 2005, during which moderate to extreme fire behavior was reported across the Southwest, Great Basin, and Southern California in National Situation Reports. By comparing these simulation results against the situation reports, we will assess whether existing fire weather indices adequately predicted the observed fire behavior, and whether new indices being developed by USDA Forest Service research meteorologists could have enhanced the fire weather forecasts for these events.

USDA Forest Service researchers have been developing new fire weather and fire behavior tools designed to take advantage of information that is routinely generated by numerical weather prediction models, the same types of models used by fire weather forecasters to produce their forecasts. This paper represents a first step towards validating the performance of these new indices, as well as existing fire weather indices, by comparing them against reports of observed fire behavior for a limited number of cases. This comparison will enable researchers and operational personnel to assess the efficacy of these indices and determine whether they are ready to be tested in the broader context of day-to-day fire weather forecasting.

Author Biographies

-Dr. Joseph J. Charney is a Research Meteorologist with the Northern Research Station in East Lansing, MI. Dr. Charney works with numerical weather prediction models to develop new fire weather and fire behavior tools for implementation by fire weather forecasters and fire managers.
-Lesley A. Fusina is an undergraduate student in the Earth Science program at Michigan State University. Ms. Fusina develops atmospheric simulations and employs visual and numerical tools to analyze simulation results in the context of fire weather and fire behavior prediction.

Presentation Type: Poster Presentations ***Session Title:*** Fire Modeling

Geospatial statistical modeling-mapping of fuel characteristics in Grand Teton National Park, Wyoming: Integration of geospatial information and fire behavior prediction

Cory B. Bolen, Mohammed A. Kalkhan and Karl E. Brown

Abstract

Active suppression of wildland fires in the western United States during the last century has resulted in an increase of fuel loads in many ecosystems. In addition, urban development has increased exposing human lives and property to the risk of wildland fires. Fire managers are faced with the task of making decisions that protect society, while maintaining the natural ecosystem process of fire. In order to mitigate fuel loadings, respond to wildfire events and restore/maintain ecosystem integrity, an accurate, spatially predictive map of fuel characteristics across landscapes are necessary. Collecting an adequate amount of fuel inventory data in order to describe fuel loading variability is often time consuming and expensive and meaningful outputs technically difficult to produce.

This project is an extension of an existing USGS/NPS Vegetation Mapping Program project at Grand Teton National Park (GRTE). An integrated approach combining spatial statistical modeling theory, remote sensing imagery (Landsat TM and aerial photography), geographical information system (GIS) data and field data was used to model and map the spatial variability of multiple fuel characteristics (topographic, ground fuels, surface fuels and crown fuels) across ecological gradients within a study area of GRTE. Trend surface models were used to explain the coarse scale variability in fuel loading. Fine scale fuel loading variability was modeled using binary regression trees. Model evaluation is performed through a 10-fold cross-validation technique. Fuel characteristic models were then applied to a fire area simulator model (FARSITE) to predict the potential fire growth and behavior across the study area landscape under a variety of weather scenarios.

The objectives of this study are: (1) Evaluate an alternative field plot design (pixel nested plot of 20m x 20m) as an efficient, cost saving sampling protocol for fuel inventory data collection and modeling; (2) Model multiple fuel characteristics across environmental gradients for a study area within GRTE; (3) Apply the findings/results from the study area to the development of fuel characteristic models for the entire boundary of GRTE and a buffer area extending into adjacent lands; (4) Identify important predictor variables that provide insight to the spatial variability of fuel characteristics; and (5) Create FARSITE landscapes using the fuel characteristic models as inputs.

Author Biographies

Mr. Cory B. Bolen is a master's of science candidate with the Natural Resource Ecology Laboratory (NREL), Department of Forest, Rangeland and Watershed Stewardship, Colorado State University. Mr. Bolen is also a SCEP student with the Bureau of Reclamation's Remote Sensing and GIS Group.

Presentation Type: Poster Presentations ***Session Title:*** Fire Modeling

Modeling equations to quantify coniferous forest litter in Californian National Forests

Carol Ewell, John Stuart and Jo Ann Fites

Abstract

Forest litter is a dead fuel layer comprised of recently fallen vegetative particles from trees and other plants such as leaves, needles, cones, and bark flakes. A variety of methods exist for quantifying litter and estimating loading. Quantification of forest litter is important in estimating fire behavior, substrate cover, erosion potential, and in tracking changes in both natural and management activities. This study analyzed monitoring data from fuel treatment projects in fourteen National Forests in California to create litter loading estimates and equations. Litter samples were dried, weighed, and correlated with litter depths that had been measured along planar fuel transects. Nineteen mixed conifer study sites were grouped according to location and tree species relative basal area. Utilizing eight conifer forest types in seven ecological regions simplified analysis. Estimated litter depths, loadings, bulk densities, and modeling equations were developed and compared to those published for many Western regions. The implications of modeling fire behavior with and without litter were compared. These comparisons highlighted the extensive variation of litter quantities available for fuel estimations and emphasized the need to evaluate methodologies to increase accuracy.

Author Biographies

-Carol is a graduate student at Humboldt State in the Natural Resources Management Program, Forestry option. She is a student trainee with the regional USFS Adaptive Management Services Enterprise Team in California where she serves as a fire ecologist and fuels researcher.
-Dr. John Stuart is a professor of forestry at Humboldt State University. He teaches courses in fire ecology, forest ecology, and dendrology. His research interests are in fire history, fire ecology, forest health, forest classification, and dendrology.
-Jo Ann has worked for the USFS for 19 years as an ecologist and fire ecologist in California. She has a PhD in Forest Resources for the U. of Washington. She leads a 25-member enterprise team emphasizing fuels, fire ecology and fire management services in the west.

Presentation Type: Poster Presentations ***Session Title:*** Fire Modeling

Modeling the Effects of Moderate Severity Burns on Fuel Loading in Northwest Wyoming Mixed Conifer Forests

Diane C. Abendroth, Mohammed A. Kalkhan and Karl E. Brown

Abstract

Many studies have documented the effects of high severity fires on fuel loading and forest succession. However, large portions of wildland fires exhibit moderate burns, and have less predictable and well-understood post-fire fuel dynamics. Moderate severity fires are characterized by partial damage to overstory trees, and incomplete combustion of fuels in the canopy and on the ground. Post-fire successional patterns in moderate burns are complicated by residual live trees, seed sources, shading, and substrate factors. Fuel loading over time has been modeled as a function of snag recruitment, decay, and accumulation of litter, duff, and branchwood, however empirical data are lacking. Additional factors contributing to post-burn fuels include insect and disease infestations and changes in herbaceous production.

Burn Severity atlases derived from archived satellite remotely sensed imagery provide an opportunity to study the effects of fire over several decades, particularly when compared to variables such as vegetation type and degree of severity. Pre- and post-fire comparisons of Landsat imagery are used to compute the Normalized Burn Ratio (NBR), which is an index correlated to ecological effects on the ground.

This project utilizes severity maps from fires dating back to the early 1970's in Grand Teton National Park and the Bridger-Teton National Forest to examine relationships between moderate severity fires in mixed conifer forests and post-fire fuel loading and forest structure. Adjacent control areas in unburned forests will be chosen by spectral reflectance analysis using pre-burn satellite images. The moderately burned locations will be paired with unburned stands for sampling of post burn fuel loading and forest structure. Comparisons will be made between burned and unburned areas and time since fire. This information will add to the understanding of how mixed conifer forests in the Intermountain West respond to moderate severity fires over time. The findings will be used to predict post-burn changes in forest structure and fuel loading and update fuels maps for moderately burned areas post fire.

Author Biographies

Diane Abendroth is a Fire ffects Monitor at Grand Teton National Park in Wyoming. She is currently a Master's Degree canditate in Forestry at Colorado State University, specializing in fire ecology, remote sensing, and burn severity.

Presentation Type: Poster Presentations ***Session Title:*** Fire Modeling

Predicting post-fire severity effects in coast redwood forests using FARSITE.

Hugh S. Scanlon and Yana Valachovic

Abstract

Assessing post-fire impacts in coast redwood (Sequoia sempervirens) forests can be difficult due to rough terrain, limited roads, and dense canopies. Remote sensing techniques can identify overstory damage, locating high intensity damage areas, although this can underestimate the effects on the understory vegetation and soils. To accurately assess understory impacts requires field assessment techniques, which can be expensive for larger burn areas.

Where geospatial data for fuels and topography can be combined with weather data in FARSITE, landscape fire behavior predictions can be made. Fire behavior outputs can be generated to produce a post-fire predicted landscape map of fire severity.

The 2003 Canoe fire burned 4,000 hectares, primarily old-growth and young-growth redwood forests in Humboldt County, California. Post-fire sampling of burn impact was assessed using the Composite Burn Index methodology (FIREMON 2003) and found to be unrelated to FARSITE produced fire behavior variables using regression analysis (Microsoft Excel 2003).

This finding is understandable because basic FARSITE landscape data available for this fire lacked fuel load information for post-combustion analysis. The Canoe Fire had a slow rate of spread, and with the deep fuel beds present, long duration burning was observed. Fire severity, as described by the Composite Burn Index, was greatest in the forest understory. FARSITE was a useful projection tool for perimeter advance and flame lengths associated with the fire front.

Author Biographies

-Hugh Scanlon is a fire behavior analyst and Battalion Chief with the California Department of Forestry and Fire Protection, Humboldt - Del Norte Unit.
-Yana Valachovic is a forest advisor for the University of California Cooperative Extension in Eureka, California.

The Use of Fire Behavior Models in Reconstructing Presettlement Vegetation on a Frequent-Fire Landscape

Diane M. Gercke, Gary B. Blank, Thomas R. Wentworth and Cecil C. Frost

Abstract

A rapid method of assessment of the distribution of presettlement vegetation and the generation of fine-scale presettlement vegetation maps may be possible with the help of conventional fire models. Fire models like FARSITE and FlamMap have been demonstrated to be relatively accurate predictors of fire behavior and spread on the landscape. These models consider slope, aspect and climate; the same factors observed to influence vegetation distribution in traditional ecology. Fire behavior may be related to vegetation distribution on a frequent-fire landscape. Fireline intensity outputs from a conventional fire behavior model (FlamMap) were used to locate plant communities in North Carolina Sandhills longleaf pine-dominated forest that were distinctly fire sheltered on this historic landscape. In a survey of 78 sites visited on the study landscape, correctly identified fire sheltered communities were found in 91% of the areas where the presence or absence of presettlement vegetation was determinable. Success in finding a single community as related to a specified range of fire behavior outputs suggests that there is potential for expanded utility of fire models in making inferences about vegetative distribution on the frequent-fire landscape.

Presentation Type: Poster Presentations ***Session Title:*** Fuel Characterization

FuelCalc: a method for estimating canopy fuel characteristics

Elizabeth D. Reinhardt, Joe H. Scott and Duncan C. Lutes

Abstract

We developed a method for estimating canopy fuel characteristics, including available fuel, canopy bulk density, canopy base height and canopy cover, from a list of trees. This method is described here. With JFSP funding we plan to develop a computer program, FuelCalc, to determine both surface and canopy fuel from inventory data, and to help managers analyze expected effects of silvicultural treatments on surface and canopy fuels.

Foliar moisture contents of North American conifers

Christopher R. Keyes

Abstract

Foliar moisture content (FMC) is a factor in crown ignition during the transitional phase of surface fire conversion to crown fire. In combination with measured stand data and assumed environmental conditions, reasonable estimates of FMC are necessary in order to determine silvicultural targets for canopy fuels management strategies. Rather than being measured directly, FMC values reported in research publications are typically used for this determination. In this paper, The FMC values for 13 North American conifers derived from 10 reporting sources are summarized and discussed. Values range from 73-480 percent but vary by species, foliage maturity, and period of measurement. The values presented here and the references associated with them will be helpful to managers engaging in canopy fuels planning with the use of popular fuels management software such as Nexus, Fuels Management Analyst, and the Forest Vegetation Simulator's Fire and Fuels Extension.

Author Biographies

Dr. Christopher R. Keyes is Assistant Professor of Silviculture & Applied Forest Ecology at Humboldt State University in Arcata, California. His research includes the study of forest fuel dynamics and the silvicultural management of aerial fuels. Dr. Keyes received degrees from Oregon State University, the University of Montana, and Holy Cross College.

Sensitivity analysis of two methods for estimating leaf area index

Abran Steele-Feldman and Elizabeth Reinhardt

Abstract

Leaf area index (LAI) estimates obtained from digital hemispherical photographs and the LICOR-LAI 2000 plant canopy analyzer were compared. Data were collected repeatedly at 12 sites in western Montana under a variety of less than ideal light and sky conditions. Several different post processing methods were also used. We evaluated the precision of each methodology, and also compared the LAI estimates to several allometrically derived measures of fuel load. Repeated estimates with each method displayed considerable variability, but those from the hemispherical photographs were considerably more precise. The LAI estimates from both methods were most correlated with allometric estimates of canopy cover. Hemispherical photography emerged as the superior methodology if measurements must be taken under sub-par light conditions, but required more extensive post-processing.

Author Biographies

Abran Steele-Feldman is a graduate student in the Quantitiative Ecology and Resource Management program at the University of Washington. Elizabeth Reinhardt is a research forester at the USFS Rocky Mountain Research Station, Fire Sciences Lab.

Presentation Type: Poster Presentations ***Session Title:*** Fuel Characterization

Making fuels data usable with maps

Jennifer L. Rechel

Abstract

Fire suppression activities have created conditions in the western United States where fuels have increased in forests and shrublands. Fuel treatments are then applied to decrease fire hazard. Fuels data from field plots and imagery are major sources of information for fire hazard and fuel treatment analysis. This has lead fire and resource managers to focus efforts on collecting fuels data to estimate fire danger and to assess the success of the treatments. Remote sensing and geographic information systems (GIS) technologies have created multiple methods to collect, analyze, and map fuels data at the stand, watershed, landscape, and regional scales. Fire managers and scientists can take advantage of these geospatial technologies and cartographic methods for quick assessment and mapping of initial fuels data at multiple scales. A primary use of these data is to make them usable in the form of maps that communicate, measure, and visualize the often complex aspects of fuel structure, live fuel moisture, fuel condition, and fuel treatments. Communication includes mapping seasonal changes in % live fuel moisture, average % live fuel moisture in early (low) risk and late (high) risk fire situations, and differences among live fuel moisture for shrublands and forests. Tree height, canopy cover, shrub height, and shrub cover can be mapped to highlight fuel structure or generalized to summarize fuel structure that reflect thinning or prescribed burning. Quantitative thematic maps depict the spatial distribution of live fuel moisture, fuel condition, and fuel structure using choropleth maps. More advanced measures of successful fuel treatments use change detection methods to document effects of the treatments using historical and current geospatial data. The results can be communicated with maps to emphasize areas where fuel treatments were successful or where additional data needs to be collected and different fuel treatments applied.

Assignment of New Fire Behavior Models in New Jersey Pine Barrens

Steve Van Tuyl, Jason Cole, Kenneth Clark, John Hom, Nick Skowronski and Robert Somes

Abstract

We used extensive field measurements, remotely sensed LIDAR data, and digitized maps of prescribed fire treatments to assign fuel models developed by Scott and Burgan (2005) to upland forests in the Pine Barrens of New Jersey. Because understory shrubs are abundant and productive, fuels accumulate rapidly, and the New Jersey Forest Fire Service and other agencies have had an active fuel reduction program since the 1930's, it is important to quantify transition rates among models (i.e., low load, medium load, high load and very high load, humid climate shrub models). Fuel bed depths in the humid climate shrub models range from 2 to 6 feet, and fine fuel loads from 4.3 to 13.1 tons/acres. Field measurements indicated that fuel bed depths were similar at 1.6 to 5.8 feet, and that fine fuels range between 2.2 to 13 tons/acre. We integrated these data with a GIS map of forest types and LIDAR data to produce a static fuel model map. Litterfall measurements and clip indicated that fine and 10-hour fuels accumulate at 1.2-1.8 tons/acre and 0.2-0.7 tons/acre per year, respectively. Pre- and post prescribed fire sampling showed that prescribed fires reduce fine and 10-hour fuels by 0.6-3.1 tons/acre and 0-0.8 tons/acre, respectively. These results indicate that accurate fuel models for the Pine Barrens must be dynamic, because both fuel accumulation and loss can be rapid, thus original estimates become obsolete quickly.

Author Biographies

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Presentation Type: Poster Presentations ***Session Title:*** Fuel Characterization

Fuel Variability in Seasonally Dry Evergreen Forests in Eastern Amazon

Gustavo H. Negreiros, Kathryn Prengaman and Matthew Othmer

Abstract

Recent reviews over tropical wildfire research indicate the need to better understand and describe the high variability of forest floor fuels conditions to be able to assess and model its flammability. This work presents initial attempts and exercises to describe forest floor litter composition and the variability of key factors of moisture flow and burning conditions between different litter types in an eastern Brazilian Seasonally Dry Amazon Forest. The litter over the forest floor was sampled and separated between leaf and non-leaf material along a 500 meters transect where 51.8% of the mass was leafs with 75 leaf types classified according to physical and visual characteristics. The dominant 6 leaf types and 3 other samples, a general leaf category, sticks, and chunky duff, were then artificially wetted and then let to dry at field conditions to monitor differences in time lag of disorption. Those same samples were then burnt in a semi-controlled environment to observe relative differences in burning characteristics. This work was performed as two Independent Study Project of undergrad students in their semester abroad in Brazil during spring and fall 2005 and is not counting with any fund or lab support.

Author Biographies

-Gustavo Negreiros - Ph.D. University of Washington 2004. Academic Director of The School For International Training in the Brazilian Amazon since 1998, and founding member of the Instituto Ecologia e Comunidade ECOMUN in the Brazilian Amazon.
-Kathryn A. Prengaman is an Undergraduate student at College of William and Mary
-Matthew Othmer is an Undergraduate student at University of Colorado at Boulder

Variation in woody fuel loading associated with masticated fuel beds in northern California and southwestern Oregon.

Jeffrey M. Kane, J. M. Varner and Eric E. Knapp

Abstract

Use of mastication to treat shrub and small tree fuels is becoming increasingly popular in the western United States. While this mechanical treatment temporarily reduces the vertical structure of the live fuel bed, the amount of woody surface fuel generated can be considerable. Fuel loading in treated stands, and the variation in loads are not fully understood, an important shortcoming to installing subsequent fire treatments and an impediment to modeling potential fire behavior and effects. To better understand site variation related to woody fuel loading across masticated fuelbeds, we evaluated fuels at six different masticated sites throughout northern California and southwestern Oregon. Mean total woody fuel loading varied significantly by site ($p = 0.04$) and ranged from 12.7 to 44.9 Mg ha-1 (5.7 to 20.0 tons ac-1). Across all sites, post-mastication loading was concentrated in 10-hr and 100-hr timelag classes (52 % and 26 % of total loads, respectively). Additionally, fine fuel loading varied by site for 1 hr ($p = 0.01$) and 10 hr ($p = 0.02$) time lag classes with some sites containing greater than 450% higher fine fuel loading than others. Fuel loading variability among sites is extremely important to land managers, especially in fine fuel timelag classes that drive fire behavior. Variability in fuel loading may explain some of the differences in fire behavior that have been reported when masticated fuels are burned. Fire behavior associated with masticated sites and the determinants of loading variation should receive increased attention from fire and fuels research.

Author Biographies

-Jeff Kane is a masters student in the Department of Forestry and Watershed Management at Humboldt State University in Arcata, California.
-Dr. Morgan Varner is an assistant professor in the Department of Forestry and Watershed Management at Humboldt State University in Arcata, California.
-Dr. Eric Knapp is a research ecologist at the U.S. Pacific Southwest Research Station in Redding, California.

Presentation Type: Poster Presentations ***Session Title:*** Fuel Characterization

Evaluation of Fuel Moisture Content Sampling Methods and Processes

Sally M. Haase and Susan M. Zahn

Abstract

Collecting, maintaining and disseminating fuel moisture content information are important components within the foundation of fire and fuels management. How fuel moisture samples are collected and processed is a critical first step in ensuring the most accurate data used in most fire behavior models and in planning for critical resource levels. A partnership was developed between the Forest Fire Laboratory in Riverside and San Dimas Technology and Development Center to test three common fuel sample containers and the prospect of using a chainsaw to collect samples in the larger fuel size classes. A series of evaluations were done to determine the effectiveness of commonly used fuel sample containers: polypropylene bottles, standard quart paint cans, and self-sealing bags. Samples were reweighed over an extended amount of time to simulate a test for maintenance of sample moisture content from the sampling site to the processing area. The second series of tests were done to compare the use of a handsaw and a chainsaw in the collection of 100-hour wood moisture content samples. A question was raised from the field that regarding the "chainsaw" affect of bar oil possibly compromising the sample, associated with collecting the larger size classes of woody fuels with a chainsaw. This test was done by comparing moisture content of samples collected with a handsaw and a chainsaw of 3-inch wood post material. These two studies are part of a push in R-5 to develop a guide of standard methods for sampling live and dead fuels moisture contents. This information will help in establishing drying trend information and will ultimately be available to aid manager's decisions in wildfire suppression and prescribed fire projects.

Author Biographies

-Sally M. Haase is a Research Forester located at the Forest Fire Laboratory in Riverside, CA. Her research has concentrated on fire effects of prescribed fire in southwestern ecosystems.
-Sue Zahn is a Fuels Management Specialist with the San Dimas Technology and Development Center in San Dimas, CA. She has worked in fire suppression and prevention of the Forest Service for almost 20 years having worked on each of the southern California forests.

Presentation Type: Poster Presentations ***Session Title:*** Fuel Characterization

Duff Moisture: A Key Factor For Staying Within The Prescription Window

Peter Robichaud, Louise Ashmun and Lonnie Newton

Abstract

Duff consumption during burning depends largely on the duff water content at the time of ignition. Prescribed fire burn plans often include a target pre-burn duff moisture range that will leave a portion of residual duff material to protect the mineral soil after the burn is completed. A portable duff moisture meter has been developed for real-time water content measurements of non-homogenous material such as forest duff. This sensor measures a change in frequency that is responsive to the dielectric permittivity of the duff material placed in a sample chamber and compressed. The accuracy of the duff moisture meter is 1.5 percent at 30 percent volumetric water content (VWC) and 4 percent at 60 percent VWC. The duff moisture meter readout can be easily programmed to provide both the gravimetric water content (GWC), which is used more frequently by fire managers and as input to models that predict duff consumption, and the standard VWC. Given the rough field environment inherent to forest fire, the duff moisture meter provides immediate moisture content read outs in the field with minimal effort. Using measured duff moisture contents, the First Order Fire Effect Model (FOFEM) can predict duff consumption and resulting bare mineral soil exposed more accurately than estimated default values. CONSUME 3.0 now requires duff moisture content as an input thus improving consumption predictions. In recent use during prescribed fires, the duff moisture meter made it easier to stay within the burn plan prescriptions and improved confinement tactics.

Author Biographies

-P. Robichaud is a Research Engineer with the Soil and Water Engineering Unit, Rocky Mountain Research Station, Moscow, Idaho
-L. Ashmun is a Civil Engineer with the Soil and Water Engineering Unit, Rocky Mountain Research Station, Moscow, Idaho
-L. Newton is a Assistant Fire Management Officer, Sandpoint Ranger District, Idaho Panhandle Nationa Forest, Sandpoint, Idaho

The Lick Creek Demonstration: Forest Renewal Through Partial Harvest and Fire

Benjamin Zamora and Melinda Martin

Abstract

The Lick Creek Demonstration Site on the Pomeroy Ranger District, Umatilla National Forest, is a Joint Fire Science Program sponsored project to create a demonstration of the effects of fuels management on forest health. The project was initiated in 2001 and involved the integration of three levels of partial harvest, post-harvest biomass utilization, and prescribed fire to attain desired stand compositions and structures, fuel levels, and improve wildlife habitat. Harvest treatments were completed in 2001, biomass utilization was conducted in 2003, and prescribed fire treatments were completed in 2004. A long-term monitoring scheme of fuels and stand attributes has been implemented across the demonstration site involving pre- and post-treatment measurements to document outcome of the fuels management project. An overview of the treatment applications and results and the first year monitoring results will be presented.

Author Biographies

-Benjamin Zamora is an Associate Professor and Scientist in the Dept of Natual Resouce Sciences at Washington State University with teaching and research emphasis in vegetation and fire ecology.
-Melinda Martin is a Fire Planner with the Pomeroy Ranger District, Umatilla National Forest.

Presentation Type: Poster Presentations ***Session Title:*** Fuel Treatment

Effect of spaced thinning of a mature lodgepole pine stand on within-stand microclimate and fine fuel moisture content

Roger J. Whitehead, Glenda L. Russo, Brad C. Hawkes, Stephen W. Taylor and Barry N. Brown

Abstract

Spaced thinnings are advocated for fuels management to reduce crown bulk density and fire spread rate. They also affect surface fuel load, moisture content and within-stand wind, which influence surface fire intensity and crowning potential. Equilibrium moisture content and rates of wetting or drying of fine surface fuels are affected by factors which are expected to change when a stand is thinned, including canopy rain interception, temperature, and relative humidity. We examined the microclimate database of the Mature Lodgepole Pine Management Project, which has studied spaced thinnings since 1992. We compared precipitation, insolation, temperature, relative humidity and wind speed in a stand thinned from below to 4m inter-tree spacing to an adjacent unthinned stand and clearcut opening. In 2005, we measured moisture content of pine needle litter and fuel moisture sticks in both stands. Differences were greatest after rain, when fire danger was very low, but decreased quickly as fuels dried to very small at moderate fire danger. There were no periods of high fire danger at this site in 2005. In Canada, Fire Weather Indices, including Fine Fuel Moisture Code (FFMC) are calculated from fire weather station outputs. Moisture content of needle litter can be predicted from FFMC. We compared measured values to values predicted from daily FFMC and found that accuracy improved as fire danger increased. Fuel moisture in both stands was predicted well when fire danger was moderate.

Author Biographies

Roger Whitehead and Glenda Russo are Research Silviculturists; Brad Hawkes and Steve Taylor are Fire Research Officers; Barry Brown is a Senior Research Technician. All are employed by the Canadian Forest Service at the Pacific Forestry Centre in Victoria, British Columbia, Canada.

A Method for Rapid Assessment of Historic Frequent-Fire Vegetation Communities

Diane M. Gercke, Gary G. Blank, Thomas R. Wentworth and Cecil C. Frost

Abstract

In the effort to restore historic landscapes, it is necessary to first specify spatially explicit target vegetation communities. Previously, botanists or other local experts have used landscape and environmental factors, historical evidence, and evidence from remnant vegetation to define presettlement vegetation communities on the landscape. Once these communities are defined, they must be mapped in order to be truly understandable and useful. Efforts to map the location of these presettlement communities on a particular landscape are often laborious and time consuming. In this study, we discuss a rapid method for assessing the location of these vegetation communities using Geographic Information Systems (GIS) and the current science of fire behavior modeling. Fire behavior models are proven predictors of fire intensities across a landscape, considering vegetation, slope, aspect, wind, and weather. Our hypothesis was that these fire behavior models could be used to make inferences about presettlement vegetation community distributions in former frequent-fire landscapes. GIS software was used to find simple combinations of variables associated with vegetation distribution, including soil type, aspect, slope, and orientation to gradient winds. A conventional fire model (FlamMap) was then used to find areas that are distinctly fire sheltered. The fire model adds to the utility of the GIS by considering the effects of fire spread direction and variation in fuel moistures in conjunction with terrain variables. The resulting fire intensity outputs represent environmental effects on vegetation distribution that cannot be modeled solely with a GIS. A final presettlement vegetation layer was completed for the study site and compared to a layer generated by an extensive 2-year study considered to be definitive. The results showed an overall map accuracy of 78 percent for the proposed procedure. This output may be used as a preliminary map that, in conjunction with ground-truthing, will shorten the process of mapping presettlement vegetation for use in the restoration of historic fire dependent communities.

Presentation Type: Poster Presentations ***Session Title:*** Wildland-Urban Interface

The Wildland/Urban Interface: Cheatgrass and Fuel Breaks

Heidi Esh

Abstract

Bromus tectorum (cheatgrass), an invasive species, is found primarily in environmentally disturbed areas across the world. Cheatgrass is an early-maturing, fine-textured grass species and when dry, easily ignites and fuels the spread of wildfires. Cheatgrass displaces native vegetation by out competing the seedlings of native species for soil moisture while changing the frequency, extent, and timing of wildfires (Bossard, 2000). The integrity of wilderness and the safety of urban communities are at risk from cheatgrass invasion and a higher frequency of fires. The primary objectives in approaching the management of this exotic phenomenon include: current location of high fire hazard areas in association with fire behavior models and variables such as terrain and the urban area at risk. A Geographic Information System (GIS) will be used in creating a Wildland/Urban Interface geodatabase template to analyze the placement of fire/fuel breaks.

Author Biographies

-I am a MSGIS (Master's of Geographic Information Systems/Science) Student at the University of Redlands in Southern California. My Master's Major Individual Project (MIP) focuses on Cheatgrass and Fuel Breaks and, as a result, am recieving a scholarship from the BASF Chemical Company for school tuition and project funding.

Small Villages in Fire Prone Wilderness--Managing the Risk

Mary Kwart and Brian Anderson

Abstract

In Alaska, National Wildlife Refuge System lands are intermixed with over 15 million acres of private, state-owned, and Alaska Native Corporation and trust lands. Included within or near refuges are 131 mostly Native villages, many of which are surrounded by highly flammable black spruce forest. The natural black spruce fire regime is characterized by high intensity, large crown fire that may occur approximately every 80 years as illustrated in the summer of 2004, when wildland fires burned 1.8 million acres of Refuge System lands in Alaska.

Alaska is fortunate to have vast expanses of wilderness within which fire can be managed for ecosystem benefit, but villages must be protected from the deleterious effects of wildfire. Wildfire hazard reduction activities in Alaska pose unique logistical and planning challenges for land managers. Remoteness, a short working season, multiple agency jurisdictions, and traditional subsistence lifestyles are some of the primary considerations that can make planning difficult.

The USFWS in Alaska is currently working in partnership with the tribal village councils of Northway, Huslia and Allakaket to decrease wildfire hazard. Fuel reduction was accomplished through hand thinning projects using the traditional Emergency Firefighting Crews that exist in many Alaskan villages.

By protecting important areas like native villages from wildfire, USFWS managers can ensure that fire will be able to maintain its vital natural role within wilderness ecosystems.

Author Biographies

-Mary Kwart graduated from Colorado State University in 1987 with a degree in Fire Management. She has worked since 1977 in the field of fire management from Interagency Hotshot Crew to Prescribed Fire Specialist. She is currently the US Fish and Wildlife Service Alaska Region Fuels Specialist in Anchorage.
-Brian Anderson has worked for 22 years with the US Fish and Wildlife Service in Anchorage, Alaska, and presently serves as the Alaska Regional Wilderness Coordinator. Brian was raised in Denver, Colorado, and graduated from Colorado State University with a bachelor of science degree
in wildlife biology.

Presentation Type: Poster Presentations ***Session Title:*** WUI

Fit for Success (Tailoring your custom Wildfire Mitigation Program)

Brad Wagner

Abstract

The Panhandle of north Idaho has five active, successful, yet different Wildland Urban Interface Fire Mitigation Programs in progress. There are similarities between the five, with agency and personnel common to all, but each is unique and was designed to accommodate the needs and resources of the individual County.

I will identify the common elements that comprise the foundation of these programs, and illustrate how the basic pattern has been altered to create a program "tailor made" for this assortment of individual communities. To accommodate this amount of information in the time allotted, Mr. Wagner will address the fundamental questions - what, who, how and provide a handout with additional detail and background.

Author Biographies

Brad Wagner is a Range/Fuels Technician for the Bureau of Land Management, Coeur d'Alene Field Office in Coeur d'Alene, Idaho. He was instrumental in the establishment of the WUI Fire Mitigation Program, and hazardous fuels treatment program FireSmart Kootenai County. Brad has worked closely with all five county programs and adds not only his fire and fuels experience to the resource list, but the knowledge and understanding of a born and bred native.

Creating an Access-Based Database for Communities at Risk

Paul Briggs, Dana Cohen, Brett Fay, Bruce Fields, Taiga Rohrer, John Schmidt, Cyndi Sidles, Scott Tobler, David Eaker and Anne Stanworth

Abstract

Beginning in 2000, the Color Country Interagency Fuels Committee undertook an intensive assessment of the 148 identified communities at risk in the Color Country fire management response area of Southwest Utah and Northwest Arizona. Compiled data included standardized internal and external risk assessments, digital photos, maps, and other information to prioritize hazardous fuels target areas and to aid in suppression efforts.

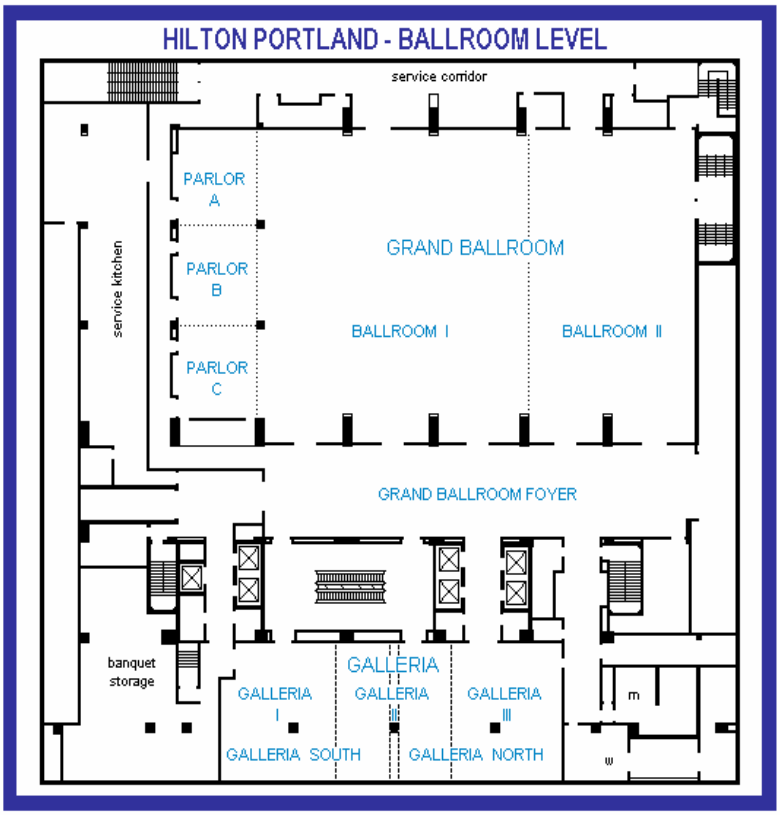
A large amount of data was generated through this process, housed at local offices and at the Color Country Interagency Fire Center. In 2004, the Committee chose to organize and centralize the data by creating a database which could be accessible to all agency partners and all field offices in Color Country. The original assessments and the Community Fire Plans that have been generated from them are housed at the Interagency Fire Center in Cedar City, Utah.

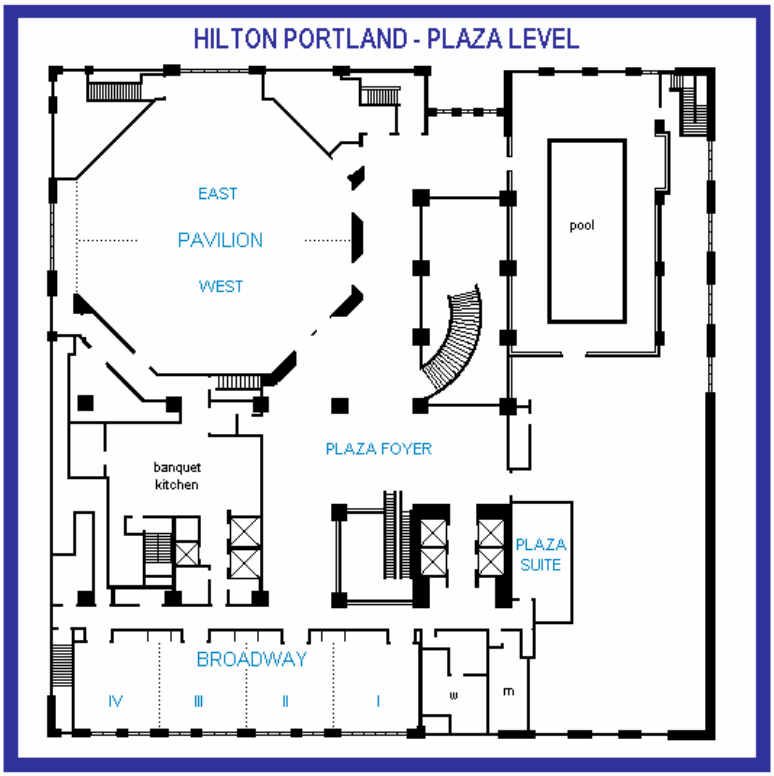
Student Conservation Associates were brought on to organize the data and develop the database. It is Microsoft Access-based and includes digital versions of all risk assessments and links to photos and community fire plans. Fuels committee members update the database yearly, including information on planned, in progress, and completed treatments. This poster highlights the main features of the Color Country Communities at Risk database.

Author Biographies

The Color Country Fuels Committee (CCFC) is made up of representatives from state and federal fire management programs administering 14 million acres in Southwestern Utah and Northwestern Arizona. The purpose of the CCFC is to serve as an interagency forum for identifying and resolving wildland/urban interface, hazardous fuels and vegetation management issues which directly impact firefighter and public safety. Effective management of the Color Country's ecosystems, in accordance with the National Fire Plan, the National Cohesive Strategy, and local land management plan objectives, is the mission of the Committee.

Meeting Room Map





Notes

International Association of Wildland Fire

1st Fire Behavior and Fuels Conference

Fuels Management – How to Measure Success

March 27-30
Portland, Oregon

Notes

Notes

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