"Uniting the Global Wildland Fire Community"

VOLUME 26.1

WILDFIRE

JANUARY - FEBRUARY 2017

PRESCRIBED FIRE & SAFETY

UPDATES FROM EUROPE TO ASIA, FROM AUSTRALIA TO THE USA.

"BUILDING ON 25 YEARS AS A GLOBAL WILDFIRE COMMUNITY"

An official publication of the **International Association** *of* **Wildland Fire**

January - February 2017 *Volume 26 Number 1*

To support regional aerial firefighting teams, Russia's Federal Firefighting Reserve provided reinforcements to Chita, east of Baikal Lake, a 2016 hotspot. See page 18 for our third in a series on Global Fire: "Eastern Fires - Western Smoke." Photo: Avialesookhrana.

On the Cover: Two Australian firefighters patrol a prescribed burn in the Cleland Conservation Park in the Mount Lofty Ranges, South Australia. Read more about fire as a tool throughout this issue, and learn about Australia's new prescbired fire policy on page 28. Photo: Ian Tanner, Department of Environment, Water and Natural Resources, South Australia.

CORRECTION: The smoke column on the cover of the Nov-Dec 2016 issue actually occured on August 14, 2015 (not 2014), on the Rough Fire, California.

COLUMNS & NEWS

FEATURES

LOOKING FORWARD

Imagining Future Wildland Fire Scenarios

TOM Zimmerman
PRESIDENT, IAWF

Reflecting on 2016

With 2016 past, it is time to take a reflective look back. While it has been another interesting, challenging, and busy year, it was not pervaded with surprise in terms of overall severity. However, it was comprised of some extreme individual events, a range of varied responses to meet and moderate challenges, and development and implementation of important events to better prepare us for the future.

In 2016, we experienced several unexpectedly difficult and relentless wildfires during historically low fire danger periods in the early season and late season. The Horse River Wildfire occurred in May and lasted into July in Alberta, Canada. Under high fire danger and extreme winds, it became the costliest disaster in Canada's history, and resulted in the largest evacuation in Canada's history. It burned over 589,500 hectares (1,456,686 acres), destroyed about 2400 structures, incurred costs in excess of $3.5 billion, caused the evacuation of almost 90,000 residents from the regional municipality of Wood Buffalo, and triggered a state of emergency that remained in place for nearly two months.

In November, the Chimney Tops 2 Fire occurred in Tennessee, USA, also under high fire danger and extreme winds. This fire became a very deadly event, burning over 17,000 acres (6870 hectares), destroying 1684 structures, causing 134 injuries and 14 fatalities, and was part of a complex of dozens of other fires.

During the historic high fire occurrence periods where preplanning and response readiness are greatest, large and costly fires occurred both in the USA and Australia.

Wildfires in January burned over 69,165 ha (170,910 ac) and destroyed 180 structures in Australia; a March wildfire burned over 367,620 ac (148,770 ha) in Kansas and Oklahoma, USA becoming the largest wildfire on record for the State of Kansas; and between June and October multiple fires burned over 310,000 ac (125,453 ha) and destroyed over 1000 structures in California, USA.

Change – Pushing our Programs

Some visible trends are apparent and have been developing over recent years. But new trends are emerging as indicators of future situations. Wildland fire management, now positioned prominently in the forefront of land and resource management, receives more social and political attention than ever before and faces demands and needs never experienced before. Changes are pushing the program far beyond its historical beginnings. Emerging trends, both good and bad, are influencing management capability, opportunities, and direction. Attention must be focused and re-focused on such issues as:

- Expansion and continuation of alterations to fuel and vegetation complexes
- Increasing wildland – urban interface areas and needs for community involvement in fuel and fire mitigation activities
- Conflicts between fire-prone landscapes and people

- Negative perceptions of wildland fire in all segments of society and within management organizations
- Recognizing and accepting fire as a natural process necessary to the maintenance of ecosystems
- Negative effects of aggressive suppression - emphasis on aggressive suppression fails to address its effects on trends in fuel complexes, potential increased damage to watersheds and sensitive natural resources, and continued public perceptions of protection capability
- Fire prevention programs
- Wildfire smoke production and social impacts
- Static and declining budgets coupled with declining workforce numbers for wildland fire management organizations
- Wildfire funding – solutions to wildfire funding
- Research – vital to increase scientific knowledge, develop new management tools, and transfer knowledge to practitioners and decision makers
- Risk management – ensuring sound risk management is the foundation for all fire management activities and emphasis on making safe, effective, risk-based wildfire management decisions
- Firefighter and public safety – reduce risk to firefighters and the public in every fire management activity
- Organizational capabilities – reduce conflicts between organizational restrictions on travel, training, research presentation, and continued education opportunities and needs to advance knowledge, skills, and capabilities

There are numerous activities underway to address many of these topics. The Wildland Fire Lessons Learned Center, in existence for 10 years, is a national, interagency, federally-funded organization based in the USA (http://www.wildfirelessons.net/home (http://www.wildfirelessons.net/home)). This center helps support and improve safe work performance and organizational learning for all wildland firefighters globally. It maintains a website having a repository of lessons learned reports and documents, podcasts providing new and innovative information, updates on new technology and advances, and short fire articles. It is making a significant contribution to improving firefighter safety and advancing learning. In just the last two years, it has documented 211 incident learning reports.

Wildland fire management agencies are highly motivated to better incorporate risk management into the business or wildland fire management and are taking steps to advance this. One key step is the clarification of risk management and its role in wildland fire management (Thompson, Matthew P.; MacGregor, Donald G.; Calkin, David E. 2016. Risk management: Core principles and practices, and their relevance to wildland fire. Gen. Tech. Rep. RMRS-GTR-350. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 29 p. https://www.fs.fed.us/rm/pubs/rmrs_gtr350.pdf). And risk management terminology has been more fully defined in respect to wildland fire management with existing science-based definitions, summarized into one concise and relevant set of consistent, clear, and usable definitions (Thompson, Matthew P.; Zimmerman, Tom; Mindar, Dan; Taber, Mary. 2016. Risk terminology primer: Basic principles and a glossary for the wildland fire management community. Gen. Tech. Rep. RMRS-GTR-349. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 13 p. https://www.fs.fed.us/rm/pubs/rmrs_gtr349.pdf)

In the United States, focused attention has been given to large-scale strategic planning for setting direction and developing a national or even international vision for wildland fire management. Such planning produced the 2014 National Cohesive Wildland Fire Management Strategy (http://www.forestsandrangelands.gov/strategy/). This strategy defines a vision for the next century as:

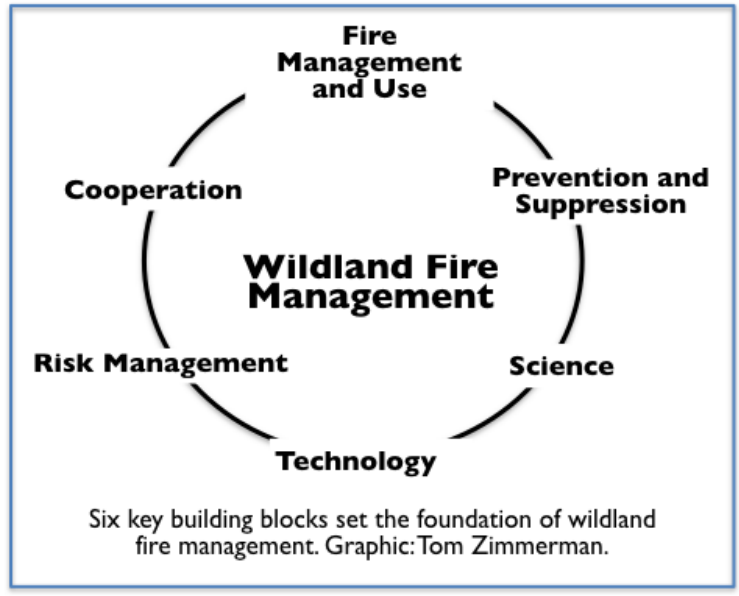
> *To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.*

Also in the USA, a strategic assessment process, the Quadrennial Fire Review (QFR) is conducted every four years to evaluate current wildland fire management community strategies and capabilities against estimates of the future environment. The most recent QFR was completed in 2014 (https://www.forestsandrangelands.gov/QFR/). It is a strategic evaluation of the long-range direction of wildland fire management looking into the future to identify potential risks, challenges, and opportunities to help inform strategic planning, investments, operational capabilities, and positioning. The 2014 QFR assessment focused on four key issue areas (changing climatic conditions, risk management, workforce, and operational capabilities), presented plausible alternative futures, and defined actions for consideration by fire leaders.

This report importantly points out that we frequently fall prey to hindsight bias while trying to understand how the present relates to the past. We also tend to display overconfidence in our ability to identify and anticipate future outcomes. Together, hindsight bias and overconfidence often prevent leaders from considering multiple future possibilities. The QFR states that leaders cannot afford the luxury of planning for just a single desired future state.

Moving into 2017 – Preparing to Accelerate

As we move into 2017, we must expect the business of wildland fire management to continue to present new and unique situations that will result from an increasing change in our fire environment – which in turn creates greater needs for awareness, attention, preparedness, response, and learning actions -- which in turn will challenge our knowledge, experience, and perceptions. We will need to accelerate learning and improve planning and program effectiveness. We need to prepare for a range of futures that could result from interactions among a number of factors, some outside of our control. Simply put, we need to look into the imaginable spectrum of future wildland fire scenarios.



Six key building blocks set the foundation of wildland fire management. Graphic: Tom Zimmerman.

The International Association of Wildland Fire (IAWF) is an independent organization established to facilitate global communication about wildland fire and provide leadership through a neutral forum that considers and addresses all important, and at times controversial, wildland fire issues. The Association enthusiastically promotes a better understanding of wildland fire, improved awareness of the interrelationship of this dynamic natural force and natural resource management, improved research and information transfer, advanced operational implementation methods and standards, increased attention, consideration, and commitment to firefighter safety, and improvements in professional development. Since its inception, the IAWF has worked to be the acknowledged professional resource for local to global scale knowledge, education, networking and professional development striving to help meet future challenges for the international wildland fire community.

We believe that wildland fire management has a foundation of six primary building blocks:

- Fire management and use
- Prevention and suppression
- Science
- Technology and information systems
- Risk management
- Cooperation and collaborative planning

We feel that many facets of these areas will be affected by future wildland fire scenarios and if approached positively, can be drivers to help shape future options and activities.

Our IAWF Priorities

The IAWF has and will continue to strive to support and advance these areas through a variety of methods.

We have published Wildfire Magazine for 25 years to provide fire related articles of interest around the globe. And for 25 years we have published the International Journal of Wildland Fire. It presents new and significant articles that advance basic and applied research concerning wildland fire.

We present international conferences to address significant fire issues, provide a forum for presentation of new science, and provide continuing education for fire professionals.

Past conferences include: Fire Safety Summit - 13 times; Fire Behavior and Fuels – five times; Human Dimensions in Wildland Fire Management – four times; International Smoke Symposium – two times; Fire Policy Summit – two times; one special conference dedicated to the 1988 Fires and the Future; and one special conference dedicated to Large Wildland fires and their social, political, and ecological effects.

We partner with a variety of organizations and associations to advance and achieve our collaborative visions about wildland fire management. We are part of the Partner Caucus on Fire Suppression Funding Solutions; a diverse group of international, national, and local organizations supporting work to develop a comprehensive solution to the wildfire suppression funding issue in the USA. Despite efforts, a fix to the fire funding problem has yet to be achieved but continued consolidated efforts will continue in 2017.

As we move ahead, there is much that can be done. Multiple issues need to be addressed but solutions in some cases will prove hard to define. That, however, is no reason to stop striving for progress.

Also necessary, as recommended in the QFR, is our ability to look into the future and use our imagination to identify possible future wildland fire scenarios.

Above all, we should actively seek to not be surprised, to be able to anticipate most, if not all, potential future scenarios, and plan proactively. As is commonly said, we should think "outside the box." We should not rely on past experience only, should not expect that a single future scenario will occur, and not underestimate potential outcomes from combinations of many factors, including social, political, and ecological ones. The IAWF, along with partners and involved wildland fire management organizations will continue efforts to find solutions, implement appropriate actions, advance capabilities, and support all wildland fire management individuals and organizations.

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BRIEFING

WITH CLIMATE ON OUR MINDS

The Doubting Thomases who parley "climate skepticism" into their own self-promotion have joined together into a club, some of whom are moving this month into a few wings of the White House and the US federal government.

As fire professionals, this does and should concern us -- as we either engage in and work to shape policy or we are shaped by it. So the national leadership transition in the US — moving from an administration that pursued climate science despite partisan gridlock and to an administration and Congress that anchors aspects of their victories in the obfuscation or outright denial of accepted climate science — has been on our mind as we gather the pages of Wildfire Magazine, because it's on many of our minds, and the focus of many a conversation at work and among friends.

But before we think of the potential impact of shifting US policy on climate change, and how it may influence our profession, we should think of the facts.

When my colleagues who practice environmental journalism gather to discuss their reporting on climate change, you will often hear a phrase: "You are entitled to your own opinion, but you are not entitled to your own facts."

In this case, the phrase is attributed to the sociologist turned senator, Daniel Patrick Moynihan, as quoted by outgoing President Barack Obama in "The Audacity of Hope."

But a version appears earlier, in 1946, voiced by financier turned presidential adviser, Bernard Baruch, who offered this:

> *On the question of principles, it is an inalienable right each of us has to express opinions on every policy animating this country, whether national or international. That is the highest function of those who live under a political democracy; of those who cherish the right of free speech. Every man has the right to an opinion but no man has a right to be wrong in his facts. Nor, above all, to persist in errors as to facts.*

When wildfire managers and scientists gather, one will hear echoes of this same phrase, whether you are joining the print-and-virtual gatherings that are collated in the pages of Wildfire Magazine and the International Journal of Wildland Fire, or in actual gatherings, such as the 3rd Southwest Fire Ecology Conference, sponsored by the Southwest Fire Science Consortium and the Association of Fire Ecology. This meeting, focused on "Beyond Hazardous Fuels: Managing Fires for Social, Economic & Ecological Benefits," was the first large-scale public gathering of US fire professionals after the November election. And I was heartened to hear a dogged commitment to correct errors and persist in the facts of climate change.

I took far too few notes for an environmental journalist, but in a concise 1000 words of notes over four days, the phrase "climate change" occurs 10 times in my notes, with the word "policy" appearing with equal frequency (though not always in the same sentence). Oddly, variants on "resilience" and

"resilient" only appear four times, balanced perhaps by variants on "resource" and "resource objectives," which appear seven times.

What I did hear goes something like this, from a wide range of experts whose reputation for being right on their facts.

Elizabeth Reinhardt (recently retired fire scientist from the US Forest Service) offered a baseline overview, as we enter into climate change impacts, that we must focus our actions on the level of risk we incur and might mitigate. "In the arid west, biomass accumulates faster than it decomposes. Fire is an intrinsic, unavoidable component of these ecosystems. We simply can't do enough to get in sync with historical patterns. Since we can't hope to do fuel treatment to the extent that there were historic occurrence, we need to prioritize our work. A risk-based approach has potential to maximize our hazardous fuels dollars."

And Peter Fule, professor at Northern Arizona University, suggested that we not "take notes on what the temperature will be in 2080. But develop questions for managers" on how they will respond. His take home messages:

- Management does make a difference.
- Within climate thresholds, future management makes a difference.
- Fuel structure makes a greater difference than fire weather.
- Need to use all our tools.
- For the Southwest United States, we can and should work with Mexican managers and ecologists.
- We need to grapple with interactions of climate disturbance and vegetation -- it is what we have to do in order to adapt to the sort of climate and world we're living in, in this century.

At the conference close-out, Tim Sexton, Program Manager for the USFS Wildland Fire Research Development & Applications Programs, offered facts but also the sort of lessons that can only be gained by 47 seasons of fire experience. His suggestion:

"We need a call to action. Current actions aren't enough. Fuel accumulation is occurring faster than treatments."

In part, he observed, we're behind because we still suppress so many fires. "Did we really abandon the '10 am/10 acre' standard [in the early 1970s]? With our current 96% success rate, we're still beating the 1936-39 standard.

"Meanwhile, in California, we're observing drought-related impact — all age classes are dying. And we may see the extinction of ponderosa pine and replacement by oak savanna or just savanna.

"In years to come we expect to see huge risk to firefighters in the southern Sierra, with more stems competing for the diminished moisture out there."

He closed with this logic for "Why we must act."

- Firefighter safety
- Threats to public and property
- Not meeting resource objectives.
- And asked, "What's in it for you?" If you find a follow a call to action, you will:
- Make a difference. You want to participate in solving this "wicked problem."
- Be a good steward of the land.
- Leave the land better for your successor by reducing risk under your watch.
- Improve your situation for your next fire. (Which he demonstrated with a WFDDSS analysis map - the Cedar 2012 fire burning into Bridge 2007 Fire and diminishing in intensity and spread, the Elizabeth 2012 burning into Black Canyon fire.)

What will our call to action look like?

Opportunism is not leadership but a mere *tactic du jour*. We need strategies guided not by an urge for power but by science that is infused and polished with our practical knowledge, earned by decades of engaged fire scientists working with fire managers. That is what we should all be seeking — in our publications, as we enter Year 26 of Wildfire and IJWF, and in our practices.

Throughout this year you'll see our tagline and occasional reflections, with this goal: ***"Building on 25 Years as a Global Wildfire Community."*** A tagline and goal which applies to Wildfire Magazine, but just as much to our sister publication, the International Journal of Wildland Fire (which reflects on its 25 years in their pages and here in this issue too). And it applies to all wildfire professionals, who must ask the question: What will be build in our times and our places, in the next 25 years?

There is no doubt, our profession is living with and leading a frontline response to the impacts of climate change. But are we leading the policy? From the conversations and presentations we've witnessed in our conference and in our pages, from the work of IAWF and AFE and so many others in our profession, I sense that we are indeed leading, and doing so successfully.

"Is science shaping policy?" This is what Bill Kaage, chief of the National Park Service Division of Fire and Aviation Management, asked at the Southwest Fire Conference. His answer was yes, and he added that we should use science "to test policy, to come up with better ways of doing things. That's how policy is changed. The role of science for why you might do things differently is critical. Change percolates up from field. You have a role in doing that and it must be science and data driven. The WIldland Fire Leadership Council — they base their work on science.

But he also reminded us about "the importance of relationship building with your constituents. Stuff will always go wrong and you don't want to be alone at that microphone."

Another speaker, University of Arizona professor Don Falk, observed that "For those of us who pledge allegiance to reality … climate change is a genie that's gotten out of the bottle and won't be going back in. On the research front we must continue to speak regardless of policy. For example, we must recognize the relationship between persistent drought and fire."

Yes, our leadership will be challenged in years to come, not unlike the challenge we face when the wind turns and a flanking fire shifts to a head fire. But we have strong relationships. And in policy as on the fireline, it may be time to fall back to the basics.

Anchor and flank.

With concern for our welfare and the welfare of the public and the management of fire's impact on resources as well as the benefit that fire brings to our fire-adapted landscapes.

REFLECTIONS *on* Wildfire Magazine *and* Thoughts on Leadership

What we've learned over 25 years

Be impeccable with your personal integrity and never give up your autonomy and ability to keep others from acting on your behalf in ways that violate your personal values.

by Mike DeGrosky

It is fair to say that I have a long history with the International Association of Wildland Fire and Wildfire magazine. I was the second President of the IAWF's Board of Directors. When I first encountered the *Wildfire* operation, as something other than a reader, the IAWF owned a full-on printing operation in Fairfield, Washington. Multiple printing presses, big building, crew of professional pressmen, the whole works. All to print Wildfire, the International Journal of Wildland Fire and other IAWF publications, supplemented by some commercial printing. Having grown up around commercial printers, I was both fascinated and surprised. The organization's founder, Dr. Jason Greenlee, ran a small empire in which both the magazine and journal were produced entirely in-house: editorial, design and layout, ad sales, everything.

While ambitious, innovative, and impressive, the IAWF printing operation ultimately proved financially unsustainable. After several years of downsizing, during a period of financial trouble that the IAWF is now long-past, the Board of Directors decided to liquidate the IAWF printing operation -- a task that I largely carried out. Those were dark times; telling the few remaining workers they no longer had jobs and selling our beautiful, vintage Heidelberg presses at bargain prices. I saw, during that time, a surprising example of human spirit. Our head pressman, who would soon be without a job, hung in until the last press was sold and picked up while the other Board members and I struggled to bring things to a close from our offices hundreds of miles away.

I have always considered Wildfire, along with the International Journal of Wildland Fire and our conferences, to be the heart, lungs, and central nervous system of the IAWF. Losing either Wildfire or the Journal represented a threat to the IAWF's very existence.

A tremendous partnership with CSIRO Publishing, that continues to this day, saved the International Journal of Wildland Fire, a publication with no peer in the world.

Though broke and facing a more difficult task, the IAWF Board also found a way to bring Wildfire back. We preserved the magazine by partnering with a consortium of small businesses in Jackson, Wyoming to start small, rely on Board members and other volunteers for editorial and managerial work, and bring the magazine back slowly. Saving both the International Journal of Wildland Fire and Wildfire could not have happened without the visionary leadership and hard work of the Board of Directors at the time.

Unfortunately, during this time, still digging out of financial trouble, the IAWF affiliated with another organization, an affiliation I take both credit and blame for initiating. Unfortunately, that affiliation brought people who did not share our values into our lives and ultimately led to the unseemly demise of the partnership between the Association and the small businesses that had taken a chance on us, fought and sacrificed with us, and who had helped bring us back from the brink of financial ruin.

Dark days again, and events that I still regret some 15 years later. Not only did we screw-over some really fine people running small start-up businesses, those people were my friends. I have told few people this, but I have never been more ashamed of something in which I was involved, particularly since I was a small

business owner myself. The lesson for me, and I believe for some of my fellow board members, was that no matter how desperate the times, no matter the reason, be careful with whom you associate. Most of all, be impeccable with your personal integrity and never give up your autonomy and ability to keep others from acting on your behalf in ways that violate your personal values.

Another, more positive, lesson we can all learn from the life of Wildfire magazine is that perseverance pays off. Since the Jackson days, beginning with Fire Chief magazine, a series of commercial publishers produced, and actually owned, Wildfire though the magazine remained "the official publication of the IAWF." Over time, with consolidation in a shrinking publishing industry, this model became unsustainable as well. The good news is that we got our magazine back. So now we have come almost full circle, and I commend our Executive Director Mikel Robinson, Managing Editor Ron Steffens, and the magazine's fine group of volunteers – Editorial Board, Contributing Editors, contributors and staff – who keep this magazine going as a labor of love, just like it started out.

Around 2000, at an IAWF Annual Meeting, Lark McDonald approached me with an idea. I had solicited his company, MCS, as a financial supporter of the IAWF. While unable to contribute financially, Lark suggested that he might write a recurring column on leadership as his contribution to the IAWF and Wildfire. From 2001 through 2004, Lark served as the primary contributor of Thoughts on Leadership [his first column appeared in December/January 2000/2001, screenshots left and right], with me standing in from time-to-time when Lark needed relief. In 2005, I took over as the full-time contributor of Thoughts on Leadership, and I am proud to say that the column is still going strong a surprising 12 years later. There have been some pretty rough times but I personally have tried to treat those as learning and character building experiences; and I am proud of my affiliation with Wildfire and grateful for the people I have gotten to meet along the way.

I frequently cite my experiences with the IAWF and Wildfire as important ones for me and opportunities to learn some important life lessons that have influenced my personal approach to leadership ever since. For me, those life lessons include:

- Influence and leadership take vision. Without Jason Greenlee's original vision, Wildfire magazine would have never existed. Without visionary leadership by members of the IAWF Board and staff, Wildfire would have died long ago. In either case, the wildland fire community would have been a lesser place without Wildfire.
- No amount of vision replaces hard work. Establishing, growing, saving, and sustaining Wildfire magazine has taken a lot of hard work on the parts of many people. The magazine is a good idea, but keeping it going requires sustained effort.
- If something is a good idea, people will work hard for it. You just have to ask them.
- No matter how desperate things look, no matter the situation, choose your friends wisely. Be impeccable with your personal integrity, never give up your autonomy, and never put others in the position of acting on your behalf in ways that violate your personal values.
- Perseverance matters. If you believe in something, hang in there, work hard for it, don't be afraid to sacrifice, work like you mean it.


Thoughts on Leadership

DANGER OR OPPORTUNITY?

By Lark McDonald

The future of leadership

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Wildfire - December/January 2000-01

Mike DeGrosky is Chief of the Fire and Aviation Management Bureau for the Montana Department of Natural Resources and Conservation, Division of Forestry, and 2016 Adjunct Instructor of the Year for the College of Arts, Humanities, and Social Sciences at Fort Hays State University, where he taught for the Department of Leadership Studies for 10 years. Follow Mike on Twitter @guidegroup or via LinkedIn.

IAWF News

New board members, a global award, and conference news

IAWF Welcomes Two New Board Members

On January 1, 2017, the IAWF welcomed two new members to our Board of Directors.

Michele Steinberg is the Wildfire Division Manager at the National Fire Protection Association (NFPA), leading a team dedicated to wildfire safety outreach. NFPA is a global nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards.

Ms. Steinberg has worked in the areas of natural hazards, land use planning, and disaster safety outreach for state and federal government agencies and nonprofit organizations for more than 25 years. She holds a BA in English and American Literature from Brandeis University and a Master of Urban Affairs from Boston University.

Dr. Gavriil Xanthopoulos is an associate researcher specializing in forest fires at the Institute of Mediterranean Forest Ecosystems of the Hellenic Agricultural Organization "Demeter." He holds a B.Sc., degree in Forestry from the Aristotelian University of Thessaloniki, Greece and M.Sc. and Ph.D. degrees in Forestry with specialization in Forest Fires from the University of Montana, U.S.A. He has been active in European forest fire research for more than 25 years, with a parallel involvement in many aspects of operational fire management, post-graduate teaching and forest fire management training.

Dr. Xanthopoulos has served as a member of the Board of Directors of the International Association of Wildland Fire (2005-2010) and as an associate editor for the International Journal of Wildland Fire. His research interests include forest fire policy, fire prevention, fire danger rating, fire behavior, fuel management, firefighting, post-fire rehabilitation, forest fires and climate change, and new technologies in fire management. His publications cover a broad spectrum and reflect his involvement with both research and operational applications.is an Associate Researcher at the Hellenic Agricultural Organization "Demeter" Institute of Mediterranean Forest Ecosystems in Athens, Greece. The research interests of Dr. Xanthopoulos include forest fire behavior modeling, fire danger rating, forest firefighting and firefighter safety, fire prevention, forest fuel management and modern technologies application in forest fire management. His long track record in forest fire research in combination with his involvement with operational fire management have allowed him to build an in-depth understanding and balanced views on fire management policy issues. His emphasis is on work that can directly benefit the operational world of forest fire management, with which he maintains good links.

We would also like to thank our two outgoing Board Members, Adam Gossell, Alberta Sustainable Resource Development from Edmonton, Alberta, Canada and Dan Neary, USDA Forest Service, Rocky Mountain Research Station from Flagstaff, Arizona, USA. Thank you for your service on the Board of Directors over the past 6 years.

Fire Work in Congo Earns US Forest Service Chief's award

Terry Severson (R9), Marlene DePietro (R4), and Ron Steffens (Grand Teton National Park) received a 2016 Chief's Award for "Applying Knowledge Globally" for work supporting fire management capacity building in the Democratic Republic of Congo. The work was funded by the United States Agency for International Development and coordinated through International Programs. The team conducted trainings for land managers and community members in the Lake Tumba region of DRC in land use planning, fire suppression, and prescribed burning. The fire-dependent ecosystems of the area include vast savannahs interlaced with gallery forests, and contain globally significant biodiversity, including bonobos, a type of chimpanzee.

Ron Steffens is a former IAWF Board of Director as well as the Managing Editor of Wildfire Magazine.

ISS2 Virtual Conference

If you missed the 2nd International Smoke Symposium which was held in Long Beach, CA on November 14-17, 2016 you can still participate in the Virtual Conference. The entire Symposium was professionally video-taped and still available for viewing. The purpose of this symposium was to convene air quality, fire, and smoke specialists from the research community, non-governmental organizations (NGOs), local/state/federal government agencies and tribes to discuss the state-of-the-science and state-of-the-applied-science for smoke management and addressing the air quality impacts of wildland fire smoke.

We are offering access to the Virtual Conference at a deeply discounted rate of $90 for individuals and $40 for students. This offer will be offered through February 14, 2017.

You can register for the Virtual Conference by visiting the ISS2 webpage. http://www.iawfonline.org/2016SmokeSymposium/

Spark Award: Best Student Presentation at the ISS2

At the ISS2 we had some stellar student presentations included on the program schedule. We had a wonderful group of professionals who volunteered to attend each of the presentations, evaluate and compile their results.

We are pleased to announce the recipients of the Spark Award: Best Student Presentation!

- First Place: Joshua Horsley, University of Sydney, AustraliaForecasting fire smoke exposure and health impacts in Australia
- Second Place: Scott Kelleher, Colorado State University Low-cost wildfire smoke monitoring and detection
- Third Place: Steven Brey, Colorado State University

There's the smoke, where's the fire? A regional analysis of which fires impact U.S. air quality based on a decade of HMS smoke data

Congratulations to each of these students. They were awarded with an IAWF membership, as well as a cash prize.

IAWF Partner Conferences

International Congress on Prescribed Fires (ICOPFIRES)

- February 1-3, 2017
- Barcelona, Spain
- http://www.paucostafoundation.org/ICoPFires

Aerial Firefighting Europe 2017

The Essential Firefighting Aerospace Forum

- October 17 -18, 2017
- Nimes, France
- http://tangentlink.com/event/aerial-firefighting-europe-2017

The International Association of Wildland Fire is pleased to consider partnering or sponsoring other organizations' conferences. Visit http://www.iawfonline.org/Partnership_Levels.php for more information.

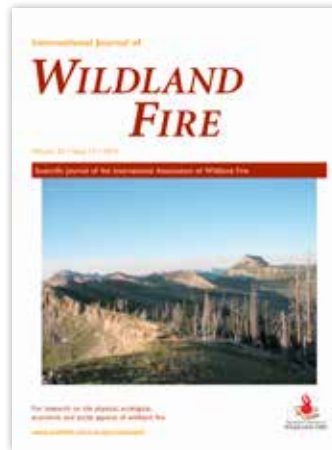
25 YEARS of the International Journal of Wildland Fire

Reflecting back and looking forward on publishing wildland fire science with an international perspective.

by Susan G. Conard, Stefan Doerr (Editors in Chief) and Jenny Foster (Publisher), IJWF

Originally published 5 December 2016 in *International Journal of Wildland Fire* 25(12) i-i http://dx.doi.org/10.1071/WFv25n12_FO

The year 2016 closes with 25 years of the International Journal of Wildland Fire (IJWF). As we celebrate this landmark, IJWF remains the only journal dedicated to publishing peer-reviewed research on all aspects of wildland fire. Founded as the official scientific journal of the International Association of Wildland Fire (IAWF), it was aimed at meeting the needs of the rapidly growing international wildland fire science community for a dedicated, multidisciplinary peer-reviewed outlet for their research. Its purpose was to disseminate the most important fire research information within the international science community, as well as to practitioners and policymakers who need to ensure their policies and practices reflect the latest scientific evidence. A quarter of a century and over 1300 published papers later, the Journal has seen many changes, yet this primary purpose has remained the same.



The IJWF was initially a quarterly journal and the first nine volumes (1991–1999) were self-published by the IAWF. Publication and management of the Journal was turned over to CSIRO Publishing under contract with IAWF in 2000. In 2001, the Journal published Volume 10, in four issues. Since 2007, the number of issues per year has gradually increased to accommodate rising submissions. This current issue is the 12th of 2016, reflecting the remarkable growth of the Journal and of wildland fire science as a whole. The stature and visibility of the Journal have also increased over time; IJWF is now ranked consistently in the top 10 of over 60 forestry journals in Thompson Reuters Journal Citation Reports. Since 2013, its papers have received over 3000 citations per year.

The Journal's content is managed by two Editors-in-Chief and a continually expanding team of over 50 dedicated Associate Editors (AEs.) These AEs have expertise in traditional and emerging disciplines of wildland fire science, including climate change and meteorology, fire behaviour, remote sensing, ecology, paleo-climate and fire history, hydrology and many other areas of the physical and biological sciences as well as economics, management, communication and social science. The AEs and of course the reviewers are at the core of enabling IJWF to publish the very best wildland fire science in this increasingly complex and interdisciplinary field.

The Journal is truly international, with the majority of submissions originating from North America (one-third), Europe (one-fifth) and Australasia (one-fifth). The remaining papers come from authors in Asia (one-tenth), with a sprinkling of papers from Africa and South America. Our readership mimics this pattern too! A steady rise in submissions over the last 5 years has translated into an increase in published output. In line with this, we have expanded the number of issues from 8 to 12 in 2016, so our authors and readers now enjoy even more frequent and rapid publication. Over 85% of our institutional subscribers choose to take the online-only option, and our content is being downloaded more than ever, with our website visits also increasing each year.

The world of publishing is developing and changing rapidly, and IJWF has aligned with –and in some cases pre-empted – trends in publishing and delivery technologies. Our new website boasts upgraded search algorithms that make user experience more efficient, and we are in the process of making our content accessible to those with audio/visual/motor impairments by implementing a standard known as Web Content Accessibility Guidelines (WCAG) compliance 2.0 AA (http://wcagcompliance.com/). We support open-access options, and from 2017 will be featuring one additional Editor-Choice open-access paper per issue. Additional partnerships with services such as Meta and Scimex

further enhance discovery and promotion of our content, which is a huge benefit for both our readers and authors.

We have, however, retained the long-proven approach of anonymous peer review and thorough evaluation of manuscripts by the editorial team. This inevitably takes time and often involves more than one revision for manuscripts that are recommended for publication, but it ensures that the quality of the research published in IJWF is of the highest standard. We would like to take this opportunity to express our gratitude to our Associate Editors, past editors and reviewers for their invaluable contributions in this process, and all authors for choosing IJWF as the journal to disseminate their work. We also thank our sponsoring organisation (IAWF) and the members of the Editorial Advisory Committee for supporting the Journal as it continues to grow and evolve.

In celebration of the 25th anniversary of IJWF, we have put together a virtual issue, freely available, comprising some of the most frequently cited papers in each 5-year period. This issue (available at http://www.publish.csiro.au/wf/content/VirtualIssues) includes research papers on topics such as erosion and hydrology, fuels, fire behaviour, fire–climate interactions, remote sensing of fire, fuels, fire management and prescribed fire, ecosystem effects of fire, and geospatial analysis of fire, vegetation, and fuels. Authors and co-authors come from more than 10 countries, and the papers serve as examples of the impactful research disseminated through IJWF. Some of the content will be familiar to many of our readers and we invite all of you to take a look at the full breadth of topics included here.

While the world of publishing and research as whole is undergoing rapid changes, wildland fires will remain, and most likely increase in prominence, as important disturbance events in many regions of the world. We look forward to IJWF continuing to serve you, the wildland fire community, by publishing your excellent research on all aspects relevant to wildland fire.

Virtual Issue - a selection of the most-cited research papers from the past 25 years

To celebrate 25 years of publication of International Journal of Wildland Fire, we have put together a virtual issue that includes some of the most-cited Research Papers over the years. This virtual issue features two papers from each 5-year period, starting in 1991: http://www.publish.csiro.au/wf/content/virtualissues?id=1962. A few examples of what you'll discover include:

Published 1998: Fuel Models and Fire Potential From Satellite and Surface Observations. RE Burgan , RW Klaver , JM Klaver. International Journal of Wildland Fire 8 (3) pp.159 - 170.

Published 13 May 2010: Forest fire occurrence and climate change in Canada. B. M. Wotton , C. A. Nock , M. D. Flanniga. International Journal of Wildland Fire 19 (3). pp.253 - 271.

Published 25 July 2013: Relationships between climate and macroscale area burned in the western United States. John T. Abatzoglou , Crystal A. Kolden. International Journal of Wildland Fire 22 (7). pp.1003 - 1020.

AFTER FLAMES

Witnessing Wildfire

Photos by Carlos Vera.

Post-fire recovery.

Laguna Verde sector, Valparaiso, Chile.

The community of Laguna Verde begins recovery after a drought- and wind-fueled fire on January 2, 2017. This fire is reminscent of what was witnessed in Chile in 2014, and of a global pattern of loss when vegetation, houses and fire mix.

This fire killed one, injured 19, and destroyed over 100 houses. The work of recovery continues in Laguna Verde, and elsewhere where wildfire and homes meet.

Eastern Fires, Western Smoke

Visit the online issue at wildfiremagazine.org for complete galleries and background.

Preface: Reflecting on 25 years of global fire

The last two essays in *Wildfire Magazine* published by the Global Fire Monitoring Center (GFMC) provided global perspectives of wildland fire – *Local Fires, Global Worries* (January 2016) and *The Global Wildland Fire Network: 2016 in Review* (November 2016). The author, Lindon Pronto – a Californian and second generation wildland firefighter, after working in US forest firefighting for almost a decade – joined the GFMC in early 2015. Since, he has witnessed the agenda and unprecedented pace of global development in cooperation of the international wildland fire community that brought the 6th International Wildland Fire Conference to East Asia – hosted by the Republic of Korea in October 2015 – and subsequent message to the World Climate Conference in Paris. Lindon's essays in *Wildfire Magazine* reflect that not only is wildland fire science globalizing, but fire management, too.

In 2016, *Wildfire Magazine* and its academic sister, the *International Journal of Wildland Fire* (IJWF) celebrated their 25th Anniversary. In its December 2016 issue, the editors-in-chief of IJWF reminded us that IJWF is the only journal dedicated to publishing peer-reviewed research on all aspects of wildland fire, and thus being the voice of a rapidly globalizing wildland fire science. The motivation to launch the IJWF was not just for a family of scientists to "have their own journal," but to expand insight into the role of vegetation fires in the Earth System.

Two years before the launch of the journal, I recall that Andy Koonce, a wildland fire researcher at the U.S. Forest Service Pacific Southwest Forest and Range Experiment Station in Riverside who passed away several years ago, presented the visions and concept of the *International Association of Wildland Fire* to the international community.

That was in 1989, at the international conference *Fire in the Tropical Biota*, hosted by the Fire Ecology Research Group of Freiburg University, predecessor institution of the GFMC. This conference, including its resulting policy statement, the *Freiburg Declaration on Tropical Fires*, revealed, from an interdisciplinary point of view, that the so far less observed – not to say "forgotten" – regions of the world were playing a major role in the global wildland fire theater. Thanks to Jason Greenlee, the custodian of the world's largest wildland fire library, who served as its first editor, the IJWF was launched in 1991. *Wildfire Magazine*, as it celebrates this landmark anniversary, can be lauded for successively widening its original North America focus to global coverage over the past quarter-century.

The ice melts

In the late 1980s, the "Eastern" fire world was not yet on the screen of an emerging international community of wildland fire scientists and practitioners. No wonder – the *Cold War* had separated the world by the *Iron Curtain* leading to a separate evolution of fire science and fire management systems in both political hemispheres – without exchange and cross-fertilization. The fall of the *Berlin Wall* a quarter-century ago and the thawing

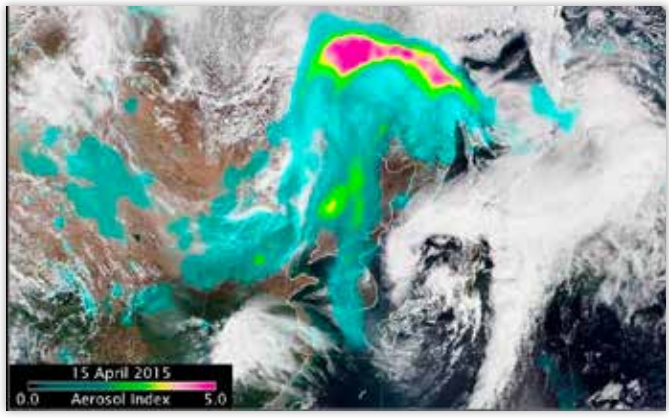
Why fires in temperate-boreal Eurasia have transboundary impacts

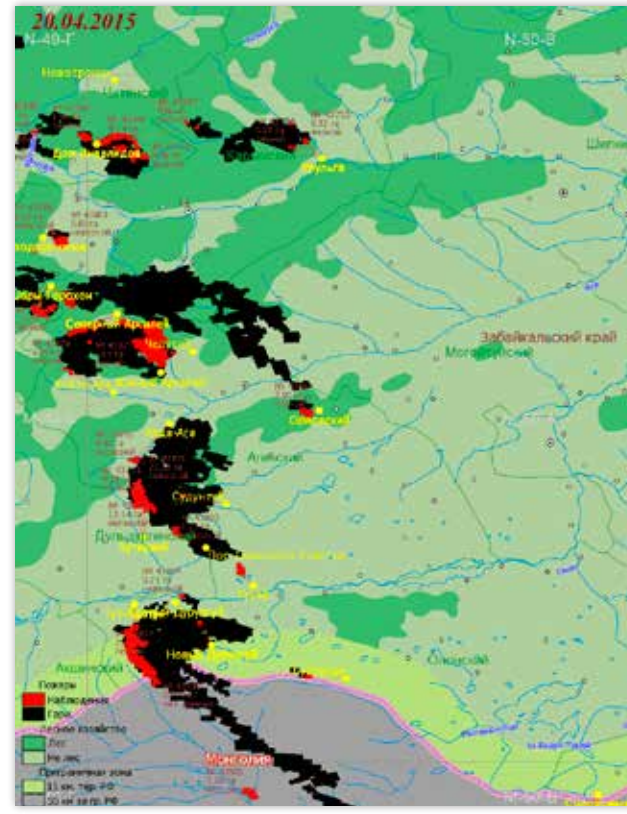
By Johann Georg Goldammer
Director, Global Fire Monitoring Center (GFMC)

of the political ice age, coincided with the advancement of satellite remote sensing capabilities. Indeed, insight from space with the increasing capacity and accuracy of satellite sensors paved the way towards a wildland fire *glasnost* in a region where the visibility and transparency of fires and fire regimes had been obscured.

In 1991, scientific dialogue and technical cooperation in fire management between the East and the West finally commenced. Two years later, the first East-West International Conference *Fire in Ecosystems of Boreal Eurasia* was held In Krasnoyarsk in Central Siberia, followed by the *Fire Research Campaign Asia North* (FIRESCAN) with its *Bor Forest Island Experiment* (1), numerous bilateral and multilateral research projects in the years after and in 1996, the first-ever international conference addressing *Forest Fire and Global Change* was held in Shushenskoe, Siberia. Thus, another landmark anniversary of 25 years of East-West cooperation in fire research management and fire research was commemorated in September 2016 at the headquarters of the Aerial Forest Fire Center *Avialesookhrana* in Pushkino (Moscow Region) and the Sukachev Institute of Forests, Russian Academy of Sciences, Krasnoyarsk (Siberia). These numerous anniversaries bear testament that the late 1980s and the early 1990s saw an awakening and the promise of a globalization of fire science and fire management towards an unprecedented era of exchange and cooperation around the world.

Visual impressions from the wildfire assessment in Eastern Mongolia in May 2015 (above and left). Extended areas of steppe ecosystems, birch, pine and larch forests were affected by the fires. Intensive grazing in and around settlements resulted in low fuel loads and slowing down the wildfire intensity and thus many villages could be successfully defended. Photos: RFMC-CAR.





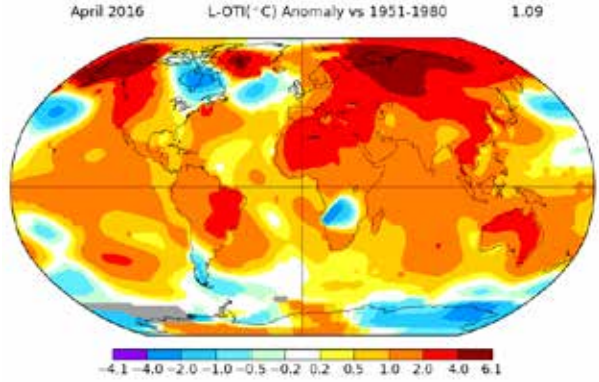
(LEFT) Smoke plumes of the wildfires in Central Asia were transported to the South (North and South Korea) and to the East (reaching the Canadian and the U.S. Pacific West Coast). Satellite observations show the Aerosol Index captured on 15 April 2016: The blue, green, yellow and orange colors show the aerosol concentrations associated with the smoke from the fires burning in Eastern Russia and Eastern Mongolia on 15 April 2015. Source: NASA. (RIGHT) Satellite tracking of wildfires crossing the border between the Russian Federation and Mongolia on 20 April 2015. Daily fire maps like this one are provided by the Sukachev Institute of Forest, Siberian Branch, Russian Academy of Sciences (SB-RAS) and its "Federal Krasnoyarsk Science Center SB-RAS."

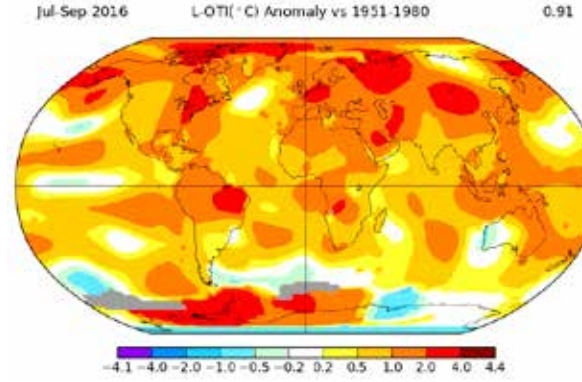
Eastern fires: Mongolia

The past year (2016) we again witnessed significant fire activity around the world. North America experienced wildfires with disastrous effects on local communities – from the devastating rampages of Fort McMurray fire in Alberta, to the tragic loss of life and dark skies over Gatlinburg, Tennessee. A comparatively small wildfire in Israel attracted an international crowd of firefighting airplanes and firefighters rushed in from all over the world. Again, after their response to the Mt. Carmel fires of 2010, Palestinian firefighters crossed the borders and assisted Israel to overcome the emergency – ignoring political and emotional boundaries and following only their mission and oath.

Urban wildfires and those burning at the fringes of urban and residential areas logically attract the attention of the media as human assets, health and lives are at risk. However, similar events in the remote regions of Central Asia did not make headlines.

For instance, in March 2015 wildfires burning in the Southeast of the Russian Federation, notably in *Zabaikal Krai*, claimed 34 lives, injured 7,500 people, destroyed over 1,400 homes and left 5,000 people homeless; by April, these fires had crossed the border into Eastern Mongolia. By the close of April, fires had scorched 5.5 million ha (13.6 million acres) of steppes, forests and pasture lands, killed several thousand livestock and burned down nomadic *gers* and injured several people over an area of more than 2000x (two thousand times) the size of the 2016 fire in Israel – or nearly as big as the entire country of Croatia (see prior pages and above, and online Gallery 1 and 2).





Climate Change Observed: Surface temperature anomalies for April 2016 and the Northern Hemispheric during Summer 2016 for Central Asia as compared to the baseline observations 1951-1980 reveal the above-average recorded temperatures and thus increased meteorological wildfire danger in the northern latitudes – and the need for enhanced preparedness. Source: NASA

The increasingly visible impacts of regional climate change have prompted the governments of Central Asia to take decisive steps to prepare for climate change including changing fire regimes, and to mitigate increasing wildfire threats. In 2015 the *Organization for Security and Cooperation in Europe* (OSCE) assisted Mongolia to set up the *Fire Management Resource Center – Central Asia Region* (RFMC-CAR).

With financial assistance from Switzerland through the OSCE and with technical support from the GFMC, the regional fire center was established at the National University of Mongolia in Ulaanbaatar with the aim to serve Mongolia and its Central Asian neighbors as an advisory and capacity-building center of excellence in fire management. The expertise of the Head of RFMC-CAR, Dr. Oyunsanaa Byambasuren, includes his responsibility as coordinator of the Regional Central Asia Wildland Fire Network and Deputy Chief of GFMC and, among other, as Secretary of the National Coordination Committee on Forest and Steppe Fire Protection (NCCFSFP), an inter-agency fire management coordination mechanism of the government of Mongolia. This is the third such Center since the establishment of two others in Southeast Europe / Caucasus in 2010 (based in Skopje, FYR Macedonia) and Eastern Europe in 2013 (Kiev, Ukraine). And in 2017, two more Regional Fire Management Resource Centers will be established in Southeast Asia (Indonesia) and Latin America (Brazil).(See below and online Gallery 3]

Eastern Fires: Russia

While the 2016 fire season gave Mongolia a break, Russia however, faced extended drought in Central Siberia and the Far East. Satellite imagery of wildfires and a satellite-derived map of aerosol emissions on 18 September 2016 North of Lake Baikal and the regional capital Irkutsk, gives an impression of the size of area affected by fire: The map of fire locations in Siberia and in the Russian Far East during the fire season of 2016 (Gallery 4) show that the territories affected by wildfires stretched from 60° to 135°E within a belt between 50° and 60°N, with main fire-affected regions around Baikal Lake and in the Amur region of the Far East. The preliminary evaluation of satellite data revealed that within Siberia about 14,000 fires burned a total vegetated area of 11.4 million ha (28 million acres), and in the Far East of Russia 4,800 fires affected 6.4 million ha (extent and boundaries of the regions – see map in Gallery 4). In both regions of Russia wildfires larger than 2000 ha affected 8.96 million ha (22 million acres) of forests.

These numbers do not distinguish the different types of fire management regimes in Russia. Since 2016 an amendment of the Federal Forest Code requires the Guidelines on Fire Management to be refined and obliges the regions of the Russian Federation to delineate in detail the different zones of fire response and fire management respectively. Depending on values at risk – economic and ecological values of forests, the socio-economic development of the areas and the natural fire danger risk – three types of fire protection zones will be distinguished:

- **Ground Fire Suppression Zones**: Forest fire suppression using ground resources is obligatory, currently covering ca. 80 million ha countrywide
- **Aerial Fire Suppression Zones**: Obligatory use of aerial firefighting resources in remote areas that cannot be reached by ground forces within 3 hours, currently covering ca. 503 million ha (fire suppression is obligatory)
- **Forest Fire Management (Controlled Regime) Zones**: Regional authorities may decide letting wildfires burn under a controlled regime, currently covering ca. 561 million ha of the country

Details of zoning in the regions are currently under deliberation. This process reflects the response of the government to reorganize and restructure fire management in Russia. In-depth discussions at the science-policy interface had been held over the last years: Two *International Fire Management Weeks* were held in Krasnoyarsk in 2012 and 2013. During these weeks, roundtables and discussion forums for fire scientists, practitioners and decision-makers fostered open discussions of state-of-the-art science, fire ecology and the implications for practical application and strategic planning.

The National Round Table of 2012 concluded that there is an urgent need to revise the policy and practice of fire management

The response: Establishment of the National Coordination Committee on Forest and Steppe Fire Protection in Mongolia, setting up the Regional Fire Management Resource Center and signing of a bilateral agreement between Mongolia and the Russian Federation on cross-boundary fire management, including regular consultations, exchange activities and exercises. Photos: RFMC-CAR.

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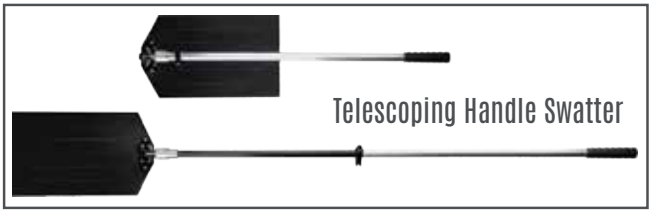

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The 2016 summary map of wildfires in Siberia and the Far East of the Russian Federation was prepared by the Federal Krasnoyarsk Science Center of the Russian Academy of Sciences. This is a pre-publication of the upcoming monograph "Monitoring of wildfires in Siberia: Dynamics of burning under the current climate, the spatial-temporal patterns, characteristics and forecasts", with the permission of the first author Evgenii Ponomarev (4). The publication contains the detailed methodology for satellite-derived data and the land cover and forest maps of Russia used.

in the Russian Federation, and agreed upon 10 recommendations – the *Krasnoyarsk 10-Point Programme on the Future of Fire Management in Russia*. Among other, it was recommended to further develop principles, capacity and apply the use of prescribed fire in Russia. In late 2013 the international congress *Forest Fire and Climate Change: Challenges for Fire Management in Natural and Cultural Landscapes of Eurasia* was held in Novosibirsk and addressed the consequences of climate change on fire regimes and fire management. The congress participants released a statement in which governments of the region were alerted and warned that the threat from wildfires in the region will become increasingly dangerous in the coming years as a consequence of climate change and socio-economic and demographic changes.

While there is a recognized need for enhancing the application of integrated fire management in Central Asia (i.e. the application of sound practices of prescribed burning and the integration of beneficial effects of natural wildfires) the vulnerability of the Eurasian landscape and their inhabitants is growing. The impact of air pollution generated by vegetation fire is one problem that is increasingly noted in many regions of the world. The severe fire and smoke episode in Western Russia in 2010, which affected the regional population through the interactions between extremely high temperatures and air pollution from the wildfires, may have contributed to the premature deaths of more than 2000 people in the Moscow region (2); globally the amount of premature deaths due to vegetation fire smoke is estimated to be in the range of 180,000 people annually (3). In September 2016, for the first time, a group of more than 3000 residents of the City of Bratsk went public and signed a petition under the headline *City of Bratsk is choking from smoke* asking President Putin and his Emergencies Minister for relief. (See above and online Gallery 4.)

The dark side of fire

The dark side of Eurasian fires is almost invisible. The fine particulate matter causing global transboundary headaches is called *Black Carbon (BC)*, also referred to as elemental carbon or soot. BC is microscopically small and primarily emitted by transport and industrial sources, but agricultural burning is emerging as a signifi-

cant yet little-understood source of anthropogenic BC emissions. Human health implications aside, BC particles have a severe environmental impact once deposited on Arctic snow and ice. Black carbon emitted from fires burning in North America and mainly from Eurasia, is transported to the Arctic environment by northerly flowing air masses. The fine particles change the albedo, i.e. the reflectance of incoming solar radiation. While the pristine white snow and ice cover reflects the incoming solar radiation back to space, a BC-darkened surface absorbs solar energy resulting in surface warming and accelerates the melting of snow and ice.

Smoke pollution episodes stemming from Eastern Europe and Russia have led to discussions of whether vegetation fire smoke may be tackled as part of the existing United Nations Economic Commission for Europe (UNECE) *Convention on Long-Range Transport of Air Pollution* (CLRTAP). Recently, this debate has emphasized BC pollution and particularly its effect on the Arctic. The Gothenburg Protocol of 1999 expanded the original 1979 CLRTAP to include numerous industrial pollutants and in 2012 this was amended to include BC as a short-lived atmospheric pollutant with significant climate forcing potential (online Gallery 5).

Apart of the impacts of gaseous and particulate emissions of vegetation fires on human health and climate, there are other collateral damages of wildfires – such as those burning on contaminated terrain, some of which are transboundary. The most dangerous fires are those burning on terrain contaminated by radioactivity and those burning on terrain contaminated by unexploded ordnance stemming from armed conflicts or military activities (online Gallery 7).

The promise of fire

Extended rural areas of temperate-boreal Eurasia are affected by land-use change and / or the abandonment of agricultural and pasture lands. This development is threatening the sustainability and survival of open cultural landscapes including habitats of open-space dependent species. Abandoned lands are undergoing rapid succession. Substitution measures, which are practiced in some places to counter succession and to maintain open space habitats, are often highly subsidized in Western European countries. Mechanical measures or targeted grazing, however, are limited by the sheer magnitude of land area to be treated and by rapidly increasing costs.

Since the 1990s, the use of prescribed fire is increasingly applied in Central and Northern Europe and is now being introduced in integrated fire management approaches for conservation purposes and wildfire hazard reduction in the temperate-boreal coniferous (pine and larch) forests. The rationale, principles and suggestions for the way ahead in the application of prescribed fire in the European biota have been expressed in the *White Paper on Use of Prescribed Fire in Land Management, Nature Conservation and Forestry in Temperate-Boreal Eurasia* and the monograph *Prescribed Burning in Russia and Neighbouring Temperate-Boreal Eurasia* (6). The *Eurasian Fire in Nature Conservation Network* is promoting the use of prescribed fire in conservation, forestry and landscape management and has organized numerous conferences, seminars and workshops addressing fire ecology and fire management throughout temperate-boreal Europe.

The very recent introduction of the use of prescribed fire in Eastern Europe and Russia is encouraging and reflected by the collection of visual impressions (see below and online Gallery 9).

What we've learned, what we need next: the search for common cross-border solutions

With this overview in "Eastern Fires" the GFMC intends to highlight – with emphasis on the Eastern part of the region – specific phenomena and problems of wildland fire in temperate-boreal Eurasia, including transnational issues, and the search for common solutions by cross-border cooperation in fire management.

In most countries of the region, financial support and human capacity for this work is unfortunately rather limited. Thus, networking, exchange and mutual assistance are imperative. These initiatives are coming from civil society – scientists and practitioners – and increasingly from governments. International organizations and frameworks such as the UN international Strategy for Disaster Reduction (UNISDR), the Organization for Security and

Cooperation in Europe (OSCE) and the Council of Europe through its Major Hazards Agreement in close cooperation with the Global Wildland Fire Network, have been essential drivers in this process.

UNISDR IWPM
International Wildfire Preparedness Mechanism

EuroFire

FOCUS on COOPERATION: In 2013 the UNECE Regional Forum on Cross-Boundary Fire Management, which was organized by the GFMC at the United Nations in Geneva, issued this key recommendation: "The cross-boundary effects of wildfires require jurisdictions at all levels to cooperate in fire management and to define collective solutions. While prime emphasis should be given to cooperation in fire management between jurisdictions sharing common borders, the long-range consequences of fire emissions are calling for strengthening existing and, if necessary, developing additional protocols addressing the reduction of adverse consequences of wildfire at international level."

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The aim of prescribed fire application in temperate-boreal Europe is to maintain biodiversity-rich open vegetation and landscapes that are home to species endangered by forest succession.
Networking and Exchange of Fire: Practitioners and targeted public relations work have proven essential in introducing prescribed fire in sustainable forest management and conservation in Mongolia, Ukraine, Russia and Poland. Examples include Pg 24, left: First prescribed burning training course for students in Mongolia, 2015. Pg 24, right: Training of prescribed burning practitioners and university students in Ukraine, 2015. Pg 25, left: First pubic demonstration to the media and practitioners of prescribed burning and underburning in Russia, 2012. Pg 25, right: A team of fire managers setting the first prescribed burn in Poland, 2015. Photos: A. Zamakhin and GFMC.

BARCELONA WILDFIRE WEEK

#BCNWildfireWeek

will launch on January 31 when forest fire specialists meet in Barcelona (Spain) to participate at the 14th International Wildland Fire Safety Summit and the ICOPFires, sponsored by the Pau Costa Foundation and the IAWF. The coordinated events address the safety of forest fires and the introduction of fire as a management tool. Specialists from around the world will gather in Barcelona to tell us about their experiences, learn, share, discuss best practices and assess potential solutions to face the challenges of forest fires.

During the week of January 31 through February 3, Barcelona (Spain) will become a hub for the exchange of knowledge and experience of a diverse selection of forest fire professionals. We aim to connect the diverse stakeholders involved in forest management (e.g. local authorities, fire fighters, foresters, land managers and owners) with researchers from several fields including biology, geography, ecology, sociology, meteorology, climatology, engineer, soil scientists, and physicists among others. It is important to transfer knowledge among the participants and provide a space for sharing and learning from the experiences of all the experts about the use of prescribed fire and land management.

Nowadays, the challenges we face are enormous: climate change, fuel accumulation, wildland-urban interface, and the challenge of increasing the budget for suppression resources and fire management. The end result of these challenges include increasingly complex forest fires that jeopardize the emergency services personnel and society in general. We face scenarios with more uncertainty and complexity that require experts who can adapt faster, more flexible organizations, and new methods of fire management based on best-available science and best practices mastered through the management of forest fires.

Spain, like other countries in the Mediterranean environment, has been facing forest fires for decades. However, in recent years, this challenge has begun to affect countries from Northern Europe. In northern countries, major forest fires have started to push their emergency organizations to the limit and put their civil society at risk. It is therefore necessary, to share knowledge and experiences of the different organizations, the operational, scientific and business, in order to seek and find common solutions that will help us better face those challenges together.

Two main concepts will be highlighted during Barcelona Fire Week

- **SAFETY FIRST:**
  We seek to improve the safety of persons involved in forest fires, as well as those affected by these phenomena. "Safety first" must be our first mission, putting it into practice by creating fire-fighting services and more resilient fire-fighting organizations, taking into account the experience of the past to improve the management of the future.

- **CHANGE OUR UNDERSTANDING OF THE ROLE OF FIRE:**
  We seek to influence the societal perception of forest fires. Natural disturbances, which have a necessary function within our ecosystems. Without forest fires, our forests will suffer more intense and virulent fires. Understanding the role of fire is necessary to reintroduce its frequency in our forest ecosystems through prescribed fires and contribute to reduce the risk of large-uncontrollable forest fires occurring in our territory.

14TH INTERNATIONAL WILDLAND FIRE SAFETY SUMMIT

The theme of the 14th International Wildland Fire Safety Summit (January 31, 2017) is Decision Making in High Risk and High Consequence Environments. The event will take place at the Pedralbes Royal Palace in Barcelona. During that day, about 40 presentations related to the topic are to be given by key professionals on the field of forest fire safety. Keynote speakers include Mr. Marc Castellnou, Chief of Forest Fire Area of the Catalan

Fire and Rescue Service (Spain), awarded with the Wildland Fire Safety Award in 2015, and Dr. Richard Thornton, Chief Executive Officer of the Bushfire and Natural Hazards CRC (Australia) and Anthony Petrilli, Fire and Aviation Program, US Forest Service, Missoula Technology and Development Center (MTDC). In the evening a dinner will feature the winner of the 2017 Wildland Fire Safety Award.

The **International Conference on Prescribed Fires** (February 1-3, 2017) will be the first international congress about prescribed fires in Europe. The event will take place at the historic building of the University of Barcelona. During the event over 95 oral and poster presentations have been scheduled from 20 countries.

Among all the relevant presenters, keynote speakers are Dr. Paulo Fernandes, wildland fire researcher at the Univerity of Trás-os-Montes e Alto Douro (Portugal), Dr. Tina Bell, fire ecologist at the University of Sydney (Australia), Mr. Jeremy Bailey, leader and coordinator of the Fire Learning Network of the Nature Conservancy (US), and Mr. Marc Castellnou, Chief of Forest Fire Area of the Catalan Fire and Rescue Service (Spain).

The conference field trip will be a Prescribed Fire executed by the GRAF Team (Catalonia Fire Department, Bombers de la Generalitat de Catalunya) at the Collserola Natural Park. Dedicated discussions and open debates are expected among all the participants and experts on prescribed burning, forest and fire management.

— *Pau Costa Foundation*. info@paucostafoundation.org.

More information can be found at:
www.paucostafoundation.org/ICoPFires
www.paucostafoundation.org/ICoPFires/wildland-fire-safety-summit

Follow the events on twitter:
#2017FSS #iCOPFires #BCNWildfireWeek

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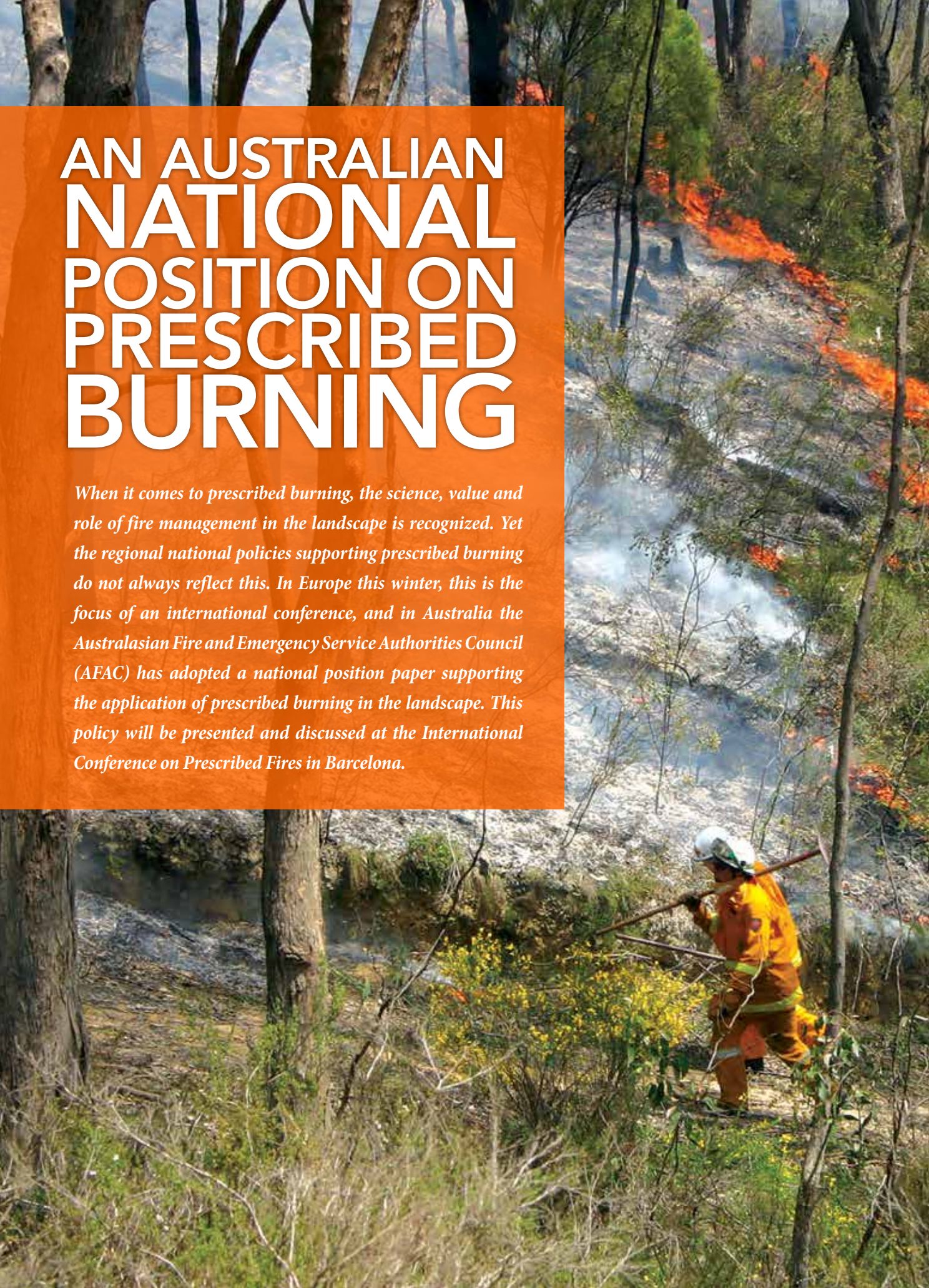
ecología del fuego y gestión de incendios / fire ecology & management

AN AUSTRALIAN NATIONAL POSITION ON PRESCRIBED BURNING

When it comes to prescribed burning, the science, value and role of fire management in the landscape is recognized. Yet the regional national policies supporting prescribed burning do not always reflect this. In Europe this winter, this is the focus of an international conference, and in Australia the Australasian Fire and Emergency Service Authorities Council (AFAC) has adopted a national position paper supporting the application of prescribed burning in the landscape. This policy will be presented and discussed at the International Conference on Prescribed Fires in Barcelona.



BY WAYNE KINGTON and DEB SPARKES OF AFAC

Much of the Australian landscape has evolved with fire. Fire events are a certainty and necessary for the continued survival of fire dependent species and ecosystems. Indigenous Australians understood this relationship and effectively used fire to manage landscapes for multiple purposes.

Flammable environments create a challenge for public and private land managers to mitigate the risks of bushfires within the context of competing land management objectives.

In developed areas, the natural landscape – containing environmental or conservation assets – is fragmented and punctuated with communities and fire vulnerable assets such as homes, primary industries, businesses, significant infrastructure and social and economic networks essential to modern day functionality.

Previous management philosophies of eliminating fire from the environment proved unsuccessful as they resulted in fuel accumulation where consequential unplanned fires caused catastrophic damage to life and property and resulted in long term impacts on ecosystem health and biodiversity.

Today, land and fire managers proactively place prescribed fire into the landscape with the objective of reducing the spread and severity of bushfires and improving the safe and effective control of bushfires. Reduced bushfire impacts serve to protect communities, the built environment, ecosystems and biodiversity. Prescribed burning is placed in the landscape at a range of scales; from the local level to protect communities and infrastructure to a landscape level which provides risk reduction and broader ecological benefits. Well planned and implemented prescribed burning is an essential, practical and cost effective tool for reducing risk to life, property and the environment.

AFAC, the National Council for fire and emergency services, are undertaking a multi-year project bringing together inter-related aspects of prescribed burning across Australasia to design guiding frameworks and principles for a more consistent approach to prescribed burning. A key component was to deliver a National Position on Prescribed Burning which was approved by AFAC Council and the Forest Fire Management Group (FFMG) in October 2016.

The National Position on Prescribed Burning includes a position statement agreed upon by Australian fire and land management agencies, along with a number of agreed principles to guide and support prescribed burning activities. It is targeted at anyone interested in the common principles that underpin prescribed burning.

The position and principles are as follows.

THE POSITION:

AFAC and FFMG member agencies take the position that prescribed burning is an essential part of bushfire mitigation across the Australian landscape to reduce risk to communities and ecological health.

Each fire and land management agency has different legal, political, organisational, social, economic and environmental requirements, and responds in its own manner in providing its prescribed burning programs.

Under the National Burning Project, extensive consultation with agencies has drawn out and identified common approaches which are defined in the principles below. The context of each principle describes the understanding AFAC and FFMG member agencies have of the environment from which these principles are drawn.

A prescribed burn in New South Wales. Photo: NSW National Parks and Wildlife Service.

PHOTO ON LEFT & COVER: The photographer, Ian Tanner, senior regional fire manager with the Department of Environment, Water and Natural Resources, South Australia, recounts that this was "one of the first really significant strategic burns we did in the Mount Lofty Ranges after the 2003 Canberra fires. This was Cleland Conservation Park. A 30 hectare burn to protect the Crafers West and Stirling. A rural-urban interface burn close to Adelaide in stringybark forest. There are homes at the top of the slope. This is half way through the burn, around mid afternoon. The burn was competed in one day, to protect homes/suburbs. It has been burned once more since this occasion. It's been successful in reducing fuel load to the desired standard, and the second time was significantly easier than the first. The photo doesn't really show some of the challenges we had."

PRINCIPLE: PROTECTION OF LIFE IS THE HIGHEST CONSIDERATION

Context: Prescribed burning is used in reducing the quantity, extent and connectivity of fuel hazards to assist in protection of life, property and community assets.

The protection of human life will be given priority over all other obligations in prescribed burning operations.

PRINCIPLE: LANDSCAPE HEALTH IS LINKED TO FIRE AND FIRE MANAGEMENT

Context: Fire affects the environment as a single event and as multiple events (regimes) of differing fire intensities spread over temporal and spatial dimensions. Inappropriate fire and fire regimes pose a significant risk to ecosystem function, health and diversity.

Managing fire in the environment can help to create a mosaic of diverse fire regimes across the landscape. This aims to provide an improved range of habitats and ecosystems. Fire management also aids in the exclusion of fire from fire sensitive ecosystems by reducing adjacent fuel hazards. Maintenance of biodiversity can contribute significantly to the resilience of ecosystems in the face of bushfires and other threatening processes such as climate change and weed invasion.

Australia's Biodiversity Conservation Strategy (NRMMC, 2010) seeks to improve the use of ecological fire regimes to conserve biodiversity and protect the public.

PRINCIPLE: PRESCRIBED BURNING IS A RISK MANAGEMENT TOOL

Context: Bushfires will never be eliminated from the environment. Prescribed burning can help to reduce the risk and severity of impacts that these events have on life, property, community and the environment. Reduced fuel hazards assist the success of first attack efforts and reduce the intensity, extent and impacts of subsequent bushfires.

Prescribed burning is more effective where used alongside complementary risk reduction measures.

PRINCIPLE: ENGAGEMENT WITH COMMUNITY AND BUSINESS STAKEHOLDERS

Context: Community support for prescribed burning programs is essential to their success. Engagement is a two way model (e.g. IAP, 2016) whereby the intentions of agencies are communicated to stakeholders and concerns of stakeholders are identified and considered at all levels of prescribed burning planning and during the burn. In this way, the benefits to land managers and the broader community are optimised and any adverse impacts are minimised as far as practicable. Community engagement also serves to increase awareness of the benefits of prescribed burning for risk reduction and ecosystems.

PRINCIPLE: PRESCRIBED BURNING IS DONE IN THE CONTEXT OF MEASURABLE OUTCOMES

Context: Objectives of individual prescribed burns should be clearly stated, preferably as measurable objectives. Clearly stated objectives facilitate the formation of suitable burn prescriptions, fire implementation tactics and allow evaluation of burn success for adaptive management purposes. Objectives of individual burns should be guided by and service strategic objectives. Strategic objectives include broad organisational level goals that are further detailed through performance measures that allow an organisation to monitor the success of burn programs.

PRINCIPLE: INFORMED KNOWLEDGE OF FIRE IN THE LANDSCAPE

Context: Our knowledge of fire, including fire behaviour, ecological responses to fire and the measurement of risk reduction from prescribed burning, can all be informed by sharing research and experience. Informed knowledge comes from research outputs from academic institutions, effective measurement, monitoring and evaluation of the operational programs

undertaken by agencies, and from across the community including the knowledge of Traditional Owners. Applied knowledge will allow communities and managers to respect fire as a tool as well as a hazard. Knowledge can always be enhanced, so fire managers must engage in an adaptive management process to ensure improvements can be made across all processes and activities in a continual improvement framework.

PRINCIPLE: CAPABILITY DEVELOPMENT

Context: Whilst the theory of fire behaviour and fire ecology can be taught in a formal setting, the skill of placing prescribed fire in the landscape to meet stated objectives requires practical experience that can only be gained under variable operational conditions. Experienced practitioners are a highly valued commodity. The knowledge of experienced practitioners should be captured through targeted development, mentoring and training programs to increase agencies' human capital and to feed into agencies' continuous improvement.

PRINCIPLE: TRADITIONAL OWNER USE OF FIRE IN THE LANDSCAPE IS ACKNOWLEDGED

Context: Fire is culturally significant to Indigenous Australians. The use of fire by many Indigenous Australians to shape the landscape is widely acknowledged. Where Traditional Owners have not been able to continue these practices the depth of spiritual and cultural knowledge and connection to the land is maintained through stories and memories. Integration of this retained knowledge into current agency practices should be actively supported and promoted. Where knowledge gaps exist, agencies should work with Traditional Owners to build that knowledge, and, where appropriate, revive practices.

PRINCIPLE: AN INTEGRATED APPROACH IS REQUIRED ACROSS LAND TENURES

Context: An integrated and cooperative approach across all tenures is the best way to minimise bushfire risk to lives, property

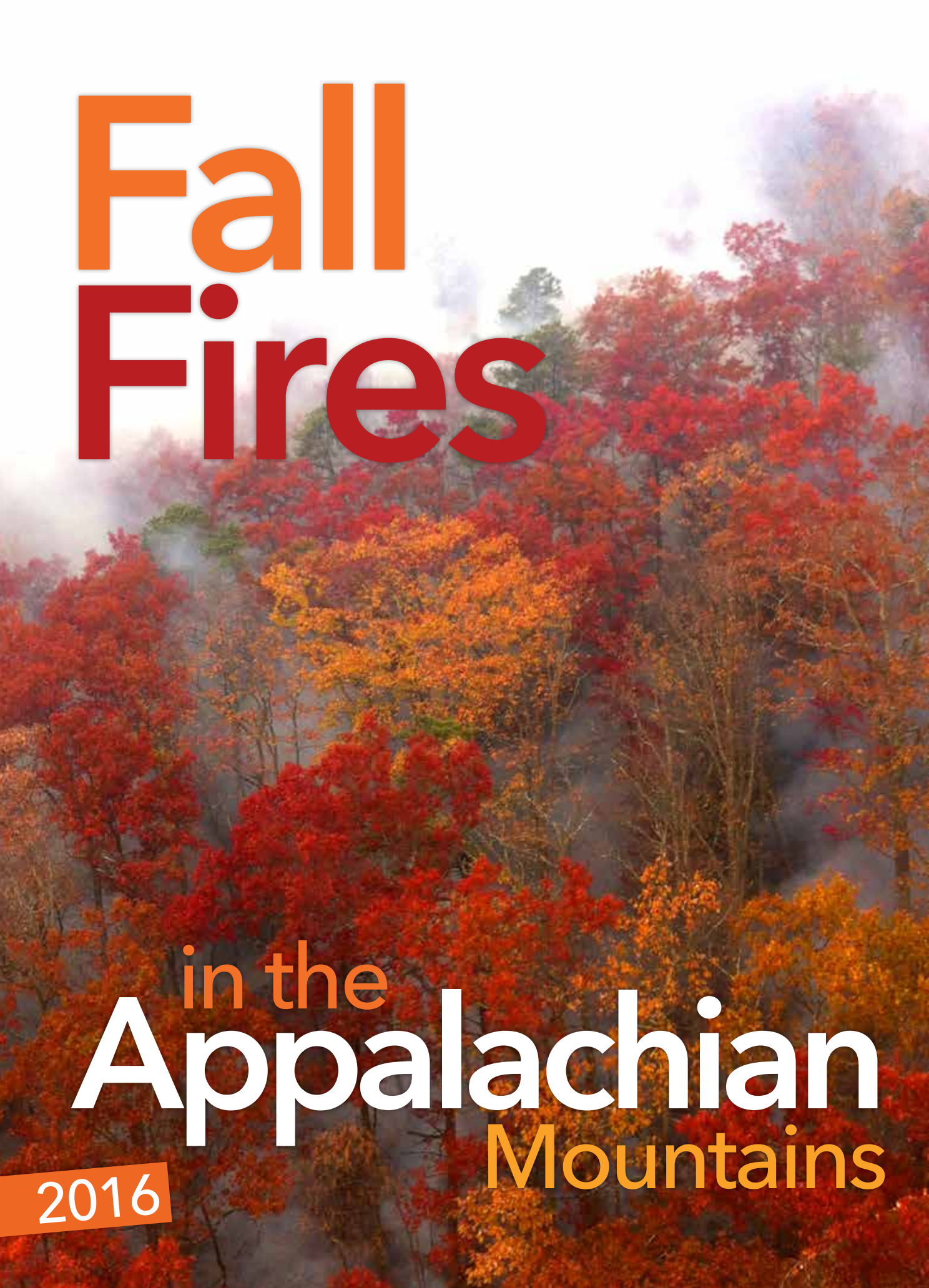
and the environment. Responsibility for risk reduction should be shared between all landholders (including land management agencies) and achieved by risk treatment within the boundaries of their own property and cooperatively with neighbours to increase these benefits across their shared landscape. Education on risk reduction is required in some cases to increase the understanding of the benefits of prescribed burning.

PRINCIPLE: PRESCRIBED BURNING IS CARRIED OUT UNDER LEGISLATIVE, POLICY AND PLANNING REQUIREMENTS

Context: Agencies that carry out prescribed burning are required to comply with Commonwealth and relevant respective state or territory legislation that address facets of land management, environmental protection, and indigenous cultural heritage, among other requirements.

This position was prepared by the National Burning Project on behalf of the Australasian Fire and Emergency Service Authorities Council (AFAC) in conjunction with the Forest Fire Management Group (FFMG), a sub-group of the Forestry and Forest Products Committee under the Agriculture Senior Officials' Committee and Agriculture Ministers Forum.

For more information on the National Burning Project and to download the National Position on Prescribed Burning, visit www.afac.com.au/initiative/burning .


Fall
Fires
in the
Appalachian
Mountains
2016

AFTER ACTION

Fire beneath the canopy from a recon flight for the Clinch Mountain VDOF Fire, November 15, 2016, Virginia. Photo: Michael Scott Hill

By Michael Scott Hill

In November of 2016, severe drought conditions across the southern Appalachian Mountains set in place conditions for a series of wildfires to take hold and spread across this Southeast region of the United States. The event peaked at the end of the month, when a fire left the slopes of a nearby mountain and winds funneled it into the tourist communities of Gatlinburg and Pigeon Forge, Tennessee, claiming 14 lives and over 2000 structures. Torrents of rain came down after that fire had done its work in the forest at the end of November, soaking the primary oak and pine forest to penetrate its thick basal layer of leaf litter and once again moderate fire danger across the region.

The sheer size of the region affected by this drought-and-fire event, plus other unique factors in the ecosystems of the Appalachian Mountains, call for this fire event to be given a closer look as a unique natural process.

Fire in the Appalachia is strongly influenced by climate factors, as well as by its historic vegetation. Climate experts have predicted that with the destabilization of worldwide weather patterns, as influenced by global warming, we may expect fire cycles in the Appalachian Mountains to become a more influential and intense element across the region. Climate is believed to exert a strong control on its fire activity across the region, in both its seasonal and inter-annual time scales, and within those scales there are certain features that appear to affect fire activity more.

Fuels and the Fire Cycle

The first influence is based on regional humid temperate conditions that encourage high levels of vegetation production that in turn lead to rapid accumulation of fuel loadings. Throughout the year in the Southeast United States, annual weather and leaf fall patterns also affect its seasonal fire activity. Yet on longer multi-year seasonal cycles, sometimes wet patterns rotate in, which lead to extended periods of heavy fuel buildup and other drier times of drought, like that experienced in the recent fall when conditions become highly favorable for burning. During the dry times, lightning can ignite fires that take place during the trees' growth period that will cause much greater mortality than those occurring during the trees dormant season.

In the past, these natural fire conditions of a dry drought period and fire introduced by both man and lightning, caused large-scale cyclic fire exposure across the region, but these were mostly short intensity fires that had healthy effects to the Appalachian forest ecosystems. Today however it would be impossible to safely replicate this fire environment on that historic scale due to the increased population settlement across this region.

Fire has been an integral natural process in the oak and pine forests that have made up the Appalachian ecosystem for thousands of years. Studies of soil charcoal here have recorded that periodic fires have been a part of its cycles dating back at least 10,000 years. Other studies, surveying the fire scars back to the mid-1600s, have documented that forest fires have occurred periodically, sometimes as often as every 3 to 9 years across the southern Appalachian region. This land and its vegetation, has long been adapted to fire.

Our Fire History

Fires amongst these ancient mountains, historically introduced by lightning bolts on nature's own timeline, have more recently been ignited largely via human intervention across the region. This history of human-activated fires in the Appalachia dates back to Native American times. Fires were traditionally lit by Native Americans annually in areas across the Appalachians to assist in opening the forest understory, to reduce dangerous fires, to make forest travel and foraging easier, to increase plant diversity and improve food sources for wildlife. Native Americans allowed camp fires to escape after their use and left others burning along trails as they moved about on their seasonal journeys across these mountain slopes. Fires to the Native Americans were a tool to help them shape their environment.

Early Europeans, who followed the Native Americans here, continued to use fire to adapt their environment in a similar fashion. The Europeans lit their fires to consume logging slash and clear lands for agricultural purposes, keep ridge tops open and exposed to sun to benefit livestock and game grazing, and to increase their wild berry foraging yields. Fire was also used by the Europeans to kill off pesky infestations of ticks and chiggers on newly settled lands and to open up choked understory areas to their slightly different means of travel and hunting.

This cyclic exposure to human-ignited fires across Appalachia has been significantly altered over the past 80-100 years, with more people pouring into the region after the turn of the 20th century. Our current perspective on wildfire protection has also been transformed with this increased population -- to where fire is now being seen as a destructive force in the places where humans and the forest interfaces at the urban/rural fringe.

Fire, Returning

State and federal agencies across the region have been aggressively assigned to extinguish fires in the Appalachia region, creating a drastic shift from cyclic fire exposure for forests into zones of fire exclusion that have greatly altered the forests of Appalachia. Open habitat vegetation of the region long adapted to flames, like grasses, were overtaken by more shrubs and tree species not adapted to survive exposures to fire. The Appalachian forests became denser without fire, as the forest canopies closed in and the numbers of trees per acre increased unnaturally without the occasional fires to thin them out, until today some species of pine and oaks are having trouble reproducing in these areas due to crowded situations.

The idea of reintroducing periodic fires to the Appalachian forests with prescribed or controlled and monitored wildfire events, just as they had for thousands of years, benefits the region's oak and pine forests. Across the region land managers are once again starting to reintroduce annual spring prescribed fires treatments into selected locations. These "controlled" ground fires – cooler burning and swifter moving – consume leaf litter, downed limbs, and thin out over-crowded forest conditions, to increase the amounts of sunlight available to reach a forest's floor which promotes seed germination.

Fires in Appalachia can act to weed out non-fire tolerant tree species, such as red maple, tulip poplar, and white pine, as these species have thinner protective bark and have only begun to thrive in these forests since the absence of fire. It is said that after a forest has been burned for hazard reduction in Appalachia it will be safe from wildfires until the next leaf fall and the threat from fire will be decreased for the following 3 to 7 years.

"Controlled" fire exposure for a forest in this region can also reduce its occurrences of disease and insect pest outbreaks. Long dormant native grasses and wildflowers are also known to return after some types of exposure. Foraging animals such as black bear, white-tailed deer, songbirds, turkey, migrating geese and many other animals, benefit from wildfires as afterwards they move throughout those areas to feed on new growths of seeds of plants rejuvenated by fire exposures such as acorns, blueberries and other seeds returns.

Fires can be good for Appalachia's ecosystem, then so why are we tasked as firefighters to extinguish forest fires in this environment that is naturally adaptive to fire and has been burning for thousands of years? Rapid increases in population of the Appalachian region have brought the development of increasingly urbanized communities set amongst this mountainous landscape, and these new growing populations reside alongside large coal mining and gas well operations. The added risk of fire exposure for these relative newcomers, as well as the impacts on non-fire tolerant species of vegetation, has turned these ancient natural fire cycles in the Appalachians much more complex.

The protection of man-made structures, communities and economic resources are a main focus of fire agencies during severe drought years in the Appalachians, such as this November. This complexity has been further intensified as a result of fire being withheld from many of these forest areas for the past 80-100 years. During this period, forest litter and overcrowding flourished on such scale as to make fires burn hotter and more intensely than historic Appalachian fires when the flames were allowed to periodically thin forests and reduce its accumulated fire danger.

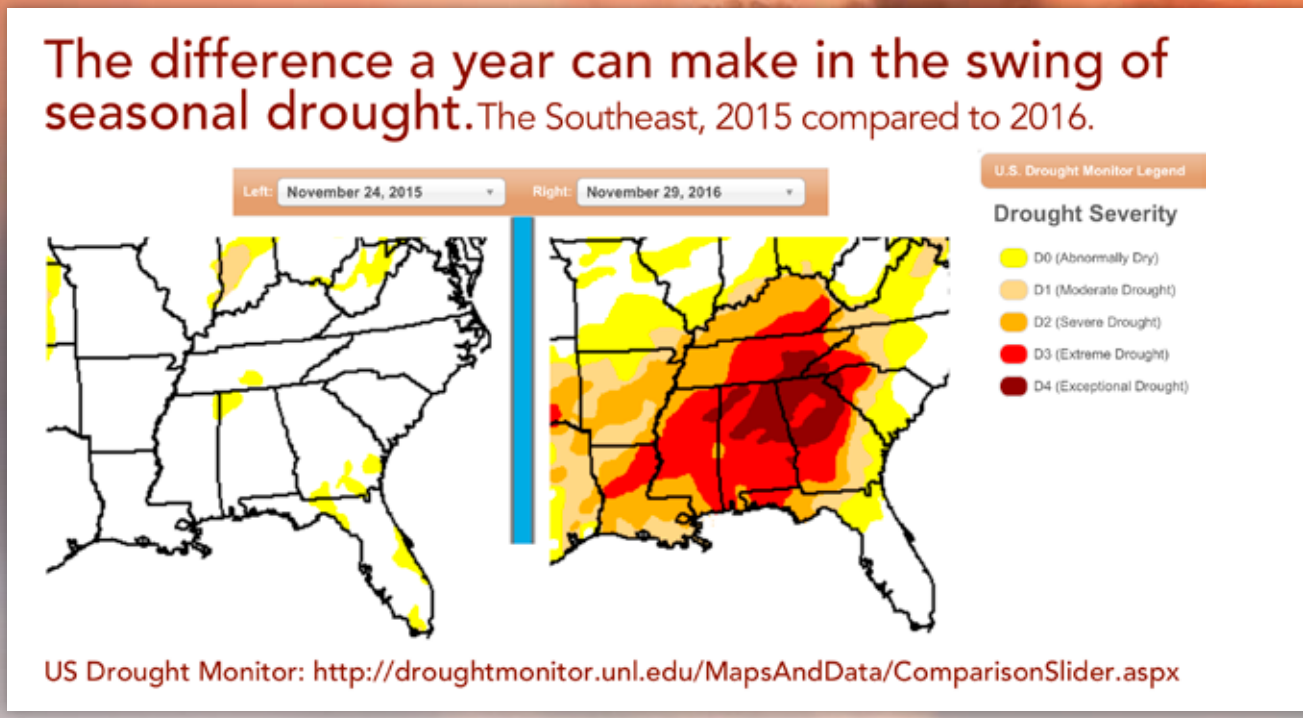
Living in our Long Fire Story

What we know for sure, with history as our teacher, is that the mountain ecology and weather will attempt to continuously work together to give the ecosystem of the Appalachia the fire it requires to regulate these oak and pine forests and heal the local unique vegetative system long adapted to thrive.

Those of us who took part in the Appalachian fires of the fall season of 2016 have become a part of the long ongoing story of fire in the region. The pressure of increased population certainly adds complexity to this natural schedule, and those that live here always need to hold the awareness that fire has been deeply entrenched in the life of these mountains and is a far more powerful force than any of us who responded will be.

Fire in the forests of Appalachia, due to unique local weather patterns, may not return on an annual cyclic schedule. But fire here does make one promise: it will return when the necessary factors again combine to give the flames the opportunity to do what fire here has so long been tasked to do across the slopes of Appalachia. Fires will always come and go here, and for those of us who chose to live on these same slopes, we have the option to either prepare our homes to withstand the flames, or not. Whether you're a firefighter or a resident, in the Appalachian Mountains these are the risks we all should be managing for.

Michael Scott Hill, a contributing editor for Wildfire Magazine, manages fire and aviation with a global perspective from a home base in Virginia (USA). For Wildfire he's written on aviation work in Australia, drones in Alaska, and the Tasmanian fires early in 2016. See this arrticle and more by MIke at **http://wildfiremagazine.org/article/the-tasmanian-fires-of-2016/**.



From a recon flight of the Pike County VDOF Fire-Va/Ky, November 19, 2016. Photo: Michael Scott Hill

BOOK REVIEW

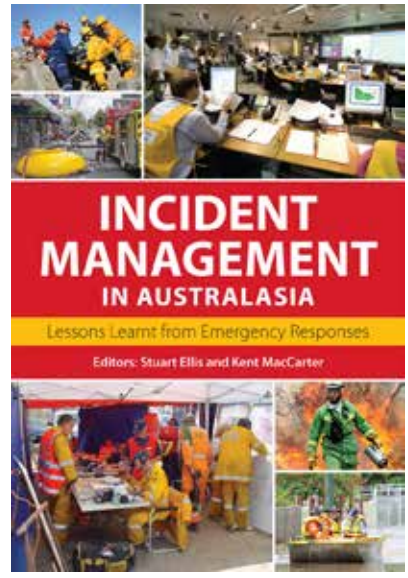
Incident Management in Australasia

Incident Management in Australasia: Lessons Learnt from Emergency Response. Ed. Stuart Ellis & Kent MacCarter, CSIRO 2016. http://www.publish.csiro.au/book/7543.

by Nick Goldie

The title of this new book -- *Incident Management in Australasia* -- doesn't do it justice. It deserves something much more dramatic, like: *Disaster! How our Blokes coped with Fire, Flood, Fear!* But then it would be for a different audience.

Ten chapters deal with ten major emergencies: floods in Queensland (2013) and Victoria (2011), a road-train cyanide spill at Tennant Creek (2007), major structural fires in Tasmania (2007) and South Australia (2012), the Christchurch (NZ) earthquake (2011) and of course the deadly bushfires at Eyre Peninsula, SA (2005), Kuring-Gai, NSW (2001), Linton, VIC (1998) and Canberra, ACT (2003).



Some of us were directly involved in the Canberra fires, which started and finished in the forest and farmlands of NSW, after destroying 488 homes in the national capital, and we have followed the drawn-out inquiries, rich with accusations and counter-accusations that followed.

This book perhaps suffers from the fact that the different chapters are all written by Incident Controllers and Chief Officers, rather than firefighters on the ground, but that gives us a great insight into who and how decisions were made -- incident management, in fact.

The Canberra chapter is written by Mark Crosweller, Director General of Emergency Management Australia, previously Assistant Commissioner of the NSW Rural Fire Service.

It's a deeply personal account, starting with the disastrous lack of communication between the ACT and NSW services.

"I'm not interested in blame," says Crosweller, "but I am interested in accountability."

It was apparent that the Canberra fires went beyond anything that fire managers had previously experienced (being only slightly less intense than the well-documented Chisholm fire of 2001, described by McRae and Sharples in their 2015 "Extreme Fire: A Handbook" as "the most intense even yet recorded." http://www.highfirerisk.com.au/extras/extreme_fire.pdf). This in itself meant that the emergency services let people down. Only some years after the event was the fire science able to explain what had actually happened, notably in the work of Jason Sharples and Rick McRae, who, despite some skepticism, brought the ideas of pyrocumulonimbus clouds and pyrocyclonic winds into mainstream Australian fire science.

Crosweller is emphatic that we need to change how we perceive the inevitability of natural disasters, and how the failure to learn from Canberra in 2003 had a direct bearing on Victoria's *Black Saturday* in 2009.

The book opens in South Australia in 2005, on the flat windy grasslands of the Eyre Peninsula. Nine people lost their lives, farmers and firefighters. The fire was timed by CSIRO researchers at a constant 30 km/hour, and in four hours, some 70,000 hectares were burned along with more than a hundred buildings. Author Euan Ferguson, at the time Chief of the South Australian Country Fire Service, is careful to state that allocating blame is not productive, though he himself was the victim of media finger-pointing and even death threats.

Most firefighter entrapments are the result of major bushfires in extreme weather. The fatal events at Mt Kuring-Gai were the result of a routine hazard reduction burn in benign weather conditions, on a parcel of land between a suburban National Park, a residential suburb, and a major motorway. What could be safer?

There are some steep slopes, covered with dry eucalyptus scrub, and the local Council had been asking for a hazard reduction burn for some years. All the firefighters involved were members of the National Parks and Wildlife Service, which maintains its own bushfire-fighting unit. The Coroner's subsequent recommendations suggested that in some cases, training and protective clothing were inadequate, and the maps which were issued were also inaccurate and lacking in detail. The Coroner also suggested that hazard reduction burns involving ground crews should not take place until the designated area had been inspected and the maps "ground-truthed." Ultimately, the NPWS was prosecuted under the NSW Occupational Health and Safety Act, found guilty, and fined.

A name that all Australian firefighters know is Linton. The Linton fire happened in December 1998, and has been used ever since as a tragic and dire warning, notably in the scary instructional video created by CSIRO's Phil Cheney, called Dead Man Zone -- a must-see for all firefighters. Firefighters need to be very aware of the consequences of wind change -- two fire trucks from Geelong were moving parallel with the Linton fire, the wind changed, and five men died. Incident Controller at the time, Greg Leach, gives a graphic report on the events that happened, the consequences, and the lessons learned. Like the other accounts in this book, there's technical detail, operational reports, and some very personal recollection.

All of the disasters described in this excellent book have led to improvements in safety, in training, and in equipment. Perhaps surprisingly, Mark Crosweller, writing about the Canberra fires, emphasizes the human element. An effective emergency manager can't be constrained by emotional baggage or concealed resentment. The most important thing to learn, says Crosweller, is forgiveness.

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