

Fire Management *today*

Volume 68 • No. 4 • Fall 2008



INTERNATIONAL FIRE MANAGEMENT— PART 2



United States Department of Agriculture
Forest Service

On the Cover:



On the Cover: An Australian Bushfire Cooperative Research Center research burn conducted at the Ngarkat Conservation Park, South Australia, March 2008. Photo by David Burce, Bushfire CRC.

The USDA Forest Service's Fire and Aviation Management Staff has adopted a logo reflecting three central principles of wildland fire management:

- **Innovation:** We will respect and value thinking minds, voices, and thoughts of those that challenge the status quo while focusing on the greater good.
- **Execution:** We will do what we say we will do. Achieving program objectives, improving diversity, and accomplishing targets are essential to our credibility.
- **Discipline:** What we do, we will do well. Fiscal, managerial, and operational discipline are at the core of our ability to fulfill our mission.



Firefighter and public safety is our first priority.

CONTENTS

Coming Next.	Inside Front Cover
Special Thanks to Our Coordinator	Inside Front Cover
International Fire Assistance, Part II — Giving and Receiving.	4
<i>Tom Harbour</i>	
Korean Delegation Experience Fire and Aviation Management Study Tour in California.	5
<i>By John C. Heil III</i>	
International Cooperation in Wildland Fire Management: The Global Wildland Fire Network	6
<i>Johann Goldammer</i>	
Fire Management Strategy.	9
<i>Jim Carle</i>	
What Is a Wildland Fire? The Importance of Clear Terminology	12
<i>Denny Truesdale</i>	
Foreign Exchange—A Great Investment	13
<i>Gwen Beavans, Donna Deaton, and Brenda Schultz</i>	
Greek Firefighters and Forest Service Little Tujung Hot Shots Captain Meet Governor Schwarzenegger	15
<i>John Heil, III</i>	
Community-Based Fire Management	16
<i>Peter Van Lierop</i>	
South Africa To Host World Wildfire Conference.	17
<i>Alex Held</i>	
Working on Fire: A South African Solution To Fighting Poverty and Fighting Wildfires	18
<i>Karen Rutter</i>	
Australasia's Cooperative Fire Research Efforts	23
<i>Gary Morgan</i>	
Wildfires and Wallabies: U.S. Fire Staff Goes Down Under	25
<i>Max Schwartz</i>	
The Incident Command System—A Foundation for International Cooperation	31
<i>Murray Dudfield</i>	
Fire Behavior Advisories in Saskatchewan: Why Not?	33
<i>Paul Emmett</i>	
Fire, Nature, and Humans: Global Challenges for Conservation	36
<i>Ayn Shlisky, Ronald L. Myers, John Waugh, and Kori Blankenship</i>	

SHORT FEATURES

Web Sites on Fire	24
Guidelines for Contributors.	43



by Tom Harbour
Director, Fire and Aviation Management
Forest Service

INTERNATIONAL FIRE ASSISTANCE, PART II — GIVING AND RECEIVING

In the summer 2008 edition of *Fire and Aviation Management*, my Anchor Point article, “*International Fire Assistance, Benefits Are Many; Balance Is the Key*,” talked about the many benefits of our international fire assistance program—not only to the international partners we assist but, personally, to those of us who participate. How we balance our primary mission and our obligation to the American public with the assistance we provide internationally is the key to our success.

The issues and challenges we face managing wildfires are not ours alone. They cross oceans and continental boundaries as well. Through the international fire program, we’ve had the opportunity to take a look at what we do here at home and how our international counterparts deal with the same type of issues abroad. As has been demonstrated this year, it works both ways—we give and receive. Considering the international fire assistance we’ve received so far this year, I believe it is only fitting that

The issues and challenges we face managing wildfires are not ours alone.

Tom Harbour is the director of Fire and Aviation Management, Forest Service.



Group photo of the Greek and United States firefighters who worked on the East Basin Complex Fire. Photo by Kari Greer, NIFC.

this issue starts by reflecting on the recent assistance we’ve been honored to receive from our fire comrades across the globe and not on what *we’ve done* over this past year to assist other countries.

In late June, a series of lightning strikes rocked the State of California, causing more than 2,000 individual fires and burning more acres than any other fire season across California. When this happened, the traditional fire season had not even begun. Resources throughout the Nation, across boundaries and jurisdictions, responded. As the time drew on and the fires continued to burn, we requested assistance from our international friends and counterparts in Greece, Mexico, Canada, Australia, and New Zealand. They graciously responded with overhead and crews.

In the fire service, we often do heroic work on a daily basis. We are

A strong fire service is important; but alone, it will never be sufficient.

pleased and proud to do it. The fire siege in California earlier this season demonstrated, and continues to demonstrate, that without assistance and cooperation from our colleagues around the world, our jobs will become increasingly dangerous and more costly to society.

While language, customs, and culture can separate us, wildfires are the same no matter whether we call them forest fires, bush fires, or fires in the wildlands. A strong fire service is important; but alone, it will never be sufficient. We are grateful for the international fire assistance and support provided us this year. We pledge to continue to work with our international counterparts, not only in the role of reciprocal assistance but to better manage our wildlands and promote well-accepted international fire management principles. Together, wildfires can be managed. Together, we can help each other be successful. As always, the benefits are many; balance is the key, whether we are giving or receiving. ■

—Tom Harbour, Director
Fire and Aviation Management

Author's note:

As we all reflect on the subtitle of this article, "Giving and Receiving," our thoughts cannot help but turn to those who have tragically lost their lives this past fire season in California. They gave the ultimate sacrifice while serving and protecting others. As we face future fire seasons, I believe we must nurture the esprit de corps demonstrated by those attending the memorials for these fine, brave men. Challenges abound, risks are numerous, uncertainty is our constant companion. But, as we lift our minds, focus our energy, and mutually raise our situational awareness, I'm confident we'll successfully navigate the perilous path ahead. The sunrise does herald the dawn of a new and better day. Let us keep these brave men and their families in our thoughts and prayers as we honor their memory and continue to safely meet our future challenges.

KOREAN DELEGATION EXPERIENCE FIRE AND AVIATION MANAGEMENT STUDY TOUR IN CALIFORNIA

By John C. Heil, III

California is not alone. The Republic of Korea has also had a record numbers of fires and burned acreage in the past decade. That's why it makes a lot of sense for countries to learn from each other.

From October 13 to 15, a Republic of Korea delegation came to California for a Study Tour of Fire and Aviation Management. Twenty-one Korean forest fire officers and assistant directors spent 3 days learning about fire in California and how the Forest Service Incident Command System works. The delegation experienced an Aviation Flight Simulator Demonstration, learned how the Forest Service works with other State and Federal agencies, and discussed many other fire management topics.

In addition to the presentations that took place at the Forest Service McClellan Wildfire Training



A group of 21 Korean forest fire officers and assistant directors pose in front of the forest supervisor's office in Placerville, CA, with Forest Service employees. Photo by John Heil, III, Forest Service.

Center, the delegation also visited the Cal Fire Aviation Facility, the Sacramento County Office of Emergency Services, and the California Office of Emergency Services in Sacramento. On their final day, the group went on the road for a site visit of the 2004 Fred Fire near Kyburz, CA. They made a stop at the Big Hill Fire Lookout Tower, viewed a Fuels Reduction Project, learned about the operations of a forest fire cache, and ended their tour at the Camino Interagency Dispatch Center where the delegation received an overview of the Fire Safe Council Program and the Fire Prevention Program

used on the Eldorado National Forest.

The Korean delegation enjoyed checking out all the various equipment used at the Forest Fire Cache in Camino, CA, where they also were able to get a full tour of a fire engine.

As stated by Trudie Mahoney, Region 5 cooperative fire assistant, "It was a wonderful training event, the Koreans really appreciated all of our time and effort. Once again, the Forest Service family (and partners and cooperators) did an outstanding job of showcasing our work." ■

John C. Heil, III, is the Pacific Southwest Region media officer. He has worked for the Federal Government in Public Affairs, Communications, and Broadcasting for the past 11 years.

INTERNATIONAL COOPERATION IN WILDLAND FIRE MANAGEMENT: THE GLOBAL WILDLAND FIRE NETWORK



Johann Goldammer

Are Wildland Fires Increasing Globally?

During the last decade, many countries have experienced extremely severe wildfires and wildfire episodes. Two general assumptions have been repeatedly communicated by the media and seem to be accepted by the public: (a) a trend of a global increase in the occurrence and destructivity of forest fires exists, and (b) this trend is a precursor or indicator of global climate change. A closer look at these assumptions reveals, however, that these assumptions are difficult to prove because of the lack of knowledge on the extent of historic fires and nonexistence of a comprehensive and reliable database of contemporary vegetation fires. Only with such data can the question of whether the extent of and degree of destruction we are currently experiencing from vegetation fires has increased or decreased when compared to historic times be proven. Furthermore, more quantitative and qualitative information is needed on the occurrence of fires in those ecosystems that are fire dependent or fire tolerant. Hundreds of millions of hectares of tropical and subtropical savannas and open forests, and coniferous forests of the temperate and the northern boreal zones, are quite well adapted to natural and even human-influenced fire regimes.

Johann Goldammer is the coordinator at the Global Fire Monitoring Center, Max Planck Institute for Chemistry, Freiburg, Germany.

The incidence of fires burning under extreme conditions and affecting previously nonflammable ecosystems may serve as indicators of how the world would look like in a scenario in which climate change has gained momentum

Growing evidence exists, however, to suggest that the accumulated effects of population growth, land use, deforestation, desertification, industrial development, and fossil fuel emissions have created conditions that make ecosystems and humans more vulnerable and less resilient to fire. Extreme fire weather episodes have occurred over the last decade as a consequence of interannual climate variability. Land use fires and wildfires have been widely observed in ecosystems that were historically not considered to be flammable at all—e.g., the tropical rain forests or the swamps and wetlands in most continents. The incidence of fires burning under extreme conditions and affecting previously nonflammable ecosystems may serve as indicators of how the world would look like in a scenario in which climate change has gained momentum—a world in which extreme weather episodes, notably drought, will increase the likelihood of occurrence and

destructivity of vegetation fires. This trend is expected to go along with post fire secondary disasters—notably those caused by extreme precipitation events—resulting in flooding, erosion, landslides, and the general impoverishment of forests and other lands. The long-term effects of fires that result in ecosystem degradation are leading to the depletion of terrestrial carbon, thus constituting one of the driving agents of disturbance of global biogeochemical cycles, particularly the global carbon cycle.

These expected trends are challenging the international community to address the problem collectively and collaboratively.

Global Considerations: Development of a Global Alliance

In recognition of the significant impacts of vegetation fires on the global environment, economies, and society, and the role of natural and anthropogenic fire as an important factor in maintaining stability, biodiversity, and functioning of some ecosystems, several international consultations during the 1990s, including the 2nd International Wildland Fire Conference in 1997, recommended that a group and mechanisms be formally established under the auspices of the United Nations (UN) to facilitate international cooperation in addressing global fire needs (GFMC 2003a).



The most recent consultation of the UNISDR Wildland Fire Advisory Group was held at the Global Fire Monitoring Center (GFMC) in July 2008 with representatives from the regions of the Global Wildland Fire Network (Australia, Austria, Canada, Chile, Costa Rica, Cuba, Macedonia, Nepal, South Africa, United States of America) and the United Nations and International Organizations (Food and Agriculture Organization, Global Fire Monitoring Center, International Association of Fire and Rescue Services, International Tropical Timber Organization, UN International Strategy for Disaster Reduction). Photo by Johann Goldammer, GFMC.

In response to this recommendation and the need for implementing the strategic goals of the UN Convention to Combat Desertification, Convention on Biological Diversity, the UN Framework Convention on Climate Change, and the Ramsar Convention on Wetlands, the Global Fire Monitoring Center (GFMC) was founded in 1998, aimed at providing a global fire monitoring system and an interface between the fire science community, fire managers, and policymakers.

This step was followed by the creation of a dedicated international and UN interagency platform under the auspices of the

UN International Strategy for Disaster Reduction (UNISDR). Following a proposal of the GFMC and the International Union for Conservation of Nature (IUCN), a working group on Wildland Fire was established in 2001 under the auspices of the UNISDR Inter-Agency Task Force for Disaster Reduction. This working group was coordinated by the GFMC and operational until 2003.

The working group provided an international platform and forum with the overall aim of bringing together the technical members of the fire community and the authorities concerned with policies at national to international levels to

realize their common interests and commitments in fire management on a global scale. The working group examined actions related to international collaboration, capacity building, and human resource development; reviewed mechanisms to support cooperation in forest fire management at bilateral, regional, and international levels; established intercountry agreements aimed at sharing resources, personnel, and equipment; and examined components of such intercountry agreements, including overall logistical, policy, and operational level considerations. Most importantly, the Working Group initiated the establishment of the UNISDR Global Wildland Fire Network (GWFN)

under which Regional Wildland Fire Networks would play a key role in developing partnerships and cooperation in fire management between countries.

In 2003, the International Wildland Fire Summit, an informal summit organized in conjunction with the 3rd International Wildland Fire Conference and attended by representatives from 34 countries and 12 international organizations, recommended principles and procedures for international cooperation in fire management. Furthermore, the summit recommended pursuing the international policy dialog through the Regional Wildland Fire Networks organized under GWFN and coordinated by the UNISDR Wildland Fire Advisory Group (WFAG) (GFMC 2003b). In May 2004, the GFMC, Food and Agriculture Organization (FAO), UNISDR, and the Global Observation of Forest and Land Cover Dynamics drafted a paper, “Framework for the Development of an International Wildland Fire Accord” (GFMC 2003c).

Regional consultations in 2004 recommended the development of informal partnerships, joint projects, and formal agreements between government and nongovernmental institutions to enable nations to develop sustainable fire management capabilities. In 2004, Food and Agriculture Organization, WFAG, and GWFN proposed the development of a nonlegally binding International Wildland Fire Accord to the FAO Ministerial Meeting on Forests and the 17th Session of the FAO Committee on Forestry (COFO) in 2005. The Ministerial Meeting and COFO 2005 rejected the proposal

of an “accord.” The ministers and forestry administrations, however, called on FAO, in collaboration with countries and other international partners, including the UNISDR, to develop a “strategy to enhance international cooperation on wildland fires,” that advances knowledge, increases access to information and resources, explores new approaches for cooperation at all levels, and develops “voluntary guidelines” on the prevention, suppression, and recovery from forest fire (FAO 2005a and 2005b).

Today, we can look back on two decades of progress.

In response, FAO coordinated the development of a Strategy to Enhance International Cooperation in Fire Management in 2006. The four elements of the strategy were presented to the 18th Session of the FAO Committee on Forestry in March 2007 and the 4th International Wildland Fire Conference held in Seville, Spain, in May 2007, and endorsed by representatives of government institutions and fire management organizations, respectively.

Today, we can look back on two decades of progress. Starting with the International Wildland Fire Conferences, and spurred on by an

apparent increase in fire activity with severe impacts, several important activities brought us closer and closer to a truly global community. International organizations, such as the ISDR and the FAO, have focused attention on these issues and provided guidance with the International Strategy and the Voluntary Guidelines.

There is much to do, but there is also an experienced cadre of people who are working to bring solutions to all corners of the globe. The establishment of the GWFN demonstrated that the international community can come together and make a difference in developing strategies, policies, and organization to address this important issue.

Reference

- FAO. 2005. Ministerial Meeting on Forests. <<http://www.fao.org/forestry/site/26480/en>>. (September 2, 2008).
- FAO. 2005b. 17th Session of COFO. <<http://www.fao.org/forestry/site/2960/en>>. (September 2, 2008).
- GFMC. 2003a. International Wildland Fire Summit Background Document. <<http://www.fire.uni-freiburg.de/summit-2003/Wildlandfire-97%20Outputs.pdf>>. (September 2, 2008).
- GFMC. 2003b. International Wildland Fire Summit. <<http://www.fire.uni-freiburg.de/summit-2003/introduction.htm>>. (September 2, 2008).
- GFMC. 2003c. Framework for the Development of the International Wildland Fire Accord. <<http://www.fire.uni-freiburg.de/GlobalNetworks/Global-Wildland-Fire-Framework-12-April-2005.pdf>>. (September 2, 2008). ■

Fire Management Today would like to extend a Special Thank You to Johann Goldammer, the coordinator at the Global Fire Monitoring Center (GFMC), Max Planck Institute for Chemistry, Freiburg, Germany. In addition to contributing articles for the two issues—68(3) and 68(4)—on International Fire Management, Goldammer facilitated access to numerous pictures and articles. Much of the success of these two issues can be contributed to GFMC and Johann Goldammers’ unlimited knowledge and willingness to help.

FIRE MANAGEMENT STRATEGY

Jim Carle



When people think of the Food and Agriculture Organization of the United Nations (FAO), headquartered in Rome, Italy, the first thing that comes to mind may be cultivation, farming, and perhaps grazing and emergency food assistance—activities that provide food and livelihoods throughout the world. What may not be obvious is that the FAO also has Fisheries and Forestry Departments that provide the same type of international support for these activities. In fact, the Code of Conduct for Responsible Fisheries reportedly is translated into more languages than any other FAO-published document.

The Forestry Department includes an active Fire Management group made up of permanent staff and a cadre of experts who work on special activities and advisory groups. The Fire Management Web site offers a range of publications that include fire assessments (updated every 5 years) from all parts of the world and a glossary of fire terms in English, Spanish, French, and German. The Fire Management group supports fire organizations by financing fire-related projects in the United Nation's 163 member countries. Several FAO regional offices, particularly the office in Santiago, Chile, are also active with fire-related projects.

The member countries interested in forestry formed and chartered the Committee on Forestry (COFO)

Jim Carle, Officer in Charge Forest Resources Development Services, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy.

The Fire Management group supports fire organizations by financing fire-related projects in the United Nation's 163 member countries.

to advise the FAO on forestry-related issues. During its biannual meetings, COFO receives reports on FAO forestry activities and makes specific recommendations for FAO support work. FAO also established six regional Forestry Commissions to assist members in their regions to develop and implement policies and practices for sustainable forestry. These commissions also meet biannually on alternating years from COFO, and their recommendations are submitted to FAO through COFO.

Rome 2005

In March 2005, the FAO Ministerial Meeting on Forests and the 17th COFO Session called on FAO—in collaboration with its member countries and other international partners, including the United Nations International Strategy for Disaster Reduction (UNISDR)—to develop a Strategy to Enhance International Cooperation in Fire Management. The meeting provided its participants with advanced knowledge, increased access to information and resources, and new approaches for cooperation at all levels.

Participants noted the increase in fire size and frequency on a global level and requested that this strategy should include voluntary guidelines that would assist firefighters deployed to an international

incident. These guidelines would support those firefighters with information about preventing, suppressing, and recovering from wildland fires while cooperating within a foreign country. This topic is not new; the request dates back to the 3rd International Wildland Fire Conference and the International Wildland Fire Summit in 2003.

Madrid 2006

To meet the request to develop a strategy and guidelines, FAO coordinated a wildland fire international expert consultation in Madrid, Spain, in May 2006 at which members deliberated and agreed on the components that should be included in the Strategy to Enhance International Cooperation in Fire Management.

The strategy is primarily tailored for land use policymakers, planners, and managers, including governments, the private sector, and nongovernmental organizations (NGOs). The key components should be thought of as “tools” that assist managers in recognizing legal conditions. Identifying the need for policies and regulations would also be helpful as part of an overall strategic plan. The plan would be important for integrating and providing a cross-sector approach to fire management.

Strategy To Enhance International Cooperation in Fire Management

The overarching Strategy to Enhance International Cooperation in Fire Management includes the following components (all found on the FAO Fire Management Web site: <<http://www.fao.org/forestry/firemanagement/en/>>):

- A Fire Management Global Assessment to assess and analyze fire occurrence and management in each region of the Global Wildland Fire Network, with global conclusions and recommendations (<<http://www.fao.org/docrep/009/a0969e/a0969e00.htm>>);
- The 2006 Fire Management Review of International Cooperation with detailed and prioritized themes, key actors, activities, and scope for future international cooperation



tion in fire management (<<http://www.fao.org/docrep/009/J9406E/J9406E00.htm>>);

- Fire Management Voluntary Guidelines that outline the principles and strategic actions necessary for policy, planning, and senior management decisionmakers to achieve more integrated and cross-sectoral approaches

to fire management (<<http://www.fao.org/docrep/009/j9255e/j9255e00.htm>>); and

- The Fire Management Actions Alliance group to review and implement the Voluntary Guidelines, enhance international cooperation, and share knowledge and technology (<<http://www.fao.org/forestry/site/firealliance/en/>>).

The Scope

The strategy's scope is to offer guidance and information about positive and negative social, cultural, environmental, and economic impacts of natural and planned fires in forests; woodlands; rangelands; grasslands; and agricultural, rural, and urban landscapes.

The other aspect of the strategy guides fire managers to answers regarding monitoring, early warning, prevention, preparedness (international, national, subnational, and community), safe and effective fire initial attack, and postfire landscape restoration.

The Process

Representatives for multiple interest groups from several countries

The International Wildland Fire Conference in Seville, Spain, drew in more than 1,500 fire management specialist.

reviewed the Strategy to Enhance International Cooperation in Fire Management. As part of that process, they also formulated and reviewed the strategy components. Technical core group meetings in March, July, and September 2006, and an expert consultation in May 2006, provided working sessions for fire specialists from governments, private sector associations, and NGOs and intergovernmental

organizations (IGOs) to prepare and revise the draft documents.

The 2006 Fire Management Global Assessment and the Fire Management Review of International Cooperation provided valuable baseline information that highlighted and prioritized technical and geographical focus areas necessary to craft the Voluntary Guidelines and establish the Fire Management Actions Alliance.

Final Product

The Fire Management Strategy and Voluntary Guidelines were presented to the six FAO Regional Forestry Commissions and at the UNISDR 2006 fire management meetings. The FAO provided copies of the draft Fire Management Voluntary

Guidelines for fire management stakeholders to analyze and provide feedback. In March 2007, fire experts presented the final draft of the Voluntary Guidelines to the 18th COFO Session in Rome, Italy. The final COFO report of the 18th Session welcomed the development of the Voluntary Guidelines for a multi-interest group process and contained the following requests and recommendations:

- Requested FAO, in collaboration with the UNISDR Global Wildland Fire Network and other partners, to finalize the Strategy to Enhance International Cooperation in Fire Management;
- Recommended that members and forestry stakeholders make use of the Voluntary Guidelines;
- Recommended that FAO and its partners facilitate implementation of the Voluntary Guidelines; and
- Recommended that the Voluntary Guidelines be maintained as a living document, to be updated and enhanced through feedback from implementations.

Following the advice of COFO, the FAO staff officially launched the Voluntary Guidelines and Fire Management Actions Alliance at the 4th International Wildland Fire Conference in Seville, Spain, in May 2007. This international gathering of more than 1,500 fire management specialists was an opportune venue to launch the strategy. The participants recognized the conference as a prime setting to foster international partnerships in its implementation and, in particular, reach out and strengthen fire management capacities and capabilities in developing countries. The Fire Management Actions Alliance was a response to these expectations.

The FAO's collaborating partners that provided input on an in-kind basis included members of the Forest Service; Global Fire Monitoring Center; UNISDR Global Wildland Fire Network; The Nature Conservancy; the Government of Spain; and the International Liaison Committee of the 4th International Wildland Fire Conference. A broad stakeholder group of experts representing governments, the private sector, IGOs, and NGOs also contributed their valuable time.

Voluntary Guidelines

The Voluntary Guidelines provides a nonlegally binding framework of priority principles and strategic actions for integrated and cross-sector approaches to balance the social, cultural, environmental, and economic dimensions of fire management and prescribe key actions for the fire planning and management. This framework provides a guide to the range of action needed for a holistic and sustainable fire management program, starting with the legal basis and policy support through planning, prevention, suppression, the use of fire, monitoring, and rehabilitation of burned areas.

Fire Management Actions Alliance

The alliance was launched in May 2007 during the 4th International Wildland Fire Conference in Seville, Spain, with 40 founding members. Additional membership applications are under consideration.

The Fire Management Actions Alliance is an international partnership tasked with:

- Reviewing and updating the Voluntary Guidelines based on implementation experiences;

- Encouraging stakeholders at all levels to adopt and use the Voluntary Guidelines;
- Reviewing experiences from applying the Voluntary Guidelines; and
- Strengthening international cooperation in fire management.

Any organization, agency, or group willing to adhere to the alliance's charter can apply for membership. An advisory group to the Secretariat considers membership applications.

Membership implies a commitment to the following tenets:

- Promote the Voluntary Guidelines;
- Use the Voluntary Guidelines when implementing fire management activities;
- Share knowledge, information, and data on activities and progress in fire management, with reference to the Voluntary Guidelines; and
- Enhance international cooperation in fire management.

Applications for membership from a wide range of organizations involved in different aspects of fire management are invited.

FAO, through its Forest Management Division, in collaboration with the UNISDR Global Wildland Fire Network and with support of its members, provides communications, coordination, and related services to the alliance through the Secretariat. The Secretariat operates with voluntary contributions from members.

Any queries related to these fire management tools and their application can be directed to Jim Carle (Jim.Carle@fao.org) or Peter Van Lierop (Pieter.VanLierop@fao.org). ■

WHAT IS A WILDLAND FIRE? THE IMPORTANCE OF CLEAR TERMINOLOGY



Denny Truesdale

The terms we use to describe our work are important in several ways. As public servants, we use the terms to define our scope of endeavor and provide the public with a clear understanding of what we do and its importance to them.

Over the past few years, fire management agencies have tried to move into a broader definition of wildland fires. At first, even Smokey Bear said, “Only you can prevent forest fires.” Because preventing all unwanted fires—range, grass, interface, and fires in other areas—is important, Smokey now uses the

Common translations for forest fire include *incendio forestal*, *waldbrand*, *feu de foret*, *incendio forestais*.

term “wild fire.” This distinction is critical if we are to convey the message that not all fires are bad—only unwanted, uncontrolled, and damaging fires. Wildland fire also includes beneficial fire.

Denny Truesdale recently retired from the Forest Service where he served as a fire management specialist for the Washington Office State and Private Forestry Deputy Area.

The term “wildland fire” is becoming commonly used and generally understood in the United States.

The term “wildland fire” is becoming commonly used and generally understood in the United States. Canadians, Australians, and New Zealanders are comfortable with the term in professional circles, even if this term is not broadly used in public. Several global organizations, such as the United Nations-International Strategy for Disaster Reduction Wildland Fire Advisory Group and the Global Wildland Fire Network, use the term. The next in a series of international fire conferences is called the 5th International Wildland Fire Conference.

Why the Confusion in Terms?

The fire experts who developed the Food and Agriculture Organization of the United Nations (FAO) Fire Management Strategy and Voluntary Guidelines included native speakers from France, Spain, Chile, Russia, Thailand, Germany, and several English speaking countries. Wildland fire was used as the initial title, but the group agreed that this term would not translate well. In almost all cases, the translation of wildland fire became “forest fire” or *incendio forestal*,

waldbrand, *feu de foret*, or *incendio foestais* in Spanish, German, French, or Portuguese. The final decision was to use the term “fire.” “Fire management” was used to differentiate the work from structural fire guidelines because structural fires are not managed.

This issue becomes important when working together across boundaries and languages. Many countries have laws that restrict or ban prescribed fires (another awkward term—the FAO guidelines use the term “planned fires”). In some areas, a major cause of wildland fires is agricultural fires that escape and turn into damaging wildfires. A set of guidelines for forest fires probably would not be even considered as a tool for managing escaped agricultural burns.

Thus, the proper term is important; however, when the term is used in an international or global context, one that can be translated clearly is even more important. Acceptance in the United States of wildland fire took time and continues to evolve. Global acceptance is still far in the future. ■

FOREIGN EXCHANGE— A GREAT INVESTMENT



Gwen Beavans, Donna Deaton, Brenda Schultz

There has been a history of large fires in Greece. Recently, however, fires have been increasing, specifically fires caused by arson, smoking, and fire-use for agricultural purposes. Wildfires threaten homes, people, and natural resources, particularly valuable forestry land in the country. Many of the wildfires are located in or around urban-interface areas, the area where cities and urban areas are adjacent to wildlands. The terrain is very mountainous and, in the valleys between the cities and mountains, the land is used for agricultural purposes such as olive, orange, and pistachio groves. Burning the land to create plantations, prepare the field for farms, and create grazing areas for sheep creates a very high risk in these areas. Preventing wildfires and reducing relative economic and environmental losses are issues facing the country and the Hellenic Fire Service.

The 2007 wildfire season in Greece was the worst on record, killing

The 2007 wildfire season in Greece was the worst on record, killing 76 people and causing significant human, agricultural, and economic damages.

76 people and causing significant human, agricultural, and economic damages. Because of the widespread damage, the Greek government declared a state of emergency. To show support and allow for U.S. emergency assistance to Greece, the U.S. Embassy in Athens declared a disaster situation. The U.S. Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA) provided funds to address immediate short-term needs, including the

provision of additional emergency relief supplies and fire fighting equipment, as well as to initiate a longer term program to building Greek fire management and disaster response capacities.

Stop Them Before They Start

The country of Greece, particularly the Hellenic Fire Service through programs supported by the USAID, requested a team from the Forest Service visit Greece for two purposes: (a) to study techniques utilized by the Greeks for fire investigation and fire prevention and (b) to instruct the Greek Fire Service and Forestry Department personnel about fire investigation and fire prevention techniques used in the United States.

A team of three Forest Service specialists (two special agents and one fire prevention education specialist)

Gwen Beavans has worked with the Forest Service since 1986. Her career has included being a forester, a silviculturist, an interpretive and education specialist, information officer, and team leader. Brenda Schultz has been a special agent with the Forest Service for the last 19 years. She is a certified wildland fire investigator and an instructor in wildland fire origin and cause determination and wildland fire complex case development. Donna Deaton is a certified wildland fire investigator and a lead investigator on Serial Wildland Arson Investigations. She has worked in Law Enforcement and Investigations for 22 of her 30 years with the Forest Service in California. She is currently stationed on the Eldorado National Forest.



The U.S. team visits the Chalkida Fire Station. Photo by Gwen Beavans, Forest Service.

traveled to Athens, Greece, May 3-16, 2008, to study fire investigation and fire prevention techniques used by the Greeks and to instruct the Greek Fire Service and Forestry Department personnel about fire investigation and fire prevention techniques used in the United States.

The U.S. team spent 1 week investigating sites, visting with various agencies, and discussing prevention and investigation techniques used. The second week was spent instructing components of National Wildfire Coordination Group (NWCG) fire investigation and fire prevention courses (FI-210, FI-310, P-301 and Fire Prevention Strategy Development, respectively).

As part of the longer term capacity-building effort, the Forest Service and the Government of Greece have initiated a 2-year cooperative program to address emergency and wildfire management needs in Greece. The Forest Service is collaborating with several Ministries in Greece, including the Hellenic Ministry of Interior; the Hellenic Ministry for the Environment, Physical Planning, and Public Works; and the Hellenic Ministry of Rural Development & Food, to sup-



Mapping risks, hazards, and values in the Athens area. Photo by Gwen Beavans, Forest Service.

Resources left for the Hellenic Fire Service and Forestry Department

- Two Fire Investigation Kits (Fire Service only)
- CD of all training programs provided in workshop
- NWCG Fire Prevention Education workbooks
- FireWise landscape training videos
- Samples of fire prevention and FireWise products
- Complete set of FI-110 and FI-210 Fire Investigation training supplies, hard copies of Instructor and Student Manuals, as well as CD versions.

port their efforts to mitigate damage from future fires and improve capacity in wildfire suppression, prevention, and rehabilitation in Greece.

This joint cooperative effort between Greece and the United States to further the awareness and skills in Wildland Fire Investigation and Prevention Education

Techniques was considered a success. It was an educational experience for all involved and has even led to advancements for some of the Hellenic Fire Service employees who were involved in the logistics of the workshop. This collaborative effort provides a good foundation for future training opportunities, both in Greece and in the United States. ■

Getting Things Done

The following tasks were assigned to the U.S. team based on objectives developed and identified by the Forest Service International Programs and the Fire and Aviation Management Staff of the Washington Office, the U.S. Embassy, the Hellenic Fire Service, and the Hellenic Forestry Department in Greece.

- Task 1:** With the cooperation of the Hellenic Fire investigators and Hellenic Fire Service, review some of the recent wildland fires in the Attica area and document the procedures they use to investigate the origin and cause of these fires.
- Task 2:** Provide training on the procedures and methodologies used to investigate the origin and cause of wildland fires.
- Task 3:** Review the fire prevention education strategies and techniques currently utilized by the Hellenic Fire Service, the Forestry Department, and other partner agencies.
- Task 4:** Provide training on fire prevention planning and mapping, fire prevention strategies for specific fire-causes, and fire prevention education techniques and product development for targeted audiences. Provide an overview of FireWise materials and Fire Prevention Education Teams.
- Task 5:** Learn what further fire prevention education training is desired by these agencies and what could be provided in this arena during a U.S. field study or training program.

GREEK FIREFIGHTERS AND FOREST SERVICE LITTLE TUJUNGA HOT SHOTS CAPTAIN MEET GOVERNOR SCHWARZENEGGER



By John C. Heil, III

As part of the National Response Framework's Emergency Support Function, the United States requested assistance from Greece in fighting the fires in California. A team of Greek firefighters was sent to work with their American counterparts from July 15 to August 9.

These firefighters received a grand sendoff on August 7, 2008, with congratulations from California Governor Arnold Schwarzenegger. Governor Schwarzenegger presented the Governor's coin to Panagiotis Provos, Georgios Kafkas, Ioannis Kolovos, Georgios Pasoulas, and Konstantinos Tsakiris, along with Oscar Vargas, one of the captains of the Little Tujunga Hot Shot

John C. Heil, III, is the Pacific Southwest Region Media Officer. He has worked for the Federal Government in Public Affairs, Communications, and Broadcasting for the past 11 years.



Photo courtesy of Governor Schwarzenegger's office.

crew. The Governor thanked each firefighter for his efforts in fighting the southern California fires. The crew also presented the Governor with a pin. "Everyone was thrilled to meet the Governor," said Vargas. Governor Schwarzenegger told the Greeks how much he appreciated their dedication to firefighting service.

"This was a wonderful opportunity," said Crew Superintendent Robert Garcia who heads up the Little Tujunga Hot Shots. "I'm very pleased they were able to meet the Governor. We made sure they got around and saw a lot of the West Coast when they had some time off." ■

COMMUNITY-BASED FIRE MANAGEMENT



Peter Van Lierop

African Fire Managers Embrace a Community-Based Approach

Annually, half the world's fires occur in Africa. Because 95 percent of all fires are human-caused, instead of only increasing the suppression capacities and capabilities or tightening fire legislation, addressing the reasons for these fires is a necessity.

Fortunately, Africa's long-term fire management programs have resulted in a substantial decrease in the number and extent of unwanted fires. Fire managers have worked hard to raise local awareness by providing training to a wide range of participants. By providing fire management training and outfitting communities with the proper tools, rural Africa is now better equipped to manage fires at the landscape level—which, in turn, contributes to a sustainable forest.

Living With Fire

Fire certainly cannot be excluded from African society because of its entrenchment in daily life. A community's relationship with fire is often based on a variety of themes: socioeconomic issues, commercial activities, wildland fire impacts, and public health and safety.

Fire experts advocated Community-Based Fire Management (CBFiM) programs by first stepping back and observing individual communities and other entities that may influence the use and management of

Peter Van Lierop is a Fire Management Forestry Officer, Forest Resources Division at the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy.

Because 95 percent of all fires are human-caused, addressing the reasons for these fires, rather than only increasing the suppression capacities and capabilities or tightening fire legislation, is imperative.

the land or resources and noting how each approached fire management. After the experts assimilated this information, they were able to provide local fire managers with training to successfully implement CBFiM in their local areas.

Training for Better Management First in Africa

What started as a local effort soon became a larger endeavor when several African governments, including traditional and nontraditional leadership, came together with local communities, nongovernmental organizations, and other stakeholders to provide the first regional CBFiM training course.

Organized and sponsored by the Food and Agriculture Organization of the United Nations (FAO), the

Global Fire Monitoring Center, and the Regional Sub-Saharan Africa Wildland Fire Network, this course was conducted in October 2004 in Nelspruit, South Africa, attracting 21 wildland fire managers from 10 African countries.

The participants learned not only about managing their community's wildland fires, but also about fire use as a tool in agriculture, land clearing, beekeeping, hunting, cooking, and heating, with an emphasis on landscape-scale ecosystems and socioeconomic factors.

After completing the CBFiM course, participants qualify as CBFiM instructors and become change agents—a one-person reference center advocating and facilitating community-based fire management—in their own communities.

Results From the First Regional CBFiM Training Course

- Introduced where and how to obtain regional or international wildland fire management assistance;
- Determined the basic principles and practices for successful CBFiMs;
- Highlighted fire authorities as the most important factor in local communities successfully using fire as a management tool at the ecosystem level;
- Integrated planned burning techniques and principles in community activities; and
- Demonstrated how fuel breaks can be used in critical areas through planned fire uses.

CBFiM Taught Globally

Encouraged by the African workshop's success, FAO and The Nature Conservation (TNC) reorganized and adapted the CBFiM coursework for fire managers in Central and South America. A 2005 training held in Rio Bravo, Belize, was attended by 21 participants from 10 countries.

In 2007, the FAO and TNC once again reorganized the course to instruct CBFiM in the Asia Pacific Region at Balikpapan, Indonesia. In Balikpapan, a city located on the east coast of Borneo, the workshop attendees worked together to develop a synthesis of their experiences in community-based fire prevention, suppression, and fire use and the

Fire experts advocated Community-Based Fire Management (CBFiM) programs by first stepping back and observing individual communities and other entities that may influence the use and management of the land or resources and noting how each approached fire management.

effects of each experience to forest lands and vegetation ecosystems.

Their conclusions pointed towards marked differences in political, social, cultural, ecological, and economic values and individualized policies. Because the differences were so profound in each country, province, district, and community, providing a one-size-fits-all

CBFiM framework to meet individual socioeconomic and ecosystem needs was difficult.

Inspired by the course's reception in other regions, Balikpapan participants enthusiastically grasped the CBFiM concepts, employing its principles and practices in managing their area's landscape.

Key groups in southern Africa, Central and South America, and the Asia Pacific Region are the primary forerunners in implementing community education and training, both of which are essential to addressing human-caused and wildland fire issues on a local level. ■

Inspired by the course's reception in other regions, Balikpapan participants enthusiastically grasped the CBFiM concepts, employing its principles and practices in managing their area's landscape.

SOUTH AFRICA TO HOST WORLD WILDFIRE CONFERENCE

Alex Held

The 5th International Wildland Fire Conference will be held in South Africa in May 2011. This announcement was made at the closing of the 4th International Wildland Fire Conference in Seville, Spain, which brought together more than 1,500 delegates from 88 countries.

Alex Held is the coordinator of AfriFireNet and a senior staff member for Working on Fire (WoF) International, Nelspruit, South Africa.

This conference is held under the auspices of the United Nations and the European Commission. Participants represent governmental and civil agencies from all over the world.

The conference, hosted by AfriFireNet and the Working on Fire (WoF) program, will showcase the southern Africa wildfire management programs. The conference will most likely be held in the Northern Province so that delegates would be able to see the impact of fires on

vegetation similar to that found elsewhere in Africa and the world.

AfriFireNet and WoF will manage the conference along with the organization's managers and fire-fighters. Aerial firefighting displays, live fires, and the smell of smoke will surround the event and make it clear to attendees that this is not just another conference.

Watch for further announcements and start planning your trip to South Africa in May 2011! ■



WORKING ON FIRE: A SOUTH AFRICAN SOLUTION TO FIGHTING POVERTY AND FIGHTING WILDFIRES



Karen Rutter

One relationship has spanned the Atlantic Ocean for more than a decade and has spawned one of the most successful firefighting programs on the African continent.

Working on Fire (WoF) is a South African government-funded, multipartner organization focused on integrated fire management and wildland firefighting. But its roots go back to the United States, where for many years officials from the Forest Service shared their expertise with visiting South African firefighters.

Inspired by U.S. firefighting programs, the South African firefighters eventually developed their own version to suit their landscape, both physically and economically. The program has been phenomenally effective, so much so that firefighters from the United States now want to visit South Africa to observe and learn. Currently, both countries are engaged in a training exchange in what is becoming a satisfying reciprocal relationship.

“I started visiting North America some 10 years ago with the intent to study the firefighting and management systems in place,” says Johan Heine, WoF general manager. “At the time I was a manager with the South African Forest Fire Association [FFA is a private sector wildland firefighting initiative], and I was very keen to see what kind of

Working on Fire (WoF) is using the Incident Command System exclusively in the agency. The South African Incident Command (ICS) Working Team was formed in March 2004, following the 3rd International Wildland Fire Conference in Sydney, Australia, in 2003. Subsequent to the conference recommendations, South Africa decided to adopt ICS for fire management. Since 2003, a group of Forest Service personnel is visiting South Africa annually to present Medium and Advanced ICS training to WoF and its partners.

The South African ICS Working Team is made up of the Fire Protection Associations, Forest Industry, National Parks, Cape Nature, Working on Fire, Structural Fire, and Disaster Management. The purpose of the ICS Working Team is to expand operational cooperation and coordination of veld, forest and prescribed fire operations with the utilization of the ICS. The South African ICS Working Team developed ICS standards for South Africa veld and forest fire organizations: *The Veld, Forest and Prescribed Fire Qualification System Guide*.

infrastructure had been built up by the [Forest Service] and associated agencies.”

After several years of regular visits, the FFA was awarded a tender by the South African government’s Department of Water Affairs and Forestry to implement an aerial and ground resource plan for fighting wildfires. Heine and his South African colleagues arrived at a strategy that they felt could be practically applied in their own country. WoF was officially launched in 2003, combining sound land management principles and best practice wildland firefighting expertise with the need to create jobs and develop skills.

The project has proved an astounding success, winning awards for its innovative approach and praise for its effective design. Essentially, it is

a program based on international principles with a distinctly indigenous twist. For instance, unlike in the U.S firefighting squads often made up of seasonal workers, WoF employs its firefighters on a long-term basis.

“What we did was look at what works and then adapted it,” says Val Charlton, WoF’s advocacy and awareness manager. “It would have been pointless to reinvent the wheel, not to mention the cost in terms of time and effort.”

A recent visit to the Firewise Communities Conference in Denver, CO, provided further encouragement and inspiration, as WoF is also tasked with rolling out a national fire awareness program. “Once again, we have been able to learn from the United States,” commented Charlton. Firewise South

Karen Rutter is a correspondent for the Working on Fire program in South Africa.

Teams are taught to look out for themselves and for each other and that the life of a WoF employee is paramount. At the same time, they need have the discipline to maneuver at maximum capacity—and that means being able to function as a well-drilled unit.

Africa rollout commenced in the Western Cape summer fire season and extended to the northern parts of South Africa during 2007.

“There are a lot of similarities between the U.S. and South Africa, which helped the process,” noted Charlton. “The American prairies are like our grasslands. And areas such as California and the Western Cape are very much alike—you can compare chaparral and fynbos, for example. Both burn like crazy—and they need to be allowed to burn as they are fire adapted ecosystems, but both areas have an extensive and highly populated wildland-urban interface zone.”

And when they do burn, there’s trouble. In South Africa, as in the United States, fires regularly destroy large tracts of land including farms and plantations, endangering lives and properties in the process.

Of course, there are differences, too. The United States has vast tracts of natural, slow growing coniferous forests, whereas sub-Saharan African savannas and grasslands benefit from short fire cycles of a few years.

Training in Diversity

Sociologically, there are other differences. While the end of race discrimination and the establishment of a new democracy has successfully transformed many sectors within South Africa, the country is grappling with a very high unem-

ployment rate. Figures vary, but average at around 30 percent of the population. Of those without jobs, many are young with little or no career options.

With this group in mind, WoF was established as a poverty relief program that has recruited and trained previously unemployed men and women into a national resource of more than 1,000 proud firefighters to date. This includes 47 teams of 22-person hot shot crews and 100 crew leaders who are deployed at 47 fire bases in eight fire-prone regions across the country. Primarily the crews act as hand crews and use mainly hand tools to accomplish their work.

Of the recruits who have been trained, 95 percent are between 18 and 35 years old, 27 percent are women and 77 percent are black

Africans. They are full-time employees, with a 1-year contract, which is renewed annually based on performance. The program lasts 3 years. Firefighters earn a basic wage of \$6 per day (ZAR42.50) per day. Type 2 crew leaders earn ZAR98.98 (\$14) and Type 1 crew leaders earn ZAR120 (\$17) per day. For many of the recruits, this is the very first time they have ever earned a regular salary.

The program was established under the umbrella of the Expanded Public Works Program, underpinned by South Africa’s National Veld and Forest Act of 1998 and the Disaster Management Act of 2002. The Working for Water Program of the Department of Water Affairs and Forestry funds the program at \$6.75 million (ZAR47.3 million) per year. Partnerships with the Department of Provincial and Local Government, the South African Air Force, South African National Parks, Provincial Disaster Management Authorities, and private forestry companies, amongst others, ensure substantial cost and efficiency benefits.

Apart from the ground crews, WoF comprises several other compo-



Passing out parade of Working on Fire wildfire fighters in Ermelo, South Africa. Photo by Bruce Sutherland, 2008

nents, including a team of aerial firefighting professionals, who operate helicopters, fixed wing bombers, and spotter aircraft. The aerial resources are coordinated locally, provincially and nationally, forming a pool available to support ground forces with initial attack actions. WoF also runs provincial operational centers, which coordinate the movements of all WoF ground and aerial resources. The operational centers supply long- and short-term fire weather forecasts daily, and coordinate the planning, reaction and suppression of fires in their areas.

The WoF Management and Operations

As a national organization, WoF requires management and operation structures that can function separately and independently. The enterprise is headed by a chief executive officer and five senior executive managers responsible for the individual portfolios of corporate services, finance, ground operations, air operations, and advocacy.

Reporting to the executive management team are nine senior managers responsible for the day-to-day running of the organization in areas such as human resources, training, and communications. Reporting to these managers are 8 regional managers, who liaise with 50 partner base managers regarding the daily operation of crews who are guided by a crew leader.

“In all, WoF employs just over 1,400 people nationally,” says Heine. Of these, it is the 1,056 firefighters who make up the most visible face of the organization, instantly identifiable at the scene of any major wildfire in their bright yellow uniforms. For many of the recruits, joining WoF has drastically changed their lives.



A Working on Fire bomber in action during training in Nelspruit, South Africa. Photo by Bruce Sutherland, 2008.

Task Reassignment

As well as tackling wildfires around South Africa, WoF assisted in fighting in more than 1,000 nationally in 2005 and took on new firefighting innovations in South Africa.

One of these is the Operation Firewatch Project, an early detection and rapid attack firefighting project currently being tested in Cape Town. This project uses forest firefighting techniques to suppress fires in slum areas. Fires are identified through strategically placed video cameras that send real-time images to a centralized computer monitoring center where trained personnel activate city ground forces and WoF aerial firefighting resources.

The cameras have proven extremely effective in quickly combating fires in informal settlements where homemade shacks are built very close to each other, often of highly flammable material, and burn fast and fiercely. The results of such fires are often devastating. More than 100 people died in nearly 2,000 informal settlement fires in Cape Town and surrounds during 2005. Over 8,000 housing

structures were destroyed, leaving 28,000 people destitute. The material cost to residents was conservatively estimated at around \$13 million (ZAR91 million).

Because informal settlements continue to grow, due to a formal housing shortage, the fires will also continue. According to a Central Statistical Services presentation in the April 2005 South African Parliament, informal housing settlements were home to an estimated 1.45 million households in 2001, with an expected 2-percent growth per year. Statistics show that shack fires are increasing.

“Fighting fires in informal settlements presents its own set of challenges,” says Heine. “Delays in initial reporting of fires, the intense heat generated by highly flammable building materials, tricky—sometimes impossible—access, and a lack of water hydrants are just some of the difficulties firefighters face.”

“While WoF focuses primarily on veld (rural) and wildland firefighting, there are overlaps in the way we tackle these fires and how informal settlement fires can be approached. Delivering water to a fire is the best way to quickly extinguish it. With a lack of water points in informal settlements, it makes sense to drop nontoxic foam to cool down an area so land-based firefighters can move in.”

When a fire has been spotted, firefighting methods are improved by the use of spotter aircraft, fixed-wing bomber aircraft, and helicopter assistance as a rapid aerial firefighting response, dropping Class A foam to contain and cool the fire.

It’s all a part of establishing a long-term, sustainable integrated fire management system in South

Africa. It's a system that features both private and public involvement, and is supported by various new pieces of legislation, such as the 1998 National Veld and Forest Fire Act. The act places the responsibility for the starting and spreading of a wildfire with the land user, and actively promotes the formation of local fire protection associations.

"We can't force people to form or join FPAS, which can make a huge difference in terms of cooperatively fighting wildfires—but we can encourage them," says Charlton. Education is extremely important in this respect—and, here too, WoF members play a role by giving talks and demonstrations to the public and helping their own communities to become more firewise.

In recognition of the essential service that WoF provides, the program received the prestigious Impumelelo Innovations Platinum Award last year, awarded to projects that are "innovative, sustainable, and replicable."

WoF will receive further national government funding of \$28 million (ZAR196 million) over the next 3 years to maintain its efforts in facilitating and implementing integrated fire management practice across South Africa. WoF will use this budget to:

- Create centers of excellence in 40 high fire-risk areas;
- Increase aerial and ground wildland firefighting;
- Provide general education and awareness about wildland fires;
- Train firefighters and build capacity;
- Facilitate cost-sharing partnerships;
- Improve national coordination of firefighting resources;
- Improve weather forecasting; and
- Reduce fuel.

Heine is understandably pleased with all of this, but says there is still much work to be done. "In the United States there are around 30,000 firefighters," he says. "A percentage of those are seasonal employees, but it's still a substantial figure. I reckon we need 5,000 permanent wildland firefighters in South Africa in order to function optimally. "We'll just keep going. It's been nothing but a success since we started, so we know we're doing something right."

Integrated fire management is a series of actions that includes fire awareness activities, fire prevention activities, prescribed burning, resource sharing and coordination, fire detection, fire suppression and fire damage rehabilitation at local, provincial and national levels to create a sustainable and well-balanced environment, reduce unwanted wildfire damage, and promote the beneficial use of fire.

High Training Standards

The training standards set by WoF meet and exceed the Forest Protection Units Standards. The program has adopted U.S. standards known as the "task book system," listing the tasks the candidate must be able to complete before he or she is regarded as competent.

Essential training takes place during a recruit's first year and includes standard firefighting procedures and safety rules, attack methods and tools, and how to handle equipment such as pumps and hoses.

Hot shot crews are provided with tools and personal protective equipment and taught how to use them. Training is thorough; for example, all teams have mop-up training and use cold trailing, handheld infrared heat detectors to ensure that fires

do not re-ignite because they were not properly extinguished.

There are daily physical training sessions and job-related lectures (on first aid and fire behavior, for example) as well as life skills courses covering issues such as personal banking and HIV/AIDS awareness.

There has been a very low attrition rate among recruits, with only a few people dropping out due to unforeseen reasons.

"There's a very strict code of conduct within the Working on Fire program, and our operation is military in style," says Heine. "It's very necessary in order for firefighters to perform in dangerous and stressful conditions."

Teams are taught to look out for themselves and for each other, and that the life of a WoF employee is paramount. At the same time, they need have the discipline to maneuver at maximum capacity—and that means being able to function as a well-drilled unit.

"Any breaches of discipline or regulations results in instant dismissal," says Heine. "We have a zero-tolerance policy. As anybody who fights wildfires knows, you cannot afford to ignore commands in a high-risk situation."

A strong sense of camaraderie has built up among the firefighters. Morale is high, and there is positive, friendly competition between hot shot crews. Heine credits the aspects of the program, for example its open-door policy at all levels of management and its clarity about conditions of employment. But there are other factors; one of the most important is the sense of pride that these firefighters, previously unemployed and disadvantaged, have in their work. ■

Women Working on Fire—Portraits of Success

Thirty percent of all Working on Fire (WoF) employees are female, perhaps one of the highest percentage of female firefighters in the world. The following provides an example how WoF influenced the life of two rural women.

Khomotso Moagi

Khomotso Moagi is a person one unflinchingly follows. Dead calm in a crisis, sure of her next step, well informed, and fit enough to be an Olympic athlete, she was a natural choice for recruiters looking for firefighters to join the government's WoF program. Yet not even Moagi could have foreseen how quickly she would move through the ranks of the newly developed firefighting program.

Now, nearly 4 years since joining WoF, the 27-year-old single mother from Bushbuckridge in Mpumalanga is the assistant national training manager with her sights set firmly on a national position.

"I always wanted to be a soldier but making my dream come wasn't as easy as I expected," she says. "It might still happen, but I have found my place in Working on Fire."

WoF has been quick to deliver opportunities. By May 2004,

Alex Held is the coordinator of AfriFireNet and a senior staff member for Working on Fire (WoF) International, Nelspruit, South Africa.

Moagi was made a level 2 crewleader, responsible for the lives of 22 crewmembers during fire deployment. Less than a year later, in February 2005, she was promoted to level 1. In August 2005, she moved away from the front line to become assistant national training manager.

Moagi grew up in the bustling settlement of Bushbuckridge near the western border of the Kruger National Park. Nearby are the vast pine forests that are the heart of South Africa's paper and pulp industry and easy tinder for fire.

It was these Mpumalanga pine forests that burned in a catastrophic blaze 2 years ago prompting President Thabo Mbeki to declare the province a disaster area.

"The forestry industry creates work for thousands of people and the impact of a fire for the community can be devastating," says Moagi, "I knew when I joined Working on Fire that the program could make a real difference in my community."

Phumza Matitiba

In the Eastern Cape village of Keiskammahoek near East London, a 32-year-old mother of four, Phumza Matitiba, was wondering where her life was heading. She had worked hard to pass matric at Zwelamandlovu High School where she was also a prefect. For a short time she had worked for the South African Defence Force—but since becoming a mother, her life had settled into the predictable routine

of cooking, cleaning, and looking after children.

"I want to become someone," she thought to herself, "I wanted to reach my full potential."

Matitiba heard about WoF through her local councilor and traveled to the nearest base at Jansenville to complete the fitness test.

She was accepted into the program and immediately began the rigorous firefighting training.

It did put some pressure on the family though, but with the support of her husband Dalinyebo and her mother Ndonbomzi, she was able to head off with the WoF crews to fight fires.

"All of a sudden we were being airlifted to fires in the Western Cape or other parts of the Eastern Cape." The young mother, who had thought her life would never move beyond her village, has visited KwaZulu Natal with WoF, and will soon be attending a training course at Sabi in Mpumalanga. To date, Phumza has traveled to Spain and America and all across South Africa. Before the program, this wouldn't have happened even in her wildest dreams.

"Working on Fire has given me a spirit. It is enabling me to become the person I want to be. So many rural women never reach their full potential, but with this program you can be a leader."

AUSTRALASIA'S COOPERATIVE FIRE RESEARCH EFFORTS



Gary Morgan

Australia's federal constitution defines its six state and two territorial governments as being responsible for instituting their own regulatory arrangements for the protection of life, property, and the environment. Additionally, they have the primary responsibility for delivering emergency services, including fire protection and management to the community.

By Australian law, Cooperative Research Centers (CRCs) are jointly funded by the public, government, and private companies or groups. Commonwealth, state, and territory governments are jointly responsible for establishing building fire safety codes, undertaking fire-related research, formulating accepted policies, and providing advice on forest and woodland (bush) fire safety.

In the wider Australian community, fire is increasingly regarded as a part of the environment. In large forests and woodlands, fire is understood to have occurred periodically before and since European settlement, and will continue to occur.

In northern Australia, few years pass without large areas being burned, but these fires have a comparatively low economic impact because of the limited population density and the way buildings are dispersed.

Gary Morgan is the Chief Executive Officer for the Bushfire Cooperative Research Center in East Melbourne, Victoria, Australia.

In southern Australia, however, large fires often have significant economic and social impacts. The 2002–2003 and 2006–2007 south-eastern Australia fire seasons were particularly bad, with very significant forested areas burned in both summers, major asset losses, and exceptionally high suppression costs all requiring complex incident management.

Bushfire Cooperative Research Center

In 2003, Australia's national government recognized the need for improved research capacity and agreed to establish a Bushfire Cooperative Research Center (Bushfire CRC). The new cooperative research center became one of 56 public and private research centers operating in Australia at the time.

Developing the Bushfire CRC was and remains a major initiative of fire and land management agencies in Australia and New Zealand.

Bushfire CRC Enters Its Fourth Year

In 2006, as Australia entered its fourth year of a concentrated national focus on bushfire-related research needs, the research benefits began to emerge. With 18 core partners and 8 associate partners, the Bushfire CRC and fire and land management agencies prioritized a number of research projects that are nearing completion with plans for long-term research projects on the horizon.

Bushfire CRC is strongly supported by and closely coordinated with the Australasian Fire Authorities Council (AFAC). Through a joint annual conference and associated workshops and close year-round liaisons with various specialists, the AFAC working groups have worked hard to forge strong relationships between the researchers and their supporting agencies. In addition, the groups have established institutional links with other CRCs and international research groups, in particular, those in North America and Europe.

The Bushfire CRC Australasian researchers recently declared social science-related fire research as being among their top priorities. With the 2001 National Wildfire Coordinating Group report *Burning Questions—A Social Science Plan for Federal Wildland Fire Management* in hand, researchers are developing a similar study of the social dimension of fire, social science needs, and the existing laws and policies that govern participating agencies.

Bushfire CRC's Stake For the Future

One of the key reasons for establishing the Bushfire CRC was to address the serious and growing national shortage of bushfire-related researchers. The center has recruited 80 postgraduate students with the hope of providing placements for them in the land and fire management agencies following their internships with the center.

Through the tremendous support and the considerable effort of the Bushfire CRC, Australia is now realizing an economic return for its investment in research.

Fire Knowledge Network

After being established and implementing research projects, the CRC governing board began exploring ways of disseminating the information to others—thus, the inception of the Fire Knowledge Network. Although the network is still in its infancy, the introductory Web page can be found at the Bushfire CRC Web site <<http://www.bushfirecrc.com/fkn/>>.

Once fully established, the network will bring together the broad spectrum of research in the CRC and from researchers in other organizations and provide a readily available clearinghouse of local knowledge and lessons learned, which will enable fire managers to have the right information at the right time—essential to establishing fire management strategies.

Future of the CRC and Fire Knowledge Network

Based on the Bushfire CRC record of success, the governing board and its fire and land management partners, in cooperation with AFAC, are developing plans to reach out to new partners.

In 2008, the CRC board and partners will propose a strategic plan to gain an additional 7 years of financial support for CRCs long-term projects and the Fire Knowledge Network.

Additionally, the group is proposing a new Fire, Environment, and Society CRC to deliver economic and social benefits to individuals, communities, and industry throughout Australasia. Should this new CRC materialize, Australia and New Zealand will become well placed to continue their constructive roles in their own countries and across the wider international wildland fire community. ■

Web Sites on Fire*

International Tropical Timber Organizations (ITTOs)

While the majority of information on the ITTOs site pertains to trade and tropical forestry issues, there are a few items of interest to fire managers in the publications section. *The Guidelines on Fire Management in Tropical Forests* is one example. There are a few reports—some only in Spanish—with information about assisting with assessments on for-

estry practice and writing technical reports for member countries.

Found at <<http://www.itto.or.jp/live/PageDisplayHandler?pageId=203>>

Canadian Interagency Forest Fire Centre (CIFFC)

CIFFC is the National Interagency Fire Center of Canada, managing the movement of resources between provinces and coordinating with the United States agencies. This site has up-to-date statistics, articles on fire activities, and links to the other Canadian agencies.

CIFFC can be found at <<http://www.ciffc.ca/web/>>

Bushfire CRC

CRC means: Cooperative Research Centre—a unique Australian organization that is based on a partnership between government and industry or other interest.

In this case, the CRC was established and funded to conduct research on areas of interest to the bushfire agencies in Australia and New Zealand. The site carries many research reports, news items, events, and educational material.

Visit the Bushfire CRC at <<http://www.bushfirecrc.com/>>

*Occasionally, *Fire Management Today* briefly describes Web sites that the wildland fire community has brought to our attention. Readers should not construe the description of these sites as exhaustive in any way or as an official endorsement by the Forest Service. To have a Web site described, contact the managing editor, Karen Mora, at 970-295-5715 (tel.), 970-295-5885 (fax), or kmora@fs.fed.us (e-mail).

WILDFIRES AND WALLABIES: U.S. FIRE STAFF GOES DOWN UNDER



Max Schwartz

During January and February 2007, 114 firefighters were required to adopt a completely different situational awareness.

Instead of ponderosa and lodgepole pine, spruce and alpine fir, they found themselves in eucalyptus groves and acacia forests. They were no longer concerned about the possibility of bear encounters; instead, they looked forward to seeing kangaroos, wombats, and koalas. And, in the middle of the North American winter, they were fighting heat, drought, and blazes on 2.4 million acres (971,250 ha).

Although this task may appear to be a daunting one, these men and women actually considered themselves a lucky few on the vanguard of a new firefighting experience. They were the most recent and the largest group of U.S. firefighters participating in a 6-year-old exchange program between the United States and Australia.

Program History

The Australia/New Zealand (ANZ)-United States-firefighter exchange program was born of necessity. The 2000 fire season brought the Western United States challenges not seen in more than 50 years. Eventually, 90,000 fires burned across more than 7 million acres

Max Schwartz served a 1-year internship with the National Park Service at the National Interagency Fire Center in Boise, ID.

Following a multiple-day orientation to the differences between Australian and U.S. fire behavior, topography, and suppression techniques, the U.S. firefighters were divided into modules, paired with local Victorian personnel, and sent throughout the State to help battle the fires.

(2,832,810 ha) across the country (National Interagency Fire Center 2008).

At the height of the season, in late August, the country's wildland firefighting forces were operating at full capacity: nearly 30,000 employees had been mobilized, including 20,000 civilian firefighters, 4,000 soldiers and Marines, and support staff (Shaw 2003).

Fire managers realized that any additional assistance would have to come from beyond U.S. borders. Fortunately, a mechanism existed by which this could happen: reciprocal agreements by which Canadian and Mexican firefighters could be dispatched to help fight U.S. wildfires. With that, more than 1,300 Canadian firefighters joined U.S. firefighters on the fireline (Canadian Interagency Forest Fire Centre 2008).

When these traditional sources proved insufficient, however, fire managers began to look beyond—far beyond—traditional sources. One such source was ANZ firefighters. Although they had been

visiting the United States (and vice versa) on study tours since 1951, no official agreement existed to bring them to the United States to aid in emergency suppression activities. This problem was solved with amazing quickness: in a little over a week, the arrangement was hammered out, an agreement was drafted, and 79 ANZ firefighters were on their way to the United States. These 79 men filled critical mid- and upper-level support positions throughout the wildland fire and aviation infrastructure (Patrick 2001).

The effectiveness of that first deployment, coupled with another difficult fire season in 2002, brought another deployment of ANZ personnel. Unlike 2000, this deployment was conducted under the auspices of a new agreement that had been passed into law a mere week before, after nearly 2 years of drafts and revisions. Under this new agreement, ANZ personnel continued their assistance in the United States during 2003 and 2006, with more than 100 firefighters making the journey during the 2006 season. Although the pro-

gram's early years were dominated by Australians and New Zealanders visiting the United States, a contingent of 30 U.S. firefighters assisted with the 2003–2004 fire season in Australia (Shaw 2003).

2006–2007 U.S. Deployment to Australia

Immediately following the United States' 2006 wildfire season—one of the most costly on record (eventually racking up a \$1.5 billion suppression bill)—Australia's 2006–2007 fire season began.

The fire season was especially difficult in the Australian State of Victoria where significant fires burned even while Australian firefighters were finishing their U.S. deployments.

By mid-December, record drought conditions and lightning storms caused a series of fires to burn together in the Great Divide Complex, which stretched across 2.4 million acres (971,250 ha) of the State of Victoria (Victorian Government of Sustainability and Environment and Country Fire Authority 2007) The State of Victoria soon requested international assistance, not just from their neighbor New Zealand, but also from the United States and Canada.

On December 28, 2006, the United States deployed six personnel to Victoria—two as infrared technicians and four liaisons to lay the groundwork for the larger U.S. deployment to arrive. One of those liaisons was Bodie Shaw, Bureau of Indian Affairs Deputy Director for Wildland Fire, based out of the National Interagency Fire Center in Boise, ID.

Unfortunately for the U.S. contingent (although the Australians fighting the Victorian fires probably saw it differently), a series of fronts brought humid conditions, slowing the Australian fires and delaying the eagerly waiting U.S. forces by 10 days. Finally, U.S. firefighters were mobilized, and, by January 22, 2007, two 20-person hot shot crews and 68 other resources arrived in Victoria for a 30-day assignment (Victorian Government of Sustainability and Environment and Country Fire Authority 2007).

Following a multiple-day orientation to the differences between Australian and U.S. fire behavior, topography, and suppression techniques, the U.S. firefighters were divided into modules, paired with local Victorian personnel, and sent throughout the State to help battle the fires.

Differences Between the Systems

“There were a lot of commonalities, but that doesn't mean there weren't also a lot of differences,” Bodie Shaw said about the two countries' wildland firefighting systems. The Australians operate under the Australian Inter-Service Incident Management System (AIIMS), which was modeled after the United States' Incident Command System (ICS). Australians involved in the first international deployment in 2000 thought that AIIMS was approximately “80-90 percent identical to the U.S. ICS system” (Patrick 2001).

Shaw noted that one of the major goals of the initial December deployment was to work out those differences, to “crosswalk [the AIIMS system] with ICS, and determine what we needed to order.”

“Volunteers are the backbone of the Victorian wildfire suppression organization.”



U.S. firefighters line up for a photo op after completing their 2-day in country orientation in Melbourne, Victoria. Photo by Mike Ferris, Forest Service

One major difference is that the majority of wildfire suppression operations in Victoria are conducted by the Country Fire Authority (CFA), an organization made up, for the most part, of volunteer firefighters. As U.S. Fish & Wildlife Service Deputy Chief of Fire Management John Segar, another liaison on the deployment, commented, “Volunteers are the backbone of the Victorian wildfire suppression organization.” In comparing the two systems, Segar saw a number of advantages to the Australian system: “One of the primary differences is that local communities and fire departments assume a large part of the wildland fire management responsibilities in Victoria, as opposed to the United States, where many communities and local fire departments are not actively engaged in wildland fire management.”

Another major difference came in the coordination between the CFA and the Victorian Department of Sustainability and Environment (DSE), the Victorian counterpart to the Forest Service, and the Department of the Interior.

“Unlike the United States, all Victorian fire departments are part of one organization [CFA] with similar qualification requirements, similar standard operating procedures, and a similar command structure. If you order a fire department engine, you have a pretty good idea of the capability of the engine you will receive,” Segar stated.

Beyond the organizational differences, a number of smaller challenges existed, such as the “language barrier.” As Shaw recalled, “Of course it was another English speaking country, though you’d be surprised at the differences, at the



Region 2 Hotshot firefighters (comprised of members from several U.S. Interagency hotshot crews) with their Australian supervisor counterparts at Tom Groggin Station staging area. Photo by Mike Ferris, Forest Service

“They warned our firefighters against using roads as deployment zones, because Victorian firefighters are trained to make a hasty retreat in vehicles when things get bad.”

common everyday vernacular that we use here and take for granted that was completely foreign over there.” The U.S. liaisons were prepared, however. During the 10-day wait before the January 2007 deployment, Shaw and his colleagues took the time to prepare a dictionary of Australian firefighting slang, which was given to the U.S. troops to read on the long plane ride to Melbourne (see the sidebar for some Aussie English-to-American English translations).

Another major difference between the two systems was that Australian firefighters do not carry emergency fire shelters as part of their personal protective equipment. “Their philosophy is that you should never place yourself in that situation; you should never let the circumstances of fire behavior put you in that situation,” Shaw explained. Also,

Australians use their vehicles as escape routes, which created possible conflicts with the American preference to use roads as areas to withdraw to and deploy fire shelters when necessary. “They warned our firefighters against using roads as deployment zones, because Victorian firefighters are trained to make a hasty retreat in vehicles when things get bad,” Segar reported.

Benefits of the Exchange

Both Shaw and Segar were very positive about the exchange program, describing it as a great experience and a tremendous opportunity to share knowledge across the two organizations. Shaw described what he saw as the biggest benefit: the building of a relationship of trust between the two firefighting

Australian-U.S. Fire Terminology Translations

Should you find yourself fighting bushfires alongside your Aussie compatriots, you won't have to suffer through translating their orders alone—the liaisons from the 2006-2007 deployment have produced this handy glossary. Study it.

Appliance	A firefighting vehicle, usually equipped with a pump and water supply. <i>Think engine.</i>
Battleboard	A visual tool for the management of the status of resources.
Blacking Out	The process of extinguishing or removing burning material along or near the fire control line, felling snags, trenching logs to prevent rolling, and the like, to make the fire safe. <i>Think mopping up.</i>
Candle	The ignition or flare-up of a tree or small clump of trees that ignites foliage and elevated fuels from the bottom to the top. <i>Think (but don't say) torch. (See "Torch" for why.)</i>
Ember Attack	Fire brands spotting ahead of the main fire. This term is commonly used by media to warn civilians of the potential for spot fire ignitions around properties ahead of the fire. <i>Think long-range spotting.</i>
Firebombing	The technique of dropping a suppressant or retardant from specialist aircraft to suppress a wildfire. <i>Think retardant drop.</i>
Floating Collar Tank	A flexible, self-supporting, open-top tank used as a portable water or retardant reservoir or as a dip tank for helitanker operations. <i>Think pumpkin.</i>
Gum, Ribbon, and Stringybark	All are types of bark shed by eucalyptus trees and can cause long-range spotting.
Rakehoe	A hand tool used for dry firefighting consisting of a handle and a metal head with one pronged edge for raking and one sharpened edge for cutting, chipping, and scraping down to mineral earth. <i>Think McLeod.</i>
Stag	A large, old tree, dead or with significant dead upper branches. Often hollow with an opening at ground level. Once ablaze, a stag represents a major hazard. <i>Think snag</i>
Torch	Flashlight.
Willy Willy	Dust devil.

organizations. In the earliest stages of the exchange, the U.S. deployment dealt with the comfort and liability issues that any group in a new situation would deal with; in a way, it mirrored the experience of the Australian deployment from 2006.

“When the Aussies came over in 2006, U.S. incident commanders [ICs] were cognizant of their Australian abilities, but because they had never worked in the western temperate forests of the United States, they didn’t know how much responsibility to give to an Aussie incident controller, and they wouldn’t allow them to be ICs on our fires,” Shaw recollected. “Much of it was just about developing a relationship of trust. But now, we have a relationship of more comfort with each other. We sent our best, and we began to build a real working relationship. We started to see the wall between the two organizations be broken down.”

Both men mentioned that the reciprocal nature of the deploy-

ments would also have benefits. “I think that when the Aussies come back here that our collective comfort level will continue to improve,” Shaw mentioned.

Segar explained another benefit: observing the adaptability of the Australian fire management organization. “We’re in a situation where fire management is changing very quickly, and we’re not able to keep up with that change. However, Victoria has been able to adapt more quickly than the United States. because they have fewer firefighters and fire management organizations. This gives us the opportunity to see what is and is not working in Victoria, and apply those lessons in the United States.”

Beyond just the experience of fire suppression, the program enabled U.S. firefighters to learn even more about their Australian hosts. “At each of the rest and recuperation locations, Aussies taught us about the country and the culture. So it was a really great learning experience for everyone, besides the fire

climate, to learn about Australia, and what it means to be an Aussie countryman,” Shaw said.

The Future

Building on the successful 2006–2007 deployment and the five other deployments since 2000, Interior Secretary Dirk Kempthorne announced a permanent ANZ-U.S. exchange program in May 2007 (Shaw 2003).

The exchange, slated to begin this year, will send U.S. fire managers to Australia during the Northern Hemisphere’s fall-winter seasons (corresponding to the Australian spring-summer season) with Australians returning the favor during their winter season.

Unlike the current program, which was for “dire emergencies,” this program will enable suppression assistance and exchanges of ideas in all areas of fire. Segar explained, “We can learn some things during fire suppression, in the heat of the fight, but in a lot of respects we can learn a lot more when we can go over there and can watch what people are doing without focusing on fighting the fire.” Segar noted an example: “Their work with communities and community preparedness is much more advanced than in the United States, and provides excellent learning opportunities.” The program will also make possible exchanges on topics far beyond fire management.

“We’ve also broken it down into several other areas: forest managers, range conservation, national parks in Australia. There’s just a lot of interest in cross-pollination, interest in how we do business, how we can improve both country’s systems,” Shaw added.



Region 2 Hotshot firefighters (comprised of members from several U.S. Interagency hotshot crews) mop up remaining hot spots on the 5,100-acre, lightning-caused, Hermit Mountain Fire in the Alpine National Park, Victoria, Australia. Photo by Mike Ferris, Forest Service

The Australian-U.S. Meteorological Exchange

Although no Australian firefighters assisted with U.S. suppression activities during the 2007 fire season, that doesn't mean we had no visitors from "down under."

Kevin Parkyn visited the National Interagency Fire Center in Boise, ID, from the Australian State of Victoria, where he works at the Bureau of Meteorology. While in Idaho, he worked with the National Weather Service's Boise office and the Bureau of Land Management's predictive services division. He also spent some time assisting incident meteorologists at the Cascade Complex of fires outside McCall, ID.

During Kevin's visit to the United States, he observed the significant differences between how fire weather is provided in the United

States versus Victoria. Unlike here, "In each [Australian] State you will find only a handful of people that you would call fire behavior specialists, in Victoria I believe we only have three, so they are a limited resource," he explained. Because of these limited resources, in Australia you "don't send meteorologists out to the fires—the Bureau doesn't have the staff resources," Kevin stated.

Kevin had a good experience while at the Cascade Complex. "I was really impressed with the organization, how everyone was kept up to date with good information—much of that was from Logistics, but also from the fire behavior specialist," he said. He was impressed, he continued, by how "the fire agencies [in the United States] use fire information more intelligently. Perhaps back home they could implement

some of the practices you have for exchange of information, particularly the daily morning briefings."

Beyond his experience working with fire weather, Kevin enjoyed "immersing himself in the city culture," from floating the Boise River "on a bit of rubber tire," to visiting our outdoor superstore "Capella's or Cabella's or whatever you call it." Although he was always worried about getting caught driving on the "wrong side" of the road—the correct side in his native Victoria—Kevin found Boise to be a welcoming and engaging place to live.

Reflecting on his time and experiences in Boise, he said, "This whole experience has been sensational...this has easily been the highlight of my professional career to date."

High expectations abound for the new exchange. Expressing his hopes for the new program, Shaw stated, "Suppression got us started, but there really is so much more to learn. I think that as this develops, this is really part of the globalization of resource management. This is one good way for us to start to broaden our depth and breadth of experience nationally and internationally. So that is my one hope, that as this program continues to build, we have familiarity, we have technical exchange and cultural exchange that really benefits us far beyond fire, really into the political arena that we find ourselves in with globalization."

The ANZ-U.S. exchange, in its short history, has already had an effect on how people in both coun-

tries approach fire management. Through the formalized exchange beginning this year, the potential exists to profoundly affect the business of wildfire management and international cooperation. The exchange has also genuinely affected the experiences and outlook of the firefighters who have been lucky enough to participate. "I would bet that anybody who went over would be more than happy to go back," Segar declared.

For more information on the new exchange program, contact Bodie Shaw, Bureau of Indian Affairs Deputy Director for Wildland Fire at Bodie_Shaw@nifc.gov.

References

Canadian Interagency Forest Fire Centre. 2008. Archived Reports. <http://www.ciffc.ca/index.php?option=com_content&task=view&id=40&Itemid=60>. (September 8, 2008).

- National Interagency Fire Center. 2008. Fire Information—Wildland Fire Statistics. <http://www.nifc.gov/fire_info/fires_acres.htm>. (September 8, 2008).
- Patrick, A. 2001. The globalization of wildfire: A history of the Australia/New Zealand deployment at the fires of 2000. Boise, ID: National Interagency Fire Center. 56 p.
- Shaw, B. 2003. International arrangements on the sharing of wildland fire suppression resources between the U.S. and Australia and New Zealand. International Forest Fire News. No. 29. <http://www.fire.uni-freiburg.de/iffn/iffn_29/USA-Australia-NZ-Int-Arrangements.pdf>. (September 10, 2008).
- Victorian Government of Sustainability and Environment and Country Fire Authority. 2007. Key issues identified from operational reviews of major fires in Victoria 2006/07. <[http://www.dse.vic.gov.au/CA256F310024B628/0/7A7734F35FFC2E3ACA25733A0020D8F/\\$File/Report+Ross+Smith+Op+Review+2006-07+fire+seasonv2.pdf](http://www.dse.vic.gov.au/CA256F310024B628/0/7A7734F35FFC2E3ACA25733A0020D8F/$File/Report+Ross+Smith+Op+Review+2006-07+fire+seasonv2.pdf)>. (September 8, 2008). ■

THE INCIDENT COMMAND SYSTEM— A FOUNDATION FOR INTERNATIONAL COOPERATION



Murray Dudfield

Globally, communities expect that emergencies will be dealt with safely, effectively, and efficiently by emergency management agencies. Experience has shown that parochial attitudes, internal politics, and the lack of communication sometimes give rise to poorly managed emergency operations.

Lack of coordination between agencies and unclear accountabilities often result in overlooking safety issues. Therefore, when responding to an incident, determining the professional, social, political, and economic issues is imperative.

Fire management agencies have long endeavored to improve the quality of emergency management response. The International Wildland Fire Summit convened following the 3rd International Wildland Fire Conference held in Sydney, Australia, in October 2003. This summit was attended by representatives from 34 countries and 12 international organizations.

The topic of improving emergency management response is not new. At many conferences and summits worldwide, this issue is key. The participants at this conference discussed this topic and agreed that a need remained, in principle or in substance, to implement a series of strategies to improve emergency management response. The

Murray Dudfield is the National Rural Fire Officer for the National Rural Fire Authority in Wellington, New Zealand.

A hierarchical network is a form of social coordination that uses unified and centralized control to help manage a network of four interrelated organizations pursuing a shared goal.

group decided that The Incident Command System (ICS) should become the international standard in wildland fire management when organizations operate under inter-agency agreements or exchange.

ICS Origins

ICS was first developed in the United States during the 1970s when State and Federal legislators raised concerns about the lack of uniform emergency management protocols. Federal, State, and local governments developed ICS as a common concept to provide an organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries.

In the 1980s, Australia and New Zealand were faced with similar emergency response dilemmas. The two countries evaluated various incident management systems from around the world and elected to adopt ICS, with minor modifications.

ICS: a Hierarchy or Network?

ICS conforms to neither a network nor a hierarchical organizational model, but combines elements of both. Hierarchies tend to be viewed as rigid and based on formal controls. Networks, on the other hand, tend to be viewed as fluid and based on relationships. The two models are not antithetical, although they may appear to be so. ICS is a well-blended hierarchical-network model that, when implemented properly, has shown remarkable success in the emergency management environment for more than three decades.

A hierarchical network is a form of social coordination that uses unified and centralized control to help manage a network of four interrelated organizations pursuing a shared goal.

When the ICS hierarchical network is analyzed, the ICS incident commander (controller) is at the top of the hierarchy, overseeing a variety of functional units—planning, operations, logistics, and finances. Although the ICS model may appear to be a hierarchy, it relies on the efforts of multiple organizational networks that enjoy some measure of autonomy. This mixture of social forms is remarkable, how networks differ from hierarchies is always a major topic of discussion in the study of networks.

Recognizing ICS as a hierarchical network is important because it

helps us understand the management factors that will lead to successful incident response. Treating ICS solely as either a hierarchy or a network will result in a misdiagnosis.

ICS—Becoming Universally Adopted

For ICS to be adopted universally, its components may require tailoring to suit existing customs; values; and political, administrative, or cultural systems. If we want to enhance emergency management cooperation among countries through the sharing of resources such as fire management teams, it makes sense for the sending and receiving countries to use the same emergency management system.

Given that ICS is already a proven model in many countries, and that training materials for ICS are freely available, countries gain considerable benefits by adopting the system.

The complexity of incident management, coupled with the growing need for multiagency and multifunctional incident involvement, has increased the need for a standard interagency incident management system at all levels of fire management and on a global scale. Although not all countries use ICS, many countries have adopted similar or common emergency management systems.

A number of countries have developed an interoperable firefighting agreement that enables them to lend emergency support to other countries. In the past, this type of assistance was most likely to occur between adjoining states or countries in the same geographical region. Because of their proximity, Canada and the United States

The Incident Command System (ICS) gave fire managers the ability to work together towards common objectives. ICS will not only limit property damage and improve firefighter safety, efficiency, and effectiveness; most importantly, it will save lives.

frequently exchange firefighting forces, especially along their borders. However, since the 2000 fire season, the practice has broadened significantly with firefighting resources joining forces in different hemispheres.

Sharing Expertise Globally

When two countries enter into formalized agreements to provide personnel support during large and extended wildfire events, both parties need to agree to a common pathway aligning the qualification structures of each country with ICS counterparts.

The United States, Australia, and New Zealand have established such an alignment, allowing for a seamless integration without delay when international deployments occur.

In 2000, 2002, 2003, and 2006, Australia and New Zealand sent critically needed specialist fire managers to the United States. In the 2003 and 2007 Australian fire season, the United States reciprocated by sending its fire managers down under. Canada also sent fire managers to Australia early in 2007. In 2002, 2003, and 2007, New Zealand also sent firefighting forces to neighboring Australia.

An additional element proving the success of the intercountry wildland fire cooperation arrangement is that because each agency's competency standards are simi-

lar, it is easy to adapt in each ICS role. Starting at the top with the incident commander (called the controller in other countries) down to the on-the-ground firefighter, the standards can be compared and determined to be compatible. Although the cooperative effort has been successful, an ongoing effort of evaluating and adjusting the protocols and processes is important.

Globally Integrated Systems Save Money and Lives

On a global scale, emergency management undoubtedly consumes large amounts of funding each year. Safety, effectiveness, and efficiency are most achievable with seamless agency integration.

A globally implemented ICS provides the model for command, control, and a universally coordinated emergency response—we all stand to benefit. Many emergencies, from vehicle accidents to large-scale disasters, may require such coordination across several agencies. ICS reduces the risk of agency overlap and potential confusion due to poor communication or inadequate coordination.

When emergency situations require international assistance, ICS is the incident management tool of choice. ICS not only improves firefighter safety, efficiency, and effectiveness and limits property damage, but most importantly—*it save lives.* ■

FIRE BEHAVIOR ADVISORIES IN SASKATCHEWAN: WHY NOT?



Saskatchewan
Ministry of
Environment

Paul Emmett

How to improve the safety of wildland firefighters has always been a concern of Saskatchewan Fire Management and Forest Protection Branch (FMFP), the provincial agency responsible for the management of wildland fires. Even though it has never suffered a firefighter burnover fatality in more than 60 years of firefighting, the agency has experienced situations in which it has had to remove people from possible burnover. With this in mind, a 2006 internal report proposed the development and implementation of a fire weather or fire behavior advisory system. The intent of the proposed system was to ensure the safety of wildland firefighters by advising them of dangerous burning conditions.

The northern half of Saskatchewan, with an area of about 35 million hectares (86 million acres), contains mostly the typical boreal forest species of white spruce, black spruce, and jack pine. Because the terrain is flat to gently rolling, the effects of topography upon wildland fire occur only locally, but intense and fast moving fires are common across the entire forest.

Several questions immediately arose at the beginning of the study of the development and implementation of the advisory system. Some of these questions were:

- Which weather or fire behavior conditions would such an advisory be concerned with?
- What values would trigger an advisory?
- Who within the agency would issue such an advisory?
- How would the advisory be disseminated quickly and efficiently throughout the agency?
- How would the agency ensure that the correct information is addressed to the correct audience?
- What method would guarantee staff understood the advisory?
- How would the advisory be made relevant to the correct audience?

The study began by investigating systems already in use in other jurisdictions: the U.S. Red Flag program and the British Columbia Operational Safe Work Standard #5: Fire Behavior Advisories and Warnings. We also looked at three case studies where fatalities occurred: Colorado's South Canyon Fire of 1994, the Cramer Fire of 2003 in central Idaho, and the 2006 Devils Den incident in Utah.

In two of the cases, Red Flag warnings were in effect, but firefighters still died. On the Cramer Fire, the local National Weather Service (NWS) office didn't even consider a Red Flag warning, saying that it was just "...another hot, dry day." (Close 2005) British Columbia's 1994 Garnet Fire, which caused the loss of 18 homes in the Penticton subdivision of Upper Carmi and the evacuation of over 3,000 people, was notable because it was the cata-

lyst for the development and implementation of British Columbia's fire behavior advisory system. As firefighters battled that blaze, they received the news of the 14 deaths at the South Canyon Fire on Storm King Mountain (Beck et al 2002).

After the initial study, more questions arose. First, should the advisory system be chronologically based like the Red Flag program? A watch is issued if conditions in the 24- to 72-hour period are forecast to reach certain levels. Conditions that currently reach these levels, or are forecast to reach them within the next 24 hours, require a warning. The alternative is to issue watches and warnings based on increasing levels of dangerous weather and fire behavior without reference to time, as the British Columbia system does. Other questions arose, such as what the system should base its advisory on. The options were meteorological parameters like temperature, relative humidity, and wind; fire danger indices calculated by the Fire Weather Index System of the Canadian Forest Fire Danger Rating System (CFFDRS); the fire behavior indicator calculated by the Fire Behavior Prediction System of the CFFDRS; or a combination of these. Either way, setting simple and appropriate levels required to trigger an advisory would be difficult.

Internal agency discussion about the development of such a system revealed some shortcomings:

Paul Emmett, Fire Weather Forecaster, Saskatchewan Ministry of Environment, Fire Management and Forest Protection Branch



Major run of the Coffee Fire, Saskatchewan. Photo courtesy of Canadian Forest Service

- Either a local Fire Behavior Analyst (FBAN) or Fire Weather Forecaster at the provincial headquarters would issue the advisory. However, FMFP normally only mobilizes FBAN's on Type I and Type II incidents and not on smaller incidents that occur more often. Furthermore, there is only one duty forecaster issuing a number of different products throughout the day. Neither FBAN's nor the Weather Office has the staff to issue the advisory.
- The agency wanted to ensure the development, implementation, and issue of advisories remained focused on firefighter safety, rather than liability issues.
- A major difficulty is setting appropriate and effective criteria for issuance of an advisory. If they are set too low, watches and warnings may become part of the everyday working environment, rendering them ineffective and ignored by staff. Intense crown fires are common in Saskatchewan's boreal forest and are a normal part of the job of firefighting. Watches and warnings would almost always be in effect when burning conditions are dangerous. On the other

hand, if the criteria are set too high, extreme conditions may occur without triggering a watch or warning, exposing firefighters to dangerous conditions without them having complete information.

- An experienced agency firefighter is more likely to understand what an advisory means, but the one who is a casual hire likely will not. The casual hire is the one who most needs an explanation in plain language of the conditions that will be encountered (Droog 2003). Droog goes on to say, "Fire behavior safety messages should be presented so that the firefighter with the least amount of fire knowledge understands the risks and dangers for the day. After all, this is the person that is most likely to need to have the risks identified."
- Measuring the impact of an advisory on staff is difficult, especially over time. How can a manager discern the effectiveness of an advisory on staff, especially when burning conditions have been extreme for several days and the advisory message has been consistent? How can someone measure another's safety awareness

and its influence on their fireline actions?

- Verification of advisory conditions is often difficult and may not be timely. Conditions may vary across the forecast area, change quickly, or may not be available in remote areas.
- Firefighters may rely on the issuance or nonissuance of an advisory at the expense of situational awareness. They may act on the mistaken belief that burning conditions are not dangerous simply because no advisory was issued, when, in fact, conditions have become dangerous and the action he or she takes compromises his or her safety. The firefighter has a false sense of security.

This is not a complete list, but FMFP considered them significant barriers in its decision to not develop and implement an advisory system.

Such a system may introduce redundancy into the existing stream of information without achieving the goal of increasing firefighters' awareness of dangerous situations. The agency already has a well-developed organizational and communications structure for disseminating necessary information. Fire weather and fire behavior information is available through an internal Web site and through two daily conference call briefings with all duty officers across the agency. Duty officers pass this information to the local fire bases, who in turn pass it to crews fighting fires within the fire base area. Duty officers and fire bases may also contact the forecaster directly or access the internal Web site anytime throughout the day.

In place of developing an advisory system, FMFP decided to build

upon its existing organizational and communications strengths to achieve the same end. In 2007, a formal standardized briefing package was developed within an agency directive. The directive:

- Ensures each fire base will provide firefighters a daily briefing that is consistent across the province.
- Governs the content and delivery of the briefing with a checklist of relevant weather and fire behavior information that must be conveyed to ensure it meets the required objectives.
- Includes the requirement that the person providing the briefing documents the date and time the briefing occurred, what was covered, and who was present.
- Requires that documentation be archived and becomes part of the permanent record.

The briefing package takes advantage of the established structure and enables more rigorous communication of weather and fire behavior that firefighters anywhere in the province may experience that day. It will also be able to accommodate future development in content and delivery.

The agency consulted field staff to ensure that the briefings would be understandable to firefighters, and that the person doing the briefing could tailor it to local conditions. Daily briefing also provides the

opportunity to include other safety factors, such as aviation safety, use of personal protective equipment, and local environmental factors. The briefing is normally done in person, but briefing by radio can be done if necessary to remote incidents, although it is not the preferred method. The standardized briefing package ensures consistency throughout the province and the agency is able to verify the quality of briefing.

The FMFP organization is flexible enough to ensure that information about any developing weather or fire behavior that was not forecast can be transmitted to firefighters. When these types of conditions occur, the duty officers can pass relevant information to the affected fire bases, who then will alert firefighters. The advantage is that experienced judgment and local knowledge prevail instead of established advisory criteria that may not suit the particular occasion.

Other agencies and jurisdictions may find that an advisory system will meet their needs and find ways to implement it. The shortcomings FMFP has identified are not impossible to overcome, but the agency has found that for its purposes the best system is the standardized daily briefing package.

For more information, contact Paul Emmett, Fire Weather Forecaster, Fire Management and Forest

Protection Branch, Saskatchewan Ministry of Environment, P.O. Box 3003, Hwy #2 North, Prince Albert, SK S6V 6G1, Phone: 306-953-3805, Fax: 306-953-3447, and e-mail at paul.emmett@gov.sk.ca.

References

- Beck, J.A.; Alexander, M.E.; Harvey, S.D.; Beaver, A.K. 2002. Forecasting diurnal variations in fire intensity to enhance wildland firefighter safety. *International Journal of Wildland Fire*. (11) 173-182.
- Droog, William N. 2003. Keeping it fresh: Fire behavior safety messages during extended fire situations. Paper at conference: 7th International Wildland Fire Safety Summit; 18-20 November 2003; Toronto, Ontario, Canada.
- Haugen, Kim 2006. Fire behavior intelligence within Fire Management and Forest Protection branch. Saskatchewan Environment, Fire Management and Forest Protection branch (FMFP) internal report.
- B.C Ministry of Forests Protection Program 2001. Fire behavior advisories and warnings. B.C. Ministry of Forests, Protection Program (BCFMPP), Victoria, B.C., Operational Work Standard #5.
- National Weather Service, 2006. National Weather Service Instruction 10-401. <<http://www.weather.gov/directives/010/010.htm>>. (January 7, 2008).
- Close, K.R. 2005. Fire behavior vs. human behavior: Why the lessons from Cramer matter. Paper at conference: 8th International Wildland Fire Safety Summit; 26-28 April 2005; Missoula, MT.
- South Canyon Fire Accident Investigation Team. 1994. Report of the South Canyon Fire Accident Investigation Team, Glenwood Springs, CO. <<http://www.coloradofirecamp.com/south-canyon-fire/pdf-links.htm>>. (January 7, 2008).
- Devils Den Accident Investigation Team. 2006. Report of Devils Den Fire Accident Investigation Team, Oak City, UT. <<http://www.wildfirelessons.net>>. (January 7, 2008). ■

FIRE, NATURE, AND HUMANS: GLOBAL CHALLENGES FOR CONSERVATION



Ayn Shlisky, Ronald Meyer, John Waugh, and Kori Blankenship

Fire is a global phenomenon. Worldwide, fire can play a role in maintaining or threatening natural habitats and human societies. In any case, we must consider the global context for our actions and the best possible role each nation can play in managing fire for humans and nature.

Relative to much of the rest of the world, land managers, conservationists, and scientists in the United States have access to a deep body of knowledge about the ecology of fire and the impacts of public policies and human actions on fire's natural role. The natural habitats and human communities of the United States also benefit from a relatively high level of capacity in fire management. The same cannot necessarily be said of many other nations around the world. As members of a global fire management community, we should consider how local ecological, social, and economic conditions compare to other places around the world, and how each nation might support ecologically

Ayn Shlisky was formerly Director of the Global Fire Initiative at The Nature Conservancy, and currently works for the USDA Forest Service in Mena, Arkansas. Ronald L. Myers is Fire Director for Latin America and the Caribbean, Global Fire Initiative, The Nature Conservancy, Tallahassee, FL. John Waugh is a Senior Fellow at the Multilateral Office of the International Union for Conservation of Nature (IUCN), based in Washington, DC. Kori Blankenship is a Fire Ecologist for The Nature Conservancy's Global Fire Initiative and is working on the LANDFIRE project in Bend, OR.

As members of a global fire management community, we should consider how local ecological, social, and economic conditions compare to other places around the world, and how each nation might support ecologically appropriate and socially responsible fire management.

appropriate and socially responsible fire management.

The United States and the rest of North America are dominated by temperate fire-dependent forests, woodlands, and grasslands (Forest Service 2006b).

Before European settlement, about two-thirds of the United States naturally burned at least every 35 years. Many woodlands and grasslands burned much more frequently (Blankenship and others 2007). Rural and urban development and other human actions, however, continue to increase their effects on temperate North America. Too much, too little, or the wrong kind of fire can threaten biodiversity, often with negative consequences for ecosystem sustainability and human health and livelihoods (Brown and Smith 2000; Smith 2000; Hardesty and others 2005; United Nations 2006).

Fire often positively influences ecological processes such as nutrient cycling, vegetation dynamics, and species composition (Brown

and Smith 2000; Smith 2000). Altered fire regimes can eliminate native species, accelerate soil erosion, degrade water quality and fish habitat, catalyze desertification, and alter ecosystem structure and wildlife habitat (Hassan and others 2005).

Changes in land use patterns and policies, such as rural development into wildlands, fire exclusion, tree plantations, and agricultural conversion, have contributed to changes in fire regimes in many areas of the United States (Weaver 1943; Cooper 1960; Covington and Moore 1994; Keane and others and others 2002; Dellasala and others 2004; Stephens and Ruth 2005).

Changes in fire dynamics can also interact with other threats, such as climate change, invasive species, grazing, land clearing, inappropriate logging, and landscape fragmentation (Keane and others 1999; Dale and others 2001; Brooks and others 2004; Hardesty and others 2005; Myers 2006), confounding efforts toward conserving habitats and human livelihoods. As a result

of these types of human actions, only 20 percent of habitats of the lower 48 U.S. States have fire dynamics that resemble a largely “natural” role (Blankenship and others 2007; Forest Service 2006a). Conversely, fire dynamics across 80 percent of the lower 48 U.S. States substantially differ from their natural roles.

Fire: the Good and the Bad

The human inhabitants of North America have developed relationships to fire that are both good and bad for conserving its natural role. Trends in area burned and rural and urban development are concurrently increasing across temperate North America; persons are largely wary of fire and often work hard to eliminate it and its deleterious effects. However, annual area burned by wildfires in 6 of the last 8 years in the United States has exceeded the previous 5- and 10-year annual averages (NIFC 2007). In addition, as communities experience the property losses and inevitable fire-related conflicts of inhabiting the wildland-urban interface, the United States is grappling with rising suppression costs. Federal wildfire suppression expenditures in the United States exceeded \$1 billion for the first time in 2000 and again at least twice since then.

The Global Context

North America is similar in fire ecology and human activities to many other temperate regions of the world. In fire ecology and social culture, however, the continent can be strikingly different from tropical regions.

The distribution of vegetation responses to fire varies across geographic regions and habitat types (figure 1). As in North America,

Fire's Ecological Role

Natural habitats can be classified in terms of their relationship to fire regime characteristics such as fuels, flammability, ignitions, and fire spread conditions in a given ecosystem.

Fire-dependent habitats are those in which most of the species have evolved in the presence of fire, and fire is an essential process for conserving biodiversity (e.g., savannas, temperate coniferous forests). Excluding fire from these systems or introducing ecologically inappropriate fire—at inappropriate frequency, severity, or seasonal timing—can substantially alter these systems.

Fire-sensitive habitats are those in which most of the species have not largely evolved in the presence of fire. Although fire may play a secondary role in maintaining natural ecosystem structure and function in fire-sensitive systems, the introduction of ecologically inappropriate fire can have an extensive negative impact on biodiversity (e.g., tropical moist broadleaf forests). Too much fire in fire-sensitive forests can also create a positive feedback loop, making these forests more susceptible to fire in the future and

rapidly degrading the most intact forest ecosystems).

Fire-independent habitats are those that naturally lack sufficient fuel or ignition sources to support fire as an evolutionary force (e.g., deserts, tundra).

Fire-dependent, -sensitive, and -independent ecosystems can be further classified in terms of their condition. For example, through human land uses, even fire-independent systems can experience greater fire incidences than have occurred naturally through the introduction of invasive exotic species, or excessive human-caused ignitions.

Intact fire regimes include those that have fire regime characteristics (e.g., fire frequency, severity, extent, and season—within their range of natural variability).

Degraded fire regime conditions are those that are considered by experts to be outside their range of natural variation but are considered restorable.

Very degraded fire regime conditions are those far outside their natural range of variability and may not be restorable.

more than half of global terrestrial area is fire dependent. Twenty-two percent of the terrestrial world, however, is fire sensitive, and 15 percent is fire independent. Although North America is dominated by fire-dependent ecosystems (75 percent of the area), most of South America (63 percent) is made up of fire-sensitive ecosystems (Shlisky and others 2007).

The status of fire regimes—their conditions relative to ecologically intact conditions—shows striking patterns by habitat and geography (see side bar). As in North America, only about 25 percent of the terrestrial world is considered intact relative to fire regime conditions (figure 2).

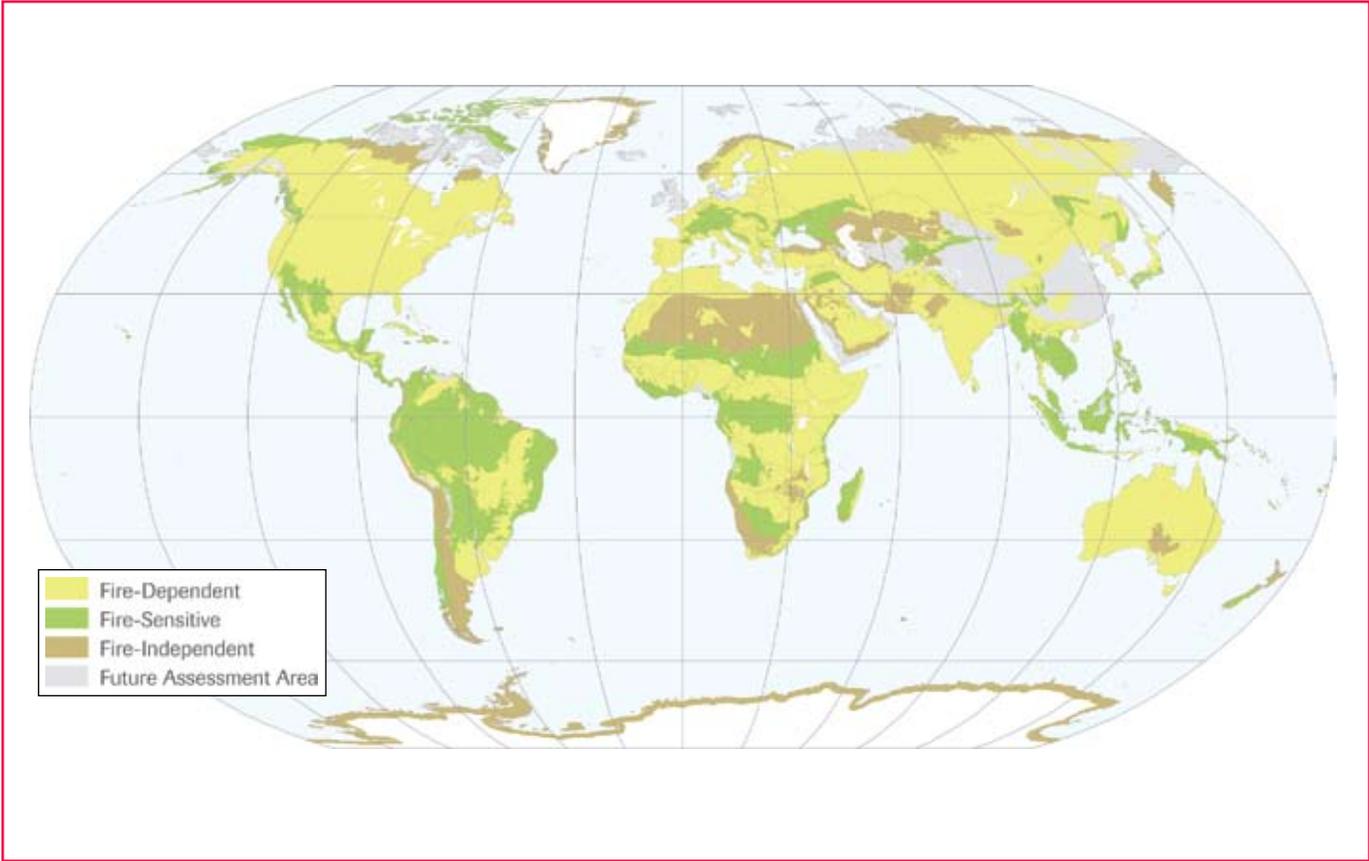


Figure 1. Global distribution of fire-dependent, fire-sensitive, and fire-independent ecosystems (Shlisky and others 2007).

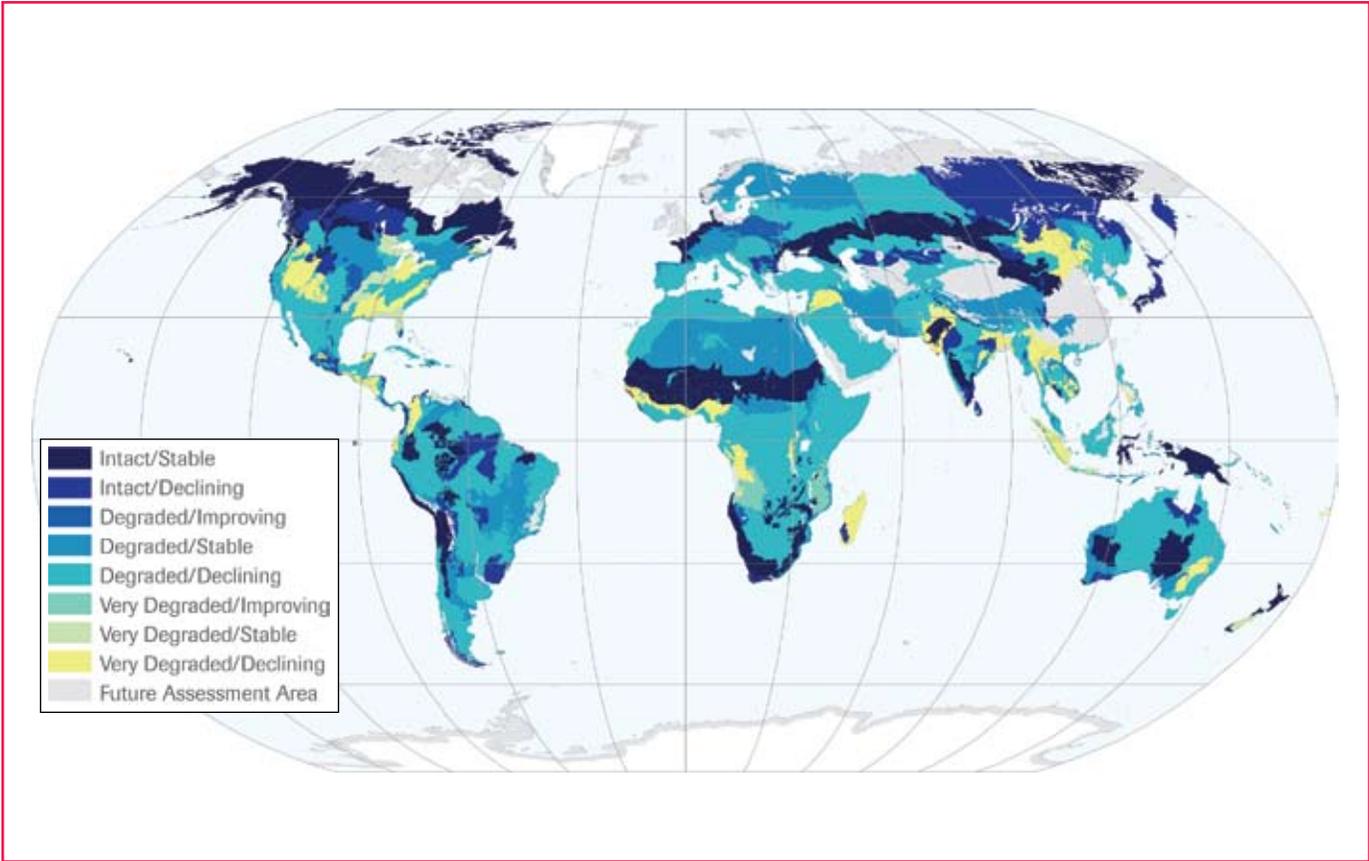


Figure 2. Global distribution of fire regime conditions (Shlisky and others 2007).

Globally, boreal forests and taiga have the most intact fire regime conditions (69 percent of boreal and taiga habitats are considered intact), largely due to their relative geographic isolation and undeveloped nature. Mediterranean habitats are the most degraded (93 percent of Mediterranean habitats worldwide), largely due to their fire dependence, their attractiveness to human development, and the fire exclusion and fragmentation threats that often accompany development.

Relationships between fire and human-caused fire regime alteration—if the fire regime is intact, degraded, or very degraded—often repeat themselves around the world and through time based on a handful of driving factors. Often, major habitat types experience similar threats across geographies, whereas the rate of change in key-stone fire-related threats—urban or agricultural development, for example—may substantively dif-

fer geographically based on social contexts and the relative degree of economic development.

Globally, the top threats to maintaining the ecological role of fire in habitats include (Shlisky and others 2007):

fer geographically based on social contexts and the relative degree of economic development.

Globally, the top threats to maintaining the ecological role of fire in habitats include (Shlisky and others 2007):

- Urban development;
- Livestock farming, ranching, and agriculture;
- Fire and fire suppression;
- Resource extraction (i.e., energy production, mining, logging); and
- Climate change.

These sources of fire regime alteration generally serve to directly or indirectly change basic fire characteristics (e.g., frequency or pattern of ignition, fuel structure or amount, or fire weather).

Managing Fire for Nature and Humans

Integrated Fire Management (IFM) is an approach for addressing the problems and issues posed by both damaging and beneficial fires in the context of the natural environments and socioeconomic systems in which they occur (Myers 2006). IFM is a framework for evaluating and balancing the relative risks posed by fire with the beneficial or necessary ecological and economic roles that fire may play in a given conservation area, landscape, or region.

IFM facilitates implementing cost-effective approaches to preventing damaging fires and maintaining desirable fire regimes at any spatial scale from landscapes to nations to regions. When fires do occur, IFM provides a framework for (1) evaluating whether the effects will be detrimental, beneficial, or benign, (2) weighing relative benefits and risks, and (3) responding appropriately and effectively based on stated objectives for the area in question.

IFM takes into account fire ecology, socioeconomic issues, and fire management technology to generate practical solutions to fire-related threats to biodiversity. Within the framework of IFM, a number of strategies are necessary to restore and maintain fire regimes in the face of increasing land use, climate change, and uninformed public policies, including those described below.

State of the World's Fire Regimes

Major habitats that are considered more than 30-percent intact relative to fire regime conditions include (Shlisky and others 2007) the following:

- Boreal forests/taiga (69 percent intact),
- Flooded grasslands and savannas (38 percent), and
- Temperate coniferous forests (38 percent).

Major Habitats in Which 70 Percent or More of Terrestrial Area Is Degraded or Very Degraded

- Mediterranean forests, woodlands, and scrub (93 percent degraded or very degraded);
- Tropical and subtropical dry broadleaf forests (79 percent);
- Tropical and subtropical moist broadleaf forests (75 percent);
- Temperate broadleaf and mixed forests (73 percent);
- Deserts and xeric shrublands (72 percent);
- Temperate grasslands, savannas, and shrublands (70 percent); and
- Tropical and subtropical grasslands, savannas, and shrublands (70 percent).

Changing the Way Humans Think About Fire: An Example From Latin America

In many parts of the world, instead of fire exclusion, fire is often being ignited for a variety of reasons by ever-increasing human populations—the underlying cause of increasing fire severity and ecosystem changes. Fire is the primary tool used when clearing fallow agricultural land, expanding agricultural into forested areas, rejuvenating the palatability of grazing lands, attracting the game animals that account for a significant portion of some persons' protein intake, and facilitating travel and access across the landscape.

In other countries, traditional fire prevention and suppression are the national policies. In most cases, the policies were instituted with no regard to the role that fire plays in maintaining certain ecosystems and no understanding of the socioeconomic and cultural systems in which many fires occur.

The first step in addressing fire problems is changing the way people at all levels of society think about fire. The U.S. experience suggests that this transformation may take a generation or more as curricula and educational messages change, and fire management capacity develops and changes its focus.

In Latin America, this change is being facilitated by learning networks and other efforts that accelerate the diffusion and acceptance of new fire management concepts and approaches. The Latin American and Caribbean Fire Learning Network brings land managers, decisionmakers, community leaders, fire management experts, and scientists together in facilitated workshops and forums to identify the role of fire in ecosystems, better understand the socioeconomic necessities of using fire, and develop strategies and actions needed to

address fire problems. Many of the solutions go beyond traditional prevention and suppression approaches. After a new paradigm is adopted by individual participants, follow-up training, consultations, and mentoring are provided. These persons will be key in disseminating the new approaches in their governments, agencies, and communities.

Fire Learning Network participants and activities have come from or taken place in nearly all Latin American countries. Over the last 4 years, conceptual workshops have been held in Mexico, Belize, Costa Rica, Honduras, Cuba, the Dominican Republic, Peru, and Paraguay. Key needs identified in these forums have been (1) a “Two Faces of Fire” approach to education rather than prevention programs that focus on only the negative aspects of fire, (2) increased capacity to use prescribed fire in fire-dependent ecosystems and to

Evaluating if the Effects of Fire Will Be Detrimental, Beneficial, or Benign

Geographic patterns in fire's ecological role, in the human land uses that maintain or alter this role, and in needs for community health and safety should be used to inform conservation and land management goals, priorities, and actions.

Weighing the Relative Benefits and Risks of Fire and Human Actions

- Habitats that currently have intact fire regimes are relatively

rare and should be monitored for trends that may degrade the ecological role of fire, such as climate change, urban development, energy production, and agriculture.

- Fire is an integral part of many habitats, and the value of the environmental services that intact fire regimes provide must be weighed against the social and economic values of these habitats for human development and resource use.
- The benefits and risks of maintaining fire's ecological role or preventing its detrimental environmental and social impacts should be considered in the con-

text of local social and ecological systems and conditions.

Responding Appropriately and Effectively

- Protect, restore, and maintain habitats that can be used to demonstrate the ecological role of fire and compatible social and economic uses.
- Promote and enable laws and policies for land uses such as agriculture, ranching, logging, energy production, housing, transportation infrastructure, and natural resources management so that they are compatible with maintaining the ecological role

protect fire-sensitive ecosystems, (3) Integrated Fire Management (IFM) planning at site, regional, and national levels, (4) policy changes that support integrated approaches to fire management, and (5) Community-Based Fire Management Programs in which rural communities are involved and have a stake in fire management decisions.

The Fire Learning Network has stimulated efforts to change fire policies and national fire management strategies in Mexico, Honduras, the Bahamas, and the Dominican Republic that will allow prescribed fire. The recent availability of the *Voluntary Guidelines for Fire Management*, produced by the Food and Agriculture Organization of the United Nations, is facilitating policy discussions in many countries and has become an important tool for the Network. A basic prescribed fire course developed by the

network has been offered in Mexico, Guatemala, Honduras, Costa Rica, the Dominican Republic, and Belize. Governments are taking on an increased role in coordinating and funding these training courses. Fire management planning workshops have focused on protected natural areas in Mexico, Honduras, and Belize. A mentoring program has provided key land managers and decisionmakers with study tours and opportunities to participate in training courses in other countries. For example, in early 2008, the National Prescribed Fire Training Center in Tallahassee, FL, offered its first prescribed fire training module in Spanish that was open to network participants.

Although the ecological effects of IFM—as a result of the Fire Learning Network at the landscape scale—may not be evident for years to come, noticeable changes in management responses are already being observed.

The relevance of IFM approaches being developed through the Fire Learning Network is illustrated in the Initiative for the Regional Integration of Infrastructure in South America (IIRSA). IIRSA is a massive multidonor program to integrate South American economies through multimodal trade corridors, involving up to 400 separate infrastructure development projects. The cumulative effects of IIRSA on the ecosystems and fire regimes of South America are unknown. Especially when combined with projected global climate changes, the effects can be expected to be extensive. Management adaptation will be learned “on the fly.”

The Latin American and Caribbean Fire Learning Network is coordinated and funded by The Nature Conservancy's Global Fire Initiative. The Forest Service and the FAO have provided funds for specific events and activities.

of fire or preventing fire in locations or circumstances where it is destructive.

- Promote and enable climate change, emissions, fire suppression, and air quality policies so that they protect biodiversity and human health and safety but do not constrain the needs for restoring and maintaining fire-dependent habitats.
- Create economic incentives to manage landscapes for fire, nature, and humans, including payment to landowners for restoring and maintaining the ecosystem services of intact fire regimes, tax or other incentives for the commercial marketing of

woody biomass and other products of restoration actions, and implementation of development loan criteria that integrate fire's ecological role.

- Recognize gaps in fire capacity and build adequate capacity for IMF, including training, mentoring, and human and material resources.
- Educate practitioners, policymakers, and decisionmakers about the ecological role of fire and the ecological and social risks and costs of altered fire regimes.
- Monitor fires and changes in land use and land cover for ecological forecasting, threat analysis, emergency response, and assessing the

effectiveness of conservation, land management, and human development actions.

- Adapt to changing knowledge, socioeconomic and political contexts, and ecological conditions, including, most importantly, climate change.

The global needs for ecologically appropriate and socially responsible fire management are enormous, and fire's relationship to human health and safety are complex. Only through collaboration and cooperation, within and across borders, can we achieve our collective goals for fire, nature, and humans. The side bar describes how IMF con-

cepts are being disseminated in Latin America through Learning Networks.

References

- Blankenship, K. and others. 2007. An ecological assessment of fire and biodiversity conservation across the lower 48 States of the U.S. Global Fire Initiative. Technical Report 2007-1. Arlington, VA: The Nature Conservancy.
- Brooks, M.L. and others. 2004. Effects of invasive alien plants on fire regimes. *BioScience*. 54(7): 677–688.
- Brown, J.K.; Smith, J. (eds.). 2000. Wildland fire in ecosystems: Effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-24. , Ogden, UT: Forest Service, Rocky Mountains Research Station.
- Cooper, C.F. 1960. Changes in vegetation, structure, and growth of southwestern pine forests since white settlement. *Ecological Monographs*. 30:129–164.
- Covington, W.W.; Moore, M.M. 1994. Post settlement changes in natural fire regimes and forest structure: Ecological restoration of old-growth ponderosa pine forests. *Journal of Sustainable Forestry*. 2:153–181.
- Dale, V.H. and others. 2001. Forest disturbances and climate change. *BioScience*. 51(9): 723–734.
- Hardesty, J.; Myers, R.L.; and Fulks, W. 2005. Fire, ecosystems, and people: A preliminary assessment of fire as a global conservation issue. *The George Wright Forum*. 22:78–87.
- Dellasala, D.A. and others. 2004. Beyond smoke and mirrors: a synthesis of fire policy and science. *Conservation Biology*. 18(4):976–986.
- Hassan, R., Scholes, R.; and Ash, N. (eds). 2005. Findings of the condition and trends working group of the millennium ecosystem assessment. Ecosystems and human well-being: current state and trends, volume 1. University of Pretoria Council for Science and Industrial Research UNEP World Conservation South Africa, South Africa Monitoring Centre, United Kingdom: Island Press.
- Keane, R.E. and others. 2002. Cascading effects of fire exclusion in rocky mountain ecosystems: A literature review. Gen. Tech. Rep. RMRS-GTR-91. Ogden, UT: Forest Service, Rocky Mountains Research Station.
- Keane, R.E.; Ryan, K.C.; and Finney, M.A. 1999. Simulating the consequences of fire and climate regimes on a complex landscape in Glacier National Park, Montana. *Fire in ecosystem management: Shifting the paradigm from suppression to prescription*. In: Proceedings of the 20th Tall Timbers fire ecology conference. Tallahassee, FL: Tall Timbers Research Station.
- Myers, R.L. 2006. Living with fire: sustaining ecosystems and livelihoods through integrated fire management. Tallahassee, FL: The Nature Conservancy.
- National Interagency Fire Center (NIFC). 2007. <http://www.nifc.gov/fire_info/fires_acres.htm>. (September 5, 2007).
- Shlisky, A. and others. 2007. Fire, ecosystems and people: threats and strategies for global biodiversity conservation. Arlington, VA: The Nature Conservancy.
- Smith, J.K. 2000. Wildland Fire in Ecosystems: Effects of Fire on Fauna. Gen. Tech. Rep. RMRS-GTR-42-vol. Ogden, UT: Forest Service, Rocky Mountains Research Station..
- Stephens, S.L. and Ruth, L.W. 2005. Federal forest-fire policy in the United States. *Ecological Applications*. 15: 532–542.
- United Nations Food and Agriculture Organization (UNFAO). 2006. Global Forest Resource Assessment: Progress Toward Sustainable Forest Management. FAO Forestry Paper 147. Rome, Italy. ISBN 92-5-105481-9.
- Forest Service. 2006a. LANDFIRE rapid assessment fire regime condition classes (rafrcc): Forest Service/Fire Science Laboratory. Missoula, MT: Rocky Mountain Research Station.
- Forest Service. 2006b. LANDFIRE rapid assessment reference fire regimes (rarfrg): Forest Service/Fire Science Laboratory. Missoula, MT: Rocky Mountain Research Station.
- Weaver, H. 1943. Fire as an ecological and silvicultural factor in the ponderosa pine region of the Pacific slope. *Journal of Forestry*. 41:7–14. ■

GUIDELINES FOR CONTRIBUTORS

Editorial Policy

Fire Management Today (FMT) is an international quarterly magazine for the wildland fire community. *FMT* welcomes unsolicited manuscripts from readers on any subject related to fire management. Because space is a consideration, long manuscripts might be abridged by the editor, subject to approval by the author; *FMT* does print short pieces of interest to readers.

Mailing Articles: Send electronic files by e-mail or traditional or express mail to:

USDA Forest Service
Attn: Karen Mora,
Managing Editor
2150 Centre Avenue
Building A, Suite 300
Fort Collins, CO 80526
Tel. 970-295-5715
Fax 970-295-5885
E-mail: kmora@fs.fed.us

If you have any questions about your submission, please contact me at the number or e-mail address above.

E-mailed Files. Mail all files to kmora@fs.fed.us. Manuscripts must be in Word, Word Perfect, or Rich Text format. Digital Photos may be submitted, but must be at least 300 dpi, with a minimum output of 5x7 (see photo section below). Digital photos must be submitted separately, please, **do not embed illustrations** (such as photos, maps, charts, and graphs) into the electronic file for the manuscript. Instead, submit each illustration as a separate file using a standard interchange format such as JPEG, TIFF, or EPS. For charts and graphs, include the data needed to reconstruct them, any special instructions for layout, along with a description of each illustration at the end of the manuscript.

Mailed Electronic Files. See mailing instructions above. Please label all

CDs and disks carefully with name(s) of file(s) and system(s) used. Along with a paper copy, please electronic files in Word, Word Perfect, or Rich Text format. Digital photos may be submitted but must be at least 300 dpi, with a minimum output of 5x7, and accompanied by a high-resolution (preferably laser) printout for editorial review and quality control during the printing process (see photo section below). Do not embed illustrations (such as photos, maps, charts, and graphs) in the electronic file for the manuscript. Instead, submit each illustration as a separate file using a standard interchange format such as EPS, TIFF, or JPEG, accompanied by a high-resolution (preferably laser) printout. For charts and graphs, include the data needed to reconstruct them.

Paper Copy. See mailing instructions above. Type or word-process the manuscript on white paper (double-spaced) on one side. Include the complete name(s), title(s), affiliation(s), and address(es) of the author(s), as well as telephone and fax numbers and e-mail information. If the same or a similar manuscript is being submitted elsewhere, include that information also. Authors who are affiliated should submit a camera-ready logo for their agency, institution, or organization.

Style. Authors are responsible for using wildland fire terminology that conforms to the latest standards set by the National Wildfire Coordinating Group under the National Interagency Incident Management System. *FMT* uses the spelling, capitalization, hyphenation, and other styles recommended in the *United States Government Printing Office Style Manual*, as required by the U.S. Department of Agriculture. Authors should use the U.S. system of weight and measure, with equivalent values in the metric system. Try to keep titles concise and descriptive;

subheadings and bulleted material are useful and help readability. As a general rule of clear writing, use the active voice (e.g., write, "Fire managers know..." and not, "It is known..."). Provide spellouts for all abbreviations. Consult recent issues (on the World Wide Web at <http://www.fs.fed.us/fire/planning/firenote.htm>) for placement of the author's name, title, agency affiliation, and location, as well as for style of paragraph headings and references.

Tables. Tables should be logical and understandable without reading the text. Include tables at the end of the manuscript.

Photos and Illustrations. Figures, illustrations, overhead transparencies (originals are preferable), and clear photographs (color slides or glossy color prints are preferable) are often essential to the understanding of articles. Clearly label all photos and illustrations (figure 1, 2, 3, etc.; photograph A, B, C, etc.). At the end of the manuscript, include clear, thorough figure and photo captions labeled in the same way as the corresponding material (figure 1, 2, 3; photograph A, B, C; etc.). Captions should make photos and illustrations understandable without reading the text. For photos, indicate the name and affiliation of the photographer and the year the photo was taken.

Release Authorization. Non-Federal Government authors must sign a release to allow their work to be in the public domain and on the World Wide Web. In addition, all photos and illustrations require a written release by the photographer or illustrator. The author, photo, and illustration release forms are available from General Manager Melissa Frey (mfrey@fs.fed.us) or Managing Editor Karen Mora (kmora@fs.fed.us).

Superintendent of Documents **Subscription** Order Form

S3

Order Processing Code:

*

Charge your order.
It's easy!



YES, enter my subscription(s) as follows:

To fax your orders: 202-512-2104

To phone your orders: 202-512-1800 or 1-866-512-1800

For subscription cost and to Order on Line: <http://bookstore.gpo.gov>

The total cost of my order is \$_____. Price includes regular shipping and handling and is subject to change.
International customers please add 25%.

For privacy protection, check the box below:

Do not make my name available to other mailers

Check method of payment:

Check payable to Superintendent of Documents

GPO Deposit Account -

VISA MasterCard

(expiration date)

**Thank you for
your order!**

Company or personal name (Please type or print)

Additional address/attention line

Street address

City, State, Zip code

Daytime phone including area code

Purchase order number (optional)

Authorizing signature

Mail To: U.S. Government Printing Office - New Orders
P.O. Box 979050
St. Louis, MO 63197-9000