

QUARTER 3, 2022
UNITING THE GLOBAL WILDLAND FIRE COMMUNITY

WILDFIRE

An official publication of the INTERNATIONAL ASSOCIATION of WILDLAND FIRE



FIRE & CLIMATE 2022
IMPACTS, ISSUES AND FUTURES

CONFERENCE WRAP | HEALTH AND SAFETY | PEAT FIRE MANAGEMENT

**WHEN THE
WORLD
DEMANDS
MORE,**

***AIR TRACTOR
DELIVERS.***

An Air Tractor aircraft is shown in flight, banking to the right and dropping a large volume of water onto a forest fire. The fire is intense, with bright orange and yellow flames rising from the trees. The aircraft is white with green and black accents, and the number '251' is visible on its tail. The background is a dark, smoky forest.

**AIR TRACTOR DELIVERS THE
PERFORMANCE, EFFICIENCY, AND
PRECISION THIS JOB DEMANDS.**

IT'S TIME YOU DEMAND MORE.

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COVER: YEAR-ROUND FIRE MANAGEMENT WAS THE TOPIC OF THE FIELD TRIP TO THE WOMBAT STATE FOREST NEAR MELBOURNE, AUSTRALIA, FOR THE FIRE AND CLIMATE 2022 CONFERENCE. PHOTO: FRIEDO LIGTHART.

WILDFIRE

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EDUCATION HELPS TO REDUCE WILDFIRE RISK TO PROPERTY

FREE TRAINING FOR PROFESSIONALS AND PROPERTY OWNERS

Wildfires pose a significant threat for the over 45 million structures at risk in the United States. But total property destruction and widespread devastation can be lessened by the actions of proactive community leaders and those who own or maintain properties that are at risk.

NFPA® offers two free training courses: *Reducing Wildfire Risk to Property: Protecting Your Home or Business* provides home and business owners and

property managers with the information they need to take simple, inexpensive mitigation actions. *Reducing Wildfire Risk to Property: Professional Online Training* gives fire service professionals the in-depth knowledge needed to identify and communicate risks and a range of mitigation options.

Visit [nfpa.org/wildfirepreparedness](https://www.nfpa.org/wildfirepreparedness) to learn more about the free training and related resources available for all audiences.

FIRE PROFESSIONALS WILL LEARN ABOUT:

- The science behind wildfires
- Assessing structure ignition potential
- Identifying and communicating mitigation options
- Working with community leaders

PROPERTY OWNERS AND MANAGERS WILL LEARN ABOUT:

- How structures ignite due to wildfire
- Simple steps they can take to reduce the risk to their property
- What they can do to motivate their neighbors to reduce risk throughout their community



NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

PLANNING FOR THE NEXT 50 YEARS

The energy that came out of Fire & Climate 2022 was palpable.

Our conference package, on pages 9 through 34, provides a glimpse into the incredible wealth of knowledge, level of debate and discussion, and cornucopia of ideas and solutions proposed and evaluated in Pasadena and Melbourne in May and June.

Even if you were fortunate enough to attend either segment of the conference in person or online, the abundance of speakers (more than 200!), workshops, field trips and poster presentations made it impossible to take in everything.

Our coverage in this issue (and subsequent issues) includes pieces by presenters themselves, and also delegate-written articles about sessions in which they participated.

Lucian Deaton's coverage of the Pasadena keynote by Kate Dargan – founder of Intterra, former California state fire marshal, and former assistant director for disaster preparedness and response in The White House Office of Science and Technology Policy – outlines the challenge posed to conference delegates.

Dargan asked a packed conference room: What is our fiery future and what can you do today to impact our future to come? The story, on pages 14-15, explains Dargan's proposed 50-year plan for fire and climate and what the wildland fire industry needs to do to elicit change.

Ron Steffens' piece on page 28 mirrors his Pasadena presentation titled It's the fuels, my friends, a fabulously detailed and personal explanation of the long-term fuel monitoring program in the Yellowstone ecosystem and how it may shape future burning.

Fuels management and prescribed burning were themes in both segments of Fire & Climate 2022. As David Bruce explains on page 10-13, the conference was built upon the 2022 IAWF Position Paper on Climate Change and Wildland Fire.

"As we collectively face a present and a future impacted by large and destructive bushfires and still under the cloud of a COVID-19 pandemic, the conference presented a timely opportunity to focus on the bigger issues involved in dealing with natural hazards under climate change," Bruce writes.

In Melbourne, the conference subtheme – Impacts, Issues and Futures – was an acknowledgment that the wildland fire sector needs to share information globally about bushfire causes and impacts, how to engage with communities and other stakeholders to act locally to protect communities and the natural environment, and how to prepare to minimize impacts of climate and fire regime changes.

Melbourne keynote speaker Sophie Lewis, the Australian Capital Territory commissioner for sustainability and the environment and a lead author on the Intergovernmental Panel

on Climate Change's 6th Assessment Report, explained the significance of a one-degree rise in temperature.

Essentially, Lewis said, it's critical to plan for a future with conditions that regularly will make more Black Summer type events likely.

IAWF board member Amber Soja, who is a research fellow at the National Institute of Aerospace in the United States, introduced a global view of where fires are burning and the impacts on both air and land.

"The earliest and largest fire season in the Arctic was in 2020," Soja said. "This ecosystem influences the entire global climate. This area is huge. The fires keep burning in the same place. So, we know it's accessing permafrost and releasing millennia of stored carbon."

Similar to Dargan's 50-year plan, the final session in Melbourne brought together leaders from a cross-section of fire-based organizations to draw together the lessons of the previous days and help conference participants determine how to get ready for future challenges under climate change.

Rob Rogers, New South Wales rural fire service commissioner, said the 2019-2020 Black Summer fires and the changing climate showed that we all need to urgently rethink what was possible for our future.

"We've prepared our people for the historic worst-case scenarios but this has now moved," Rogers said. "We need to keep adapting this worst case for what's coming in the future. We can't leave it another 50 years before we look at this again."

As Ramirez Cisneros mentions on page 7, while Fire & Climate 2022 proceeded in May and June, an IAWF sub-committee was making final edits to a position paper on prescribed fire.

While the earlier position paper on climate change shaped Fire & Climate 2022, the prescribed fire paper will provide a framework for the IAWF and Wildfire magazine going forward.

Find some time to read our conference package, return to Pheedloop (remember your login information!) to catch sessions you missed, and be prepared to provide feedback on the prescribed fire paper when it is released.

Fire & Climate 2022 has set IAWF on a path to collaboration with stakeholders and policy makers. The forthcoming paper will clarify IAWF's role in prescribed fire not only in the United States and Australia, but around the world, for the next 50 years.



ACTION NEEDED FOR EFFECTIVE FIRE MANAGEMENT

As I wrote this in June, it seemed as if my home country of Spain had won the annual fire lottery. Fueled by a heat wave of Saharan air that encased Europe, an unusually early and active wildfire season burned area in Spain of more than 80,700 hectares (200,000 acres).

In the Northwestern region of Zamora, there were evacuations in 18 different municipalities by the Sierra de la Culebra fire, which devastated 30,800 hectares (76,000 acres) of forests in one of the least populated areas of Europe.

Meanwhile, firefighters in Malaga, Catalonia, Navarre, and Aragon fought unusually extreme fires. Temperatures in the northeast coast of Spain reached 39.5 C (103 F); this was the earliest heatwave in Spain in 40 years, and broke records. Spain usually experiences such high temperatures in July and August.

Spain provides an important lesson for us when we consider how to manage our lands more effectively, because these harsh weather conditions are meeting a landscape that is not as resilient in fuels management as it once was. This loss of resiliency in Spain is due to a rural exodus to urban centers and the aging of the remaining rural population; this has led to a disappearance of traditional land uses, such as grazing, farming and forest management. Now, more scrubland and unhealthy forests make fires difficult to control. Funding for forest health lags behind, while there are no policy obligations for urban communities to support rural areas for the benefits derived from forest lands.

After 4,000 years of human presence in Southern Europe, rural economic and growth policy changes have created this challenge in an already fire prone and developed the conditions to make historical fires

more intense. More firefighting resources is not the answer. There are needs for better conditions for firefighters, but the southern European countries do have very strong aerial firefighting forces. Due to this lack of resources, other tools need to be identified to help balance the effort. Prescribed and traditional burning and the use of forest biomass as the most efficient renewable source of energy can be that support.

The future of extreme heat “is unfortunately a foretaste of the future,” said Clare Nullis, a spokeswoman for the World Meteorological Organization, in a June article in the Washington Post. Nullis stressed that influence of early-season heat waves were being propelled by climate change. The unseasonal heat wave across Europe impacted the United Kingdom, France, Italy, Poland, and Germany with wildfires. Even many communities around Berlin were evacuated as a precaution due to wildfires.

Such heat waves pose deadly risks to vulnerable populations, such as those with chronic diseases, the very young and the very old, even before the impacts of wildfire are felt. Heat waves pose a challenge to land management and agricultural efforts as they create a dryer landscape earlier in the year. Heat waves also complicate the efforts of fire agencies tasked with fuels mitigation and proper prescribed fire applications. A June article in Vox about wildfires New Mexico said that “As climate change makes for hotter, drier summers and more volatile wildfires, and as we seem to be heading into a particularly destructive fire season, prescribed burns are becoming more necessary than ever. They’re also becoming harder to pull off.”

As our wildfire community faces a future of earlier fires on a dryer landscape, I am proud that the

Spain provides an important lesson for us when we consider how to manage our lands more effectively, because these harsh weather conditions are meeting a landscape that is not as resilient in fuels management as it once was.

IAWF is completing a position paper on the proper use of prescribed fire to advance hazard reduction, ecosystem management, traditional applications and pastoral burning practices. I am happy to say that Alen Slijepcevic, IAWF's past president (2018-2019) is leading this effort and guided the development of the recently released IAWF Climate Change Position Paper. Both position papers define our association's accepted vision and set forth our future efforts. One of the strongest pronouncements made by the climate change position paper is that prescribed burning must be implemented at all levels as a management tool in this new environment. The subsequent position paper on prescribed burns will put this focus in motion.

The forthcoming position paper on prescribed fire will lay out a strong call to action. We need to positively influence the public's understanding of the overarching and long-term benefits of fire on our landscapes. In our changing climate conditions, we will need to redouble our efforts and spread the positive message about the value of both the use of fire to mitigate risks – through prescribed, Indigenous, and controlled burning – and the allowance of some wildfires deemed low risk to run their natural courses. This path forward also requires identification of ecosystems most at risk to large and high severity wildfires and the prioritization of mitigation measures to balance their impacts.

It is important that the IAWF recognizes traditional burning practices. We acknowledge and support the role that Indigenous people have in undertaking cultural and traditional burning for a range of purposes associated with caring for their land. The IAWF must also promote the natural role of wildland fire in the landscape, and the ability of communities to plan for and adapt to living with wildland fire and smoke; this can be achieved through an all-inclusive approach to the future of wildland fire management with an emphasis on a shared responsibility by all stakeholder organizations, states, and the public.

I am most excited about the position paper's focus on the need for technology, innovation, research, and policy to advance the benefits of prescribed fire. This focus on data sharing among implementers and the promotion of the best available science to the public is both needed and something we can all achieve together. I look forward to the forthcoming position paper and applaud its development committee on their comprehensive work on its goals and calls to action for us all to embrace.

The wildfires this summer in Spain reminds us all that while our landscapes are changing, we have the ability to change the practices around them. The recent practice of overprotecting those lands is not a solution but a real challenge because of a lack of real economic support to traditional practices of those areas. The Zamora wildfire in Spain is a perfect example of this impact. As a wildfire community, we need to gain the public's support for the rural populations that are making those lands viable for the rest of us.

ABOUT THE AUTHOR

Joaquin Ramirez Cisneros is a wildland fire technologist who has been working for the last 25 years to bridge the gap between scientists and end users. In 2013, Ramirez moved to San Diego from Spain, and now works with agencies worldwide trying to convert the best science into actionable tools. Ramirez is the creator of several of the most advanced fire behavior software



model implementations and decision support systems, including the Wildfire Analyst and fiResponse software tools. Since 2011, Ramirez has co-ordinated the first European M.S. in Forest Fires (www.masterfuegoforestal.es) with Prof. Rodriguez Francisco y Silva (UCO) and Prof. Domingo Molina (UdL). Ramirez is a founder and active member of the Pau Costa Foundation. He earned his PhD in remote sensing and GIS at the University of Leon in 2003, an M.S. in forestry from the University of Lleida, and his B.S. in forest engineering from the Polytechnical University of Madrid, Spain.

Autumn conferences focus on research, wildfire management



The **Wildland Fire Canada Conference** brings together wildland fire management agencies, partners, and collaborators in Canada and around the world. This biennial conference focuses on wildland fire management, ecology, and science in Canada. The conference runs Oct. 31-Nov. 4 in Edmonton, Alberta. The Canadian Smoke Forum will be integrated into the larger conference program. Understanding smoke is key to managing the impacts including appropriate evacuation, creation of shelter-in-place facilities and issuance of public advisories.



UK Wildfire Conference The Human Dimension is Nov. 9-10 in Belfast. This event brings together agencies, delegates and speakers ranging from professional firefighters to land managers, academics, researchers and government officials. The national conference will feature speakers from around the world and will facilitate the sharing of best practice in tackling wildfires



IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit Nov. 11-18 in Coimbra, Portugal, aims to provide an update on the developments in forest fire science and technology and promote international co-operation in this research and management area. Following its previous editions, the scope of this conference will cover the main topics related to fire management from a research perspective.



5th National Cohesive Wildland Fire Management Strategy Workshop, Nov. 14-18, in Asheville North Carolina, will focus on keeping pace with reality, accepting the hard truths and boldly undertaking the hard work. The Cohesive Strategy remains the solid framework by which to address and identify solutions for today's complex wildland fire issues.

To learn more, and to register for conferences, visit www.iawfonline.org and click on Events.

IAWF scholarship recipients represent diverse fields of study



Simin Rahmani is a PhD student in the field of fire ecology in Western Sydney University (WSU). Rahmani received her Master of Environmental Biology from University of Wollongong (UOW) in 2018, and studied the pollution level from bushfire smoke plumes. Rahmani started working as a research assistant in UOW and Western Sydney University, where she collected field data, did laboratory works and statistical analysis to examine effects of drought and fire on forest mortality and recovery. Rahmani's PhD research focuses on drought and fire integration and their effect on tree mortality and recruitment.



Matt Ruggirello is originally from Chicago, but has spent much of his adult life living in the western United States and Argentina. Ruggirello graduated from Northern Arizona University in 2017 with a master's degree in forestry. While in Flagstaff, Arizona, Ruggirello spent a summer on a seasonal conservation crew, hand-felling conifers to release aspen and reduce fire risk for The Nature Conservancy. After graduating, Ruggirello worked for the Washington State Department of Natural Resources and the Washington State Department of Fish and Wildlife as a forester. In the latter job, Ruggirello oversaw every element of multiple restoration timber sales aimed at reducing fire risk and improving forest health around local communities. Ruggirello also had the opportunity to work with prescribed fire crews and regularly burn slash piles. Ruggirello's personal and professional experiences in the western United States introduced him to fire, and ever since he has been fascinated by its power to drive ecosystem change. When the opportunity arose to study post-fire tree regeneration dynamics in Ruggirello's wife's hometown of Ushuaia, in southern Argentina, he jumped at the opportunity. Ruggirello lives in Ushuaia, where he and his wife are raising their newborn son, Luca, while Ruggirello pursues his doctorate in forestry. After completing his PhD, Ruggirello hopes to become the first permanent researcher in the region to focus exclusively on the impacts of wildfire on native forests.



Sam Ebright has worked in fire ecology and management as a student, wildland firefighter, and researcher since 2014. Ebright graduated from Northern Arizona University in 2018 with a B.S. Forestry and B.A. Modern Languages (Spanish), returning to NAU for a M.Sc. Forestry in 2021. As an undergraduate, Ebright was funded by NASA to study high-severity fire impacts to aspen regeneration with remote sensing and assisted international field research in Argentinean Patagonia. With the forest ecology lab, Ebright also had the opportunity to work with the Navajo Nation and Mescalero Apache Tribe to study historic fire regimes and culturally sensitive resources. After college, Ebright worked four seasons as a USFS wildland firefighter, with two seasons on the Flagstaff Interagency Hotshot Crew. Ebright's thesis continues his remote sensing work by exploring spatiotemporal relationships of fire and forest cover change in his father's homeland, Vietnam. Ebright's specialties and interests are fire ecology, remote-sensing, dendrochronology, and international conservation. Ebright now works in the US Forest Service, Washington Office.

INTERNATIONAL ASSOCIATION OF WILDLAND FIRE

Fire & Climate

IMPACTS, ISSUES & FUTURES

An international approach to wildfire



PASADENA
CALIFORNIA
MAY 23-27, 2022



MELBOURNE
AUSTRALIA
JUNE 6-10, 2022

Fire & Climate 2022 concentrated attention on the most significant forces shaping wildland fire today. One conference, two locations, in May and June, featured insights, case studies and innovations, opinions, conversations, debates, workshops, and lots of networking and camaraderie that will lead wildland fire personnel toward a global approach to the wildfire challenge.

fireandclimateconference.com

A CALL FOR MITIGATION AND PREVENTION

MELBOURNE PRESENTERS AGREE BETTER SUPPRESSION TACTICS ALSO NEEDED

BY DAVID BRUCE

Fire & Climate 2022 concentrated our collective attention on the most significant forces shaping wildland fire today. The conference goal was to better prepare us to focus and respond to the formidable challenges involving our people, our communities, and our landscapes both built and natural.

The conference was built upon the 2022 IAWF Position Paper on Climate Change and Wildland Fire, with its reliance on science and experience to advocate for a commitment to better ways of managing wildland fire under climate change; this included a comprehensive Calls to Action, much of which was addressed by Fire & Climate 2022.

Fire & Climate 2022 was the first International Association of Wildland Fire conference under that title but drew on the traditions of past IAWF conferences on fuels and fire behaviour, human dimensions and the safety summit.

As we collectively face a present and a future impacted by large and destructive bushfires and still under the cloud of a COVID-19 pandemic, the conference presented a timely opportunity to focus on the bigger issues involved in dealing with natural hazards under climate change.

Two weeks apart, the same conference, but with a separate program, was held in Pasadena, California, and then in Melbourne, Australia.

In Melbourne, about 360 people registered for the five-day program that featured nine keynote presenters – all leaders in the science, policy, planning and operations of fire and climate, expert panels on cultural burning in Australia and North America and on fire science communications, plus almost 100 research and practice presentations from subject matter experts.

The conference subtheme, Impacts, Issues and Futures, was an acknowledgment that we need to share information globally about bushfire causes and impacts, how we engage with communities and other stakeholders so that we can act locally to protect our communities and our natural environment, as well as what are we doing to prepare to minimise impacts of climate and fire regime changes.

The scale and impacts of recent bushfires in Australia and elsewhere are reminders of the relevance of innovation and research in the emergency management and bushfire management sectors. The research, case studies and personal reflections

"As each event unfolds, we assume that things can't get any worse but just ask the Californians – they can. I shudder to think what a bad summer will look like during an El Nino in 2050."

on show during conference week demonstrated the significant work and the benefits that will be delivered over coming years, both in Australia and internationally.

In Melbourne, the conference program was structured around the subthemes, with each day building on the insights of the last.

IMPACTS

The conference began with Sophie Lewis, the Australian Capital Territory commissioner for sustainability and the environment and a lead author on the Intergovernmental Panel on Climate Change's 6th Assessment Report. Lewis looked at what exactly a one-degree rise in temperature means for Australia. While one degree may not seem significant, Lewis used the 2019-2020 Black Summer fires as baseline to demonstrate just how catastrophic it actually is. Even under our most ambitious attempts to limit warming by one to two degrees in coming years, Lewis said we need to plan for a future with conditions that regularly will make more Black Summer type events likely. And it is not just about the temperature extremes, the impacts will come from compound events.

"Black Summer wasn't just one extreme event," Lewis said. "We had heatwaves, extreme smoke and then extreme rainfall falling on burnt areas while other areas were experiencing fires. We don't really understand what this kind of future will look like. What are the new challenges of compound events? How does it stress people, infrastructure, and the environment?"

Greg Mullins, climate councillor and former commissioner of fire and rescue New South Wales continued with the theme of Black Summer being a case study in what we know today to be a really bad scenario. "But fires the same as or worse than Black Summer are inevitable," Mullins said. "As each event unfolds, we assume that things can't get any worse but just ask the Californians – they can. I shudder to think what a bad summer will look like during an El Nino in 2050."

As we move into a predictable shift to increasingly worsening conditions, our knowledge, preparations, resources and political discussions need to keep pace, Mullins said.

"What now needs to be understood is that history and personal experience are no longer reliable indicators of the future, and that gap needs to be filled with high-quality research and reliable data."

How do you communicate the complexities of fire and climate science, asked a panel of fire and climate communicators from media, research and fire agencies. Photo: Friedo Lighthart.



Amber Soja, research fellow at the National Institute of Aerospace in the United States and an IAWF board member, introduced a global view of where fires are burning and the impacts on both air and land.

Shifting the audience gaze away from Australia, Soja noted that most of the carbon on the planet is stored in the boreal and arctic ecosystems; this is where climate is warming the most right now and is predicted to in future – and that’s where wildland fire has suddenly become a real problem.

“The earliest and largest fire season in the Arctic was in 2020,” Soja said. “This ecosystem influences the entire global climate. This area is huge. The fires keep burning in the same place. So, we know it’s accessing permafrost and releasing millennia of stored carbon.”

ISSUES

Amy Christianson, an Indigenous fire specialist with Parks Canada, and an IAWF board member, took us on a visually mesmerising walk-through fire in her country. Without needing her to state it, the parallels with Australia were obvious – fire prevention policies of past decades have reduced the use of Indigenous fire to the detriment of the landscape and the people on it, this was starting to change for the better.

Michael-Shawn Fletcher, associate professor from the University of Melbourne, followed with a geographer’s explanation on how neglect of country was linked to the more recent rise of large fires in Australia. Using long-term fire history in Australia as a reference, Fletcher showed that there is really no such thing as wilderness – our land has long been shaped and curated by people for their benefit and purpose.

Oliver Costello from Firesticks outlined the research work underway to learn better from country and how this should be continued by supporting those with traditional knowledge and encouraging new researchers into the field.

“What really makes a difference is when we actually lead on country,” Costello said. “When we have Indigenous leaders who know that country, stepping forward and walking forward to show that country.”

Sidney Dekker of Griffith University reckons that we might have it all the wrong way about when we try to make our world safe from the impacts of fire and other hazards. We look too much at what went wrong, the mistakes, and the failures in a misguided attempt to work out how to do the right thing.

“Instead of seeing safety as an absence of negatives, let’s see it as the presence of positive factors that go well under complex conditions,” Dekker said.

As chair of a panel of communicators I asked the question: How do you communicate the complexity of fire and climate science? A similar panel session was held in Pasadena.

Stephen Oliver, the Australian Broadcasting Corporation manager of documentaries, showed clips of a range of informative programs on the matter to demonstrate how vibrant, punchy, emotive visuals were the best way of getting the message across. Yes, we are in the entertainment business, he said, but our aim is to engage people so that they change their behaviours.

Ailie Gallant of Monash University’s Climate Change Communication Research Hub suggested that, depending on who you are wanting to talk to, other methods could be more effective in getting that engagement, especially for those who are dismissive or deny climate change.

“There’s no silver bullet when communicating,” Gallant said. “This is why the emotive stories work in some instances, the real connection absolutely works. But there’s always a section of community who aren’t grabbed by these.”

FUTURES

In the final session, leaders in a cross-section of fire-based organisations were left to draw together the lessons of the previous days and tackle the question: What will you need within your agency and externally to get ready for future challenges under climate change?

Rob Rogers, New South Wales rural fire service commissioner, said the 2019-2020 Black Summer fires and the changing climate showed that we all need to urgently rethink what was possible for our future.

“We’ve prepared our people for the historic worst-case scenarios but this has now moved,” Rogers said. “We need to keep adapting this worst case for what’s coming in the future. We can’t leave it another 50 years before we look at this again.”

Ruth Ryan, corporate fire manager at HVP Plantations, spoke about the compounding consequences for resources, both human and natural.

“There’s another aspect we need to look at – people



Participants in the field trip to the Wombat State Forest, about an hour west of Melbourne, saw forest management for fires, floods and storms and the work of scientists from the University of Melbourne. Photo: Friedo Ligthart

are getting worn out going from fire to flood to fire – I think we need a rethink and I think it comes back to good land management. It's got to be about building greater resilience in the land as well as our people."

The panel members agreed that improvements in fire suppression are needed, however the biggest benefits will be realised by increasing mitigation and prevention. Panellists also agreed that the workforce is the most important component and more needs to be done to attract and retain people as well as prepare them psychologically for what they will experience in their jobs.

On a final note, the good attendance at the conference venue was backed by solid support from a diverse range of sector organisations. Joining us as partners in Melbourne were Natural Hazards Research Australia, Australasian Fire and Emergency Service Authorities Council, Bureau of Meteorology, CSIRO and Melbourne Convention Bureau. Sector

partners included Victoria's Country Fire Authority and Department of Environment, Land, Water and Planning, NSW Rural Fire Service, NSW National Parks & Wildlife Service, the National Recovery and Resilience Agency, Minderoo Foundation and Eco Logical Australia and internationals NASA, US Forest Service, US DOI Office of Wildland Fire, Association for Fire Ecology, and Pau Costa Foundation. Others supported the conference with booths in the sold-out exhibit hall. -- *With files from Beth Patch.*

ABOUT THE AUTHOR

David Bruce was co-chair of the Fire & Climate 2022 conference steering committee in Melbourne. He is a past board member of the IAWF and is currently on the IAWF communications committee. He is the communications director at Natural Hazards Research Australia.

OUR FIERY FUTURE

HOW WE CAN FACE AND CHANGE OUR FUTURE WITH WILDFIRE

BY LUCIAN DEATON

At Fire & Climate 2022 Conference in Pasadena, Kate Dargan – founder of Intterra, former California state fire marshal, and former assistant director for disaster preparedness and response in The White House Office of Science and Technology Policy, posed a question to a packed hall: What is our fiery future and what can you do today to impact our future to come?

Dargan said fire stewardship is at the core of the IAWF and noted that the audience was positioned at the tip of the spear for the required effort.

Setting the scene, Dargan explained that we are entering a dynamic fire environment, and illustrated this as a “J curve” that is quickly leaving the relative stable and comparatively flat environment of the past to the sharp upturn we are seeing now and face in the future as well. She used this to also show what actions we should take now to confront this developing risk with similar vigor.

Dargan leveled with the audience early, explaining that she would talk about the real stuff, and that it would be “dark.” Yet, the presentation illuminated both the future and the choices we have to confront the darkness.

Dargan framed this changing environment in four distinct periods spanning from the present to beyond 2050; she challenged the audience to consider not only how to approach these times, but also how their actions would need to keep up to achieve the future they most wanted. Providing perspective to the audience, Dargan thoughtfully explained, “You need to plan for the fire you are going to have.”

2020-2030: SHOCK AND PLANNING

Dargan explained that our near future will be a time of recognition and initial steps; this is when wildfire will become “an official problem.” Dargan

challenged the audience to appreciate that our collective relationship with fire will have to change as tinder-dry landscapes burn and our response system is overwhelmed. The current reality of large fires, community destruction and ever-toppling records will set the tone for this period.

2030-2040: THE ANGRY YEARS

This not-too-distant future is when climate change “will sit in everybody’s house” becoming a communal reality and will require adaptation and mitigation. Dargan suggested this time period may be one of stricter land use regulations, home development guidelines, and even community rebuilding considerations. It will also be a period when the forests of the Northern California watersheds will reburn. When such valuable landscapes are impacted, Dargan noted that that the challenging future will be as much about wildfire as it is about water availability.

2040-2050: THE SAD YEARS

Building upon this progression of wildfire and its impacts, Dargan explained that we will find ourselves stuck in a future during which mega fires are normal. No longer will the fires be “unprecedented” or the stuff of shocked media headlines. Dargan also suggested that a rural-urban divide about the risk and response to wildfire would become extreme. The debate about costs and who should pay will dominate the discussion, Dargan said. While home insurability has a built-in system elasticity, Dargan said that during the sad years, it this insurability challenge will find itself in true crisis.

Note: Registrants can view Our Fiery Future by logging into the Phedloop link on the Fire & Climate Pasadena conference website.



Kate Dargan warned delegates to Fire & Climate 2022 in Pasadena that her keynote address would be “dark” and outlined the choices that need to be made to illuminate the future. Photo by Mikel Robinson.

2050 AND BEYOND: IT'S UP TO US

As this future arrives, Dargan said, water issues will dominate the discussion. There will be winners and losers in communities across the western United States, Dargan said, and we will face a social tipping point in need of positive attention. Hard decisions will have to be made on climate choices to save our future beyond this period.

Turning from the dark, Dargan stressed that we need will to help each other more in this distant future and be part of the necessary change. A major lesson to the audience was in Dargan's explanation that urgency and humility are needed to make the future better. Collaboration among agencies and companies on grants and available data will be needed to approach the issue holistically. Unified command in federal agency land management will be required to muster the focus needed, Dargan said. And a national consensus will be necessary to address the challenge and win the hearts and minds of a skeptical public for such dramatic but necessary change

Dargan explained that we are the lighthouses who can guide change and encouraged everyone to find consensus and build consortiums today. And, in a nod to the current reality, Dargan applauded the work of Oregon state agencies and local groups positively tackling their wildfire risk saying that “they are nailing it!”

Dargan closed by offering a proposal: a 50-year plan, an approach that sets goals, objectives, and uses clear messaging to develop a vision of where

we all want to be in a world of wildfires. Dargan said such a plan's first 25 years should be broken into five-year cycles, and that the first 10 years must be strongly funded. Dargan felt the plan requires a non-pyramidal approach, and maybe even new national institutions to guide its success; and requires international associations to build the change and lay it in front of governments.

While Dargan stressed that we are not yet at the new normal that is coming, every moment of our present counts along this path and she wanted the audience in Pasadena – and everyone else – to know that we are the change that is needed.

ABOUT THE AUTHOR

Lucian Deaton is a program and policy strategist who has worked for the last 20 years on community safety and advocacy. He is the senior digital marketing manager for Technoslyva, which focuses on operationalizing wildfire science. Previously, Deaton managed the Firewise USA® Program and its international outreach for adaptation by valued international partners. He also managed NFPA's Outthink



Wildfire initiative, advancing domestic policy for community risk reduction. Formerly, Deaton managed the IAFC Ready, Set, Go! Program and was a lobbyist representing public safety issues before the U.S. Congress and federal agencies. Deaton holds a Masters of Urban and Regional Planning and a Masters of Natural Resources degrees from Virginia Tech and lives in Denver, CO.

REIMAGINING SCIENCE, MANAGEMENT, AND CULTURE

An emerging framework for adapting to changing fire regimes

BY MOLLY HUNTER, ED BRUNSON KAREN DANTE-WOOD, CAROLYN ENQUIST, KEVIN HIERS, AND SCOTT GOODRICK

The impacts of climate change on fire regimes are currently being realized through lengthening wildfire seasons, more extreme fire events, and restricted opportunities for conducting prescribed burning.

As the climate continues to change, land managers will be increasingly challenged to develop and adopt management strategies that facilitate societal and ecological adaptation to changing fire regimes.

In some cases, such strategies may include increasing the pace and scale of actions proven to increase social and ecological resilience, such as understory thinning, prescribed burning, cultural burning, or post-fire restoration.

Under extreme scenarios, climate change may significantly reduce the relevance of historical conditions or experiential knowledge to current management strategies, and novel management approaches may be needed.

However, changing the scale of current management approaches or adopting new strategies is challenged by high degrees of uncertainty in outcomes, societal expectations, resource constraints, and longstanding organizational policy, cultural, and norms.

Recognizing the challenges society and ecosystems face with changing fire regimes, many science funding organizations invest in research related to fire and

climate change. Yet, the scale, complexity, and difficulty associated with addressing changing fire regimes means that no one funding organization can address the multitude of science needs on its own.

Partnerships among science funding organization are critical for leveraging resources and expertise of different organizations, facilitating cross disciplinary science, and engaging with different science end users.

In addition, new models of science funding that support science co-production, stakeholder engagement, and science communication may be needed to accelerate the pace of adopting innovative approaches to addressing changing fire regimes.

Recognizing this need, a new partnership among the Joint Fire Science Program (JFSP), the JFSP Fire Science Exchange Network, the U.S. Forest Service, U.S. Geological Survey (USGS) Wildland Fire Science Program,



Figure 1: An emerging framework for science funding organizations to advance the adoption of innovative management approaches to address changing fire regimes.

and the USGS Climate Adaptation Science Centers has been exploring the science needs to collectively address changing fire regimes and developing a framework for advancing implementation of innovative management approaches to inform future science funding opportunities (Figure 1).

To inform the development of this framework, we hosted two workshops in conjunction with conferences hosted by the Association for Fire Ecology and the International Association for Wildland Fire. The workshops included scientists, practitioners, Tribal members, and boundary spanners working at the nexus of climate change and fire. Participants represented academia, federal, state, and local government, Tribal organizations, and non-governmental organizations and came from several regions of the United States, as well as Australia and Canada. We asked workshop participants about innovative management strategies, enabling conditions for advancing adaptation, and science needs. During the workshop presentations, panel discussions, and open dialogue, several themes emerged that we incorporated into the framework.

The framework begins with the development of new management strategies meant to accelerate adaptation to changing fire regimes. Those strategies must be based on an articulation of desired conditions that incorporate diverse perspectives. Critically, these perspectives should include those with experiential knowledge and Indigenous cultures, who both have a deep history and knowledge of land stewardship under changing conditions.

The desired conditions also need to be feasible, given how we expect ecosystems and fire regimes to respond to changing climate. Landscape and ecosystem models are important tools in this respect, for evaluating a range of plausible future scenarios. This initial step of identifying new management approaches is not trivial, as there may be a high degree of uncertainty in the outcomes, risk of unintended consequences, or tradeoffs in various approaches for protecting different social or



Scientists and managers exploring how to incorporate climate change into restoration and fire management planning on the Kaibab Plateau during a workshop sponsored by the Southwest FireCLIME project.

ecological values. Thus, it is critical that the process of identifying new approaches to management, including modeling potential future scenarios and incorporating diverse perspectives, be done with partnerships among scientists, managers, practitioners, and others who have a deep interest in the outcomes of management interventions. Thus, any science funding opportunity should include support for the hard work that goes into building the trust and commitment that sustains these partnerships into the future.

Once a strategy is identified, the next step is to implement the strategy, at least on an experimental basis. These adaptation strategies could be actions that occur before, during, or after a wildfire. In our workshops, participants identified several adaptation strategies that already are being implemented and those that may require additional experimentation or policy-based changes. These included reintroduction of cultural



The Southwest Fire Climate Adaptation Partnership (SWFireCAP) is open and inclusive and operates with action-focused roundtable teams with capacity to tackle one or multiple objectives.



burning practices, prescribed burning outside of typical burning seasons, planting drought-adapted tree varieties after wildfire, or using robotics for long-distance water transport to critical areas.

Some strategies also entailed increasing the pace and scale of adaptation strategies already proven to be effective in increasing resilience to wildfire or adopting such practices in areas where they are not currently used. This included practices such as understory thinning, prescribed fire, invasive plant control, and utilizing wildfire for resource benefit.

During this stage, partnerships among scientists and managers are also critical for identifying common enabling conditions to implementing new strategies and replicating those conditions across landscapes.

Even with buy in from diverse groups on newly developed management strategies, there will be uncertainty in the outcomes of implementing novel management approaches, especially under changing climate conditions. Thus, it will be critical to implement long-term monitoring plans that evaluate short-, medium- and long-term outcomes of management interventions.

Implementing these monitoring plans using the principles of adaptive management will be critical for understanding and learning from the successes and failures of new management approaches. Partnerships between scientists and managers are also needed at this stage to identify appropriate metrics to evaluate outcomes and appropriate monitoring protocols.

Partnerships at multiple levels are necessary to accelerate the adoption of innovative, science-based adaptive management approaches. As mentioned earlier, partnerships among scientists and practitioners are critical at every stage of this framework to assure science being conducted is actionable, can be readily translated to non-scientists, and, in turn, are incorporated into management decision making.

Partnerships among land managers, scientists, and stakeholders are necessary to ensure diverse perspectives are considered and the broader public supports land management actions.

Partnerships among science-funding organizations are needed to leverage resources, avoid duplication of effort, and create opportunities for innovation.

While there is wide recognition that the pace and scale of management efforts need to increase dramatically, there is also recognition that the work of developing and maintaining partnerships often must occur on

much smaller, more local scales.

Several factors were identified that science funding organizations could consider to support local partnerships and collaboratives while also facilitating the implementation of management strategies across broad scales. These factors include investing in organizations that work within communities and have well established trust and relationships with stakeholders and investing in liaisons who can work across organizations and disciplines. It also will be critical to support the development of communication tools and strategies designed for the broader public, to gain broader support for management actions and trust in land management organizations.

The organizations in this partnership are well suited to collectively implement and support this framework. The Joint Fire Science Program is renowned for funding applied fire science that has been incorporated into fire and fuels management decisions and invests heavily in science communication and dissemination through the Fire Science Exchange Network. The USGS Climate Adaptation Science Centers (CASCs) also have a long history of engaging in science co-production, incorporating stakeholder engagement in science funding, and collaboration with Tribal partners.

Furthermore, many scientists within the U.S. Geological Survey have expertise in ecosystem modeling, which is critical for identifying plausible future scenarios. The recently completed USGS Wildland Fire Science Strategic Plan includes a modeling collaborative that could provide crucial support for implementing this framework. The U.S. Forest Service manages much of the land where this work would be implemented, and its recently published 10-year strategy for confronting the wildfire crisis builds off the National Cohesive Wildland Fire Management Strategy and Shared Stewardship agreements to work with partners in focusing fuels, forest health, and fire management in a manner that is strategic, science-based, and matches the scale of the wildfire problem.

In the coming months, our partnership will further develop this framework and incorporate it into a science strategy to inform future science funding opportunities.

FOR MORE INFORMATION VISIT:

Joint Fire Science Program – firescience.gov

Climate Adaptation Science Centers – usgs.gov/programs/climate-adaptation-science-centers

USGS Fire Science – usgs.gov/special-topics/wildland-fire-science

USFS Fire Research – fs.usda.gov/science-technology/fire/fire-research

Fire Science Exchange Network – firescience.gov/JFSP_exchanges.cfm

Southwest FireCLIME – swfireclime.org

Southwest FireCAP – swfirecap.org

USFS 10-year Wildfire Strategy – fs.usda.gov/managing-land/wildfire-crisis

USGS Wildland Fire Science Strategic Plan – pubs.er.usgs.gov/publication/cir1471

Examples of innovative partnerships addressing fire and climate change highlighted in recent workshops

While fire is a natural process in many Alaska environments, climate change is causing fires to become larger and more frequent. In the Yukon Flats National Wildlife Refuge, this changing fire regime has profound implications for ecosystems, carbon storage, and human health, particularly for remote Indigenous communities within the refuge boundary. To gather diverse perspectives on developing new fire management strategies in the face of changing conditions, the refuge convened a workshop with managers, boundary spanners, scientists, and community members to explore science, fire management challenges, and community needs. Setting a workshop tone of transparency, humility, and openness (before, during, and after the event) was key to establishing trust with participants and facilitated an open dialogue with diverse perspectives represented. The refuge manager will use the information gathered to broaden conversations to ultimately adapt existing refuge management plans. For more information visit frames.gov/event/574183.

The Southwest FireCLIME project (funded by JFSP) represents an example of a project that incorporates manager science partnerships to assess plausible future scenarios, desired conditions, and potential management actions. The project included a workshop hosted by project leaders in partnership with the Northern Institute of Applied Climate Science, during which scientists and

managers considered how to incorporate climate change into restoration and fire management planning on the Kaibab Plateau. Allowing scientists and managers to explore how climate change may impact fire regimes and ecosystems at the scale of an individual project was critical for changing managers perceptions about trying new adaptive management approaches. For more information visit swfireclimate.org.

The Southwest Fire Climate Adaptation Partnership (SWFireCAP) is an example of a collaborative that includes diverse perspectives in identifying adaptation strategies and opportunities in the southwest. Jointly launched by the Southwest CASC and the Southwest Fire Science Consortium, the partnership aims to bridge the gap between fire and climate adaptation practitioners and advance fire and climate adaptation in the southwestern United States. The partnership is open and inclusive, with participation from universities, federal agencies, non-governmental organizations, and Tribal organizations. The partnership operates with self-governing roundtable teams, which are action-focused groups with the capacity to tackle one or multiple objectives, including identifying cultural burning needs, documenting examples of on-the-ground adaptation, and compiling training opportunities. Find out more at swfirecap.org

ABOUT THE AUTHORS



Molly Hunter is the science advisor for the Joint Fire Science Program. For more than 10 years Hunter has assisted the program in developing science strategies and plans for a variety of fire-related topics, including the nexus of fire and climate change. Hunter is based at the University of Arizona where she is also associate research professor.



Ed Brunson is the Joint Fire Science Program manager. Brunson has worked with the program since 2015, serving in positions as deputy program manager and acting communications director. Brunson formerly worked as Bureau of Indian Affairs regional fuels specialist and regional fire ecologist.



Karen Dante-Wood is the technology transfer specialist for the Joint Fire Science Program, guiding and supporting activities for the Fire Science Exchange Network and developing fire science and technology transfer products. Prior to joining the program, Dante-Wood held positions with the National Wildlife Federation, Environmental Protection Agency, and the U.S. Forest Service.



Carolyn Enquist is the acting director and deputy director of the Southwest Climate Adaptation Science Center. For more than two decades Enquist has worked at the nexus of science and practice with a focus on the biodiversity impacts of climate change, practical guidance for conducting vulnerability assessments, and the practice of climate adaptation planning and implementation. Enquist currently serves as lead author on the IPCC Working Group 2 AR6 report and is author on the southwest chapter of the most recent National Climate Assessment, where she is leading the section on wildfire.



Kevin Hiers is the acting deputy wildland fire science coordinator at U.S. Geological Survey, where he assists in implementing USGS strategic research priorities, interagency fire science partnerships, and planning fire science support for Department of Interior fire management programs. Hiers' home agency is Tall Timbers Research Station, and he has worked at the interface of fire management and research for 27 years.



Scott Goodrick is a research meteorologist with the U.S. Forest Service Southern Research Station, where he studies fire-atmosphere interactions, smoke dispersion, and how climate influences the occurrence of forest fires. Goodrick is also a member of the Joint Fire Science Program governing board.

CHANGING THE NARRATIVE

MEDIA PANEL RECOMMENDS FOCUS ON POSITIVE NEWS

BY DYLAN BRUCE

Readers and viewers have grown weary of doom-and-gloom wildfire stories and crave news about how they can help change policy, according to members of the communications and media panel at Fire & Climate 2022 in Pasadena.

Reporters, podcasters and public-information officers who comprised the five-person panel said their audiences want a more complete picture of the wildfire problems so they can take action.

“People want to know how they can help on an individual level and on a community level, so it’s about providing the tools and resources for that,” said Amanda Monthei, creator and host of the Life with Fire podcast.

Other panelists were Nathan Rott from NPR, Elizabeth Weil from New York Magazine, filmmaker Trip Jennings, Zeke Lunder, host of The Lookout, a wildfire education channel, and Kristin Alison, a fire management officer and public information officer for the U.S. Forest Service – Type One Incident Management Team in California.

Panelists opened with a discussion about their different timeframes and deadlines and noted that deadlines affect the depth of coverage.

For example, Rott, who has covered many wildfires, said he has tight deadlines.

“I’m one of those people that has to parachute into places,” he said. “And I know that there’s a lot of consternation over parachute journalism for very good reason. I basically have to show up and do a really quick-turn piece.”

In stark comparison, Weil said she can have months to put together a piece for New York Magazine. The longer timeframe allows her to build characters and narratives and develop relationships with members of the wildland fire community.

“I’m a generalist,” Weil said. “I covered climate for a few years, but I’m really an outsider, so building relationships, getting to know people, having people themselves be really emotionally honest and willing to share complicated stories is what makes my job possible.”

Speaking about the yearning for positive news stories, Monthei said she tries to highlight wildland fire professionals who are doing meaningful work to make a difference. Podcast listeners, Monthei said, want to know how they can do the same.

Jennings, the filmmaker, echoed Monthei’s sentiments, and explained that his team puts a lot of thought into titles and thumbnails when posting content to YouTube, and have found that the traditional narrative of a battle against wildfire isn’t effective.

“The military framing around it does not work for us,” Jennings said. “Climate does. Solutions-oriented stuff does.”

The ever-changing demands of reporting on wildfire demands innovation to overcome old and new obstacles, the panelists said, and they had differing accounts of how they have adapted.

Rott highlighted the increasing importance of social media in reporting. Speaking from Ukraine, he explained how social media is a vital source of information from officials and the public, but that it isn’t without its drawbacks.

“People want to know how they can help on an individual level and on a community level, so it’s about providing the tools and resources for that,”

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“In a way, that democratization of information is really powerful and good, but I also think that it cuts both ways,” Rott said. “It’s a real challenge when there’s so many people trying to communicate their stories and content. It’s a diluted space.”

Highlighting this desire for more access, Lunder explained how he often struggles to get up-to-date infrared imagery. He said during the Dixie fire in Northern California in 2021 there were regular flights capturing images of the fire from above, but it took hours for the footage to be released to media and the public.

“That’s frustrating, because I feel like that’s critical information, and the wider we spread it the better. I’ve got firefighters watching my site and they can get it easier from me than they can get it from the actual incident.”

Alison said social media has distorted public expectations of content – everyone wants Instagram-worthy images and footage, and there is a lack of understanding of the tough conditions under which reporters work.

“In this day of influencers and social media stars, everyone thinks you’re going to have full production capacity. We get comments like ‘Why is their lighting so bad?’ or ‘Why did their bandwidth drop?’”

Alison also touched on how laws and regulations can hamper her team’s efforts to communicate with the media.

“It may look like we’re withholding or not providing all the information, but it’s just the process,” she said.

The session ended with a discussion about good fire and bad fire, and the difficulty communicating these concepts to audiences who are largely uninformed about wildfire policy and management history. Timing, Monthei said, is critical to help readers and viewers understand the broader wildfire world. For example, during wildfire season, audiences are focused on incidents and safety, and are more open to policy stories in the winter when their homes and personal safety are not threatened.

“I don’t think that August is the time to be pushing the narrative of ‘good fire’, as there’s very much the reality of fire as a disaster,” she said.

“For me it’s a matter of timescales and reading the room, and understanding what people are interested in hearing about at the exact moment you are coordinating that messaging.”

Speaking about the Dixie fire, Lunder noted that a fire had burned through the same area 10 years ago and the resulting fuels reduction bought time that allowed firefighters to save multiple towns. Highlighting such tangible examples of how fire can be beneficial is a good way to start to change people’s understanding of wildfire, Lunder said.

“I think we can call on history and spin a larger story that has space for (good fire and bad fire).”



Panelists Amanda Monthei (Life With Fire podcast) and Zeke Lunder (The Lookout podcast) provided insight into the challenges of reporting on wildfires and finding new angles for readers, viewers and listeners who want to help find solutions to the wildfire problem. Photo by Mikel Robinson.



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PARADIGM SHIFT

PANEL POINTS TO POLICY PROGRESS

BY TODDI STEELMAN

May 2022 was an eventful month for wildland fire activity in the United States; the southwest and Rocky Mountains experienced early and more-active-than-usual fire activity for spring.

Prescribed fire, its importance and the controversies that come with it, was in the forefront of the news as U.S. Forest Service Chief Randy Moore called for a 90-day moratorium on the practice following the escape of two prescribed fires that have had devastating consequences in New Mexico. The pause will allow a full review of practices, decision support tools and protocols.

Historic drought added to the expectation of another challenging fire summer, if not the whole year. And yet, as we have often experienced, necessity is the mother of invention. Humans are endlessly creative, adaptive and resilient. So, while the conditions are challenging, they have also provided a living laboratory for innovation.

At the IAWF Fire & Climate 2022 conference in May, a panel of four speakers representing diverse perspectives addressed policy opportunities and challenges.

Kelly Martin, is co-founder and president of Grassroots Wildland Firefighters

Bryan Petit, is a senior professional staff member, United States Senate Committee on Energy and Natural Resources

Carol Baldwin, is the project co-ordinator, Great Plains Fire Science Exchange and faculty at Kansas State.

Sashi Sabaratnam is program manager, Wildfire Vegetation Mitigation Division for UC Cooperative Extension, founding board member of the Marin Wildfire Prevention Authority and a Mill Valley city councilmember.



I had the pleasure of posing questions to these leaders and have distilled their insights.

Where are we making policy progress and what is left for us to work on?

The United States has made progress on policies to support living with fire and to encourage putting more good fire on the land. We are making constructive distinctions around what we can do with prescribed fire and the use of wildfires to help meet land management resource objectives. Further, these changes suggest the need for broader workforce development so we have the staffing, expertise and talent needed for a transformative change in how we learn to live with wildland fire more holistically. And we are making progress to this end.

Martin pointed to the strides toward bringing attention to workforce retention and recruitment. For instance, Office of Personnel Management is working on a new unique job classification that establishes and affirms a professional career progression as a wildland firefighter from “hire

to retire.” Pay disparity with similar emergency responders in other fields occupies much of the current media attention. There is recognition of needed reforms to address benefits such as mental health support for people when they are both on and off the job, including affirming Post Traumatic Stress Disorder (PTSD) support and other physical and mental health resources that wildland firefighters require for peak performance during emergency operations. All these support systems are essential if we are to build the workforce necessary to live with fire, do more hazardous fuel reduction, and put more good fire on the ground.

But we need to do more. In broad strokes, we know we need more beneficial fire on the landscape. We are overly focused on the western United States and tend to ignore the significant fire challenges in our grasslands and other areas. We need homeowners and communities to take a greater vested interest to prevent their own homes from burning down. And while we have ideas and initiatives to chip away at these, the map of how to actually get there is not straightforward.



Most fire mitigation work happens at the local level, with public agencies and private landowners working together to identify the local hazards and assets at risk. This can be overwhelming, and local and state regulators need to make sure they are supporting homeowners with good data, inspections, and tools without creating regulations that are at odds with scientific research or that discourage the often difficult community-wide conversations that are needed to inform planning decisions.

For instance, Baldwin noted that smoke from prescribed fire is being categorized by the U.S. Environmental Protection Agency as simply another pollutant, the same as if it were a smokestack belching industrial waste into the air. Baldwin suggested that the smoke produced by prescribed burning, which is critical for ecosystem maintenance, should be considered differently from industrial airborne pollutants for regulatory purposes. Currently, the ability to accomplish the needed prescribed burning is and will continue to be severely hampered by these kinds of regulatory standards that do not discriminate. Additionally, there needs to be greater support for gross negligence law protection at the state level for those who engage in prescribed fire.

Martin suggested to further develop our workforce the United States needs to move beyond the current low level job classification of forestry technician. The next step is to create a professional career ladder progression, in four distinct career time phases such as entry, mid-level, senior, and executive level jobs. Creating clear and established pathways would greatly reduce the current labor-intensive friction experienced when hiring, retaining and promoting wildland firefighters while also providing incentive for employees to know that when their qualifications increase, they will be eligible for non-competitive grade promotions.

Further, there are many nuances that complicate the federal government's ability to recruit, retain, and promote highly qualified individuals and keep

the wildland firefighting community out of the burnout cycle we are experiencing. For instance, USAJOBS, the federal government's hiring website, favors individuals with computer access and savvy. This means a potential large candidate pool is overlooked, especially in more rural areas. Many wildland firefighters spend their first 10 years working in entry-level wage positions that require an extraordinary amount of overtime just to make ends meet; this leads to burnout and loss of expertise as these firefighters exit their federal careers for more lucrative and stable positions with state and municipal fire departments. The situation is compounded by the housing circumstances. Government and local housing, if available, can and often does put people into an extreme rent burden. When this burden cannot be mitigated, firefighters find themselves in an untenable situation camping in public campgrounds, sleeping in their cars or having to pay for poor housing conditions. There is no current policy solution, but the wildland fire community could examine the General Services Administration requirement to raise government rental rates to match those of surrounding communities. This arcane policy no longer serves the American public and needs to be reviewed and omitted as a public policy requirement.

What difference will the Bipartisan Infrastructure Law make for wildland fire personnel and current wildland fire challenges?

Petit was in a good position to lay out the details on this question and outlined five big "game-changers" in the law.

1. Funding associated with PODS workshops (Potential Operational Delineations). PODs involves people huddling around a map and deciding ahead of time the strategies and tactics that would be preferred for future wildfires in an area, including deciding where to contain them. This type of

collaboration and co-ordination can facilitate more strategic placement of future fuels work and other mitigation efforts that can be used during the wildfire.

2. In the law, the U.S. Congress has made the biggest allocation of fuels-reduction funding available to areas that have finished a PODS workshop. This initiative creates the right incentives to do the pre-wildfire planning.
3. Congress provided the largest investment in home-hardening ever, but tied much of the funding to areas that have local ordinances regulating flammable building materials. So again, financial incentives are tied to the places that are institutionalizing the change that is needed.
4. The law refocused the federal agencies' treatments to those areas in which a large wildfire would be hardest to stop once started, and that have communities nearby. This provision will result in half of these most problematic areas of the United States having their fire risk changed over the next few decades. Congress also directs the federal fire agencies to map all of the federal fuels treatments in the United States alongside all of the wildland fires. This information will be useful for fire operations, so the wildland fire community can more objectively see how treatments interact with wildfires and accelerate our learning in a way that is more than just anecdotal about how fuels treatments really work.
5. Lastly, Congress required a new job series with a new pay regime be established for federal wildland firefighters.


Of particular interest to the panelists was the fact that most of the big policy wins in recent years were the products of bi-partisanship, which was notable on two levels. First, the Bipartisan Infrastructure Law provides an alternative narrative of possibility when the wildland fire community typically hears only narratives about the rancor and intransigence that pervades Washington, D.C. Important work can get done when we compromise and maintain focus on common sense solutions. The Great American Outdoors Act and the Bipartisan Infrastructure Law were the result of a handful of dedicated elected officials from both parties putting together concepts they thought others from their parties could support. Second, these successes may lay the groundwork for tackling even more controversial challenges that have eluded coalition building in recent years.

There are a dozen other bills related to vegetation management or wildfire management. For example, Senator Cortez-Masto has introduced bill to update the list of at-risk communities. The National Prescribed Fire Act would address the liability issues faced by prescribed burn bosses and EPA's regulation of smoke emissions from prescribed fires. More policy is on the horizon, including bills related to land management plans, firefighter classification, retirement, health and fair pay, response protocols, forest collaboratives, and issues pertaining to agency culture.

In short, while there are plenty of challenges given current trends with climate change, human settlement patterns, existing forest- and grassland-management conditions, and what these issues mean for threats to people and the places we care about, there is also a lot of creativity, innovation and solutions moving through the U.S. legislative processes into implementation. A window of opportunity has opened and there are many dedicated professionals, practitioners and legislators working to create the building blocks for the paradigm change we know we all need for the next 2 to 3 generations.

IT'S THE FUELS, MY FRIEND

How a long-term fuel monitoring program in the Yellowstone ecosystem may shape our future burning



The Berry Fire in 2016 was managed on the landscape with point protection strategies. It burned more than 20,000 acres over six weeks and through two prior fires, in 1988 and 2010. This decrease in fire return interval may reflect and foreshadow the impacts of a changing climate and can be forecast by monitoring tree regeneration patterns and fuel moistures, among other conditions.

Photo by Ron Steffens

BY RON STEFFENS

*EDITOR'S NOTE: Fire & Climate registrants can view the presentation *It's the fuels, my friend* online, until October. All registered attendees for Melbourne and Pasadena can access to all presentations on PheedLoop. Registration is still open at <https://inawf.memberclicks.net/fire-climate-conference-registration--pasadena>. All presentations (and other past conferences) will be available to IAWF members in the fall.*

When I completed my first set of sign-in paperwork as a seasonal park ranger at Grand Teton Nation Park in Wyoming 30 years ago, in 1992, we already knew the force of this devil.

Four years earlier, a goodly portion of the Yellowstone ecosystem had burned. Back then, we witnessed fire of this scale as a terror but soon enough, as forests regenerated and wildlife prospered, these fires represented natural renewal, once-in-a-few-hundred-years events.

Yet within the forest's recovery there was a darker shadow in the smoke's footprint, and we wondered if we would face fires in the future that burned past renewal if we're unable to disconnect our addiction to carbon and its greenhouse gases.

In 2022, as I returned to my summer seasonal job. A recent global analysis offers 50-50 odds that in a few years we'll cross the 1.5 degree C warming that signals a tipping point.

As we entered our Northern hemisphere summer — and after the IAWF's Fire & Climate 2022 conference in California and Australia in May and June, I can join the many fire managers who focus not only on the fires but on the greenhouse gases propelling us into an era of fire-terrors.

While I was away from Wyoming managing fire responses in Arizona, a severe weather event — a warm deluge pummeling a melting snow pack — flooded the north half of Yellowstone Park. A 100- or 1,000-year flood event closed Yellowstone while 100 miles south, my home park of Grand Teton simply absorbed heavy rains.

Sampling the fuels – and climate change

As a fire and all-risk manager, closing a road isn't that unusual. But if the park-closing 1988 fires may have ended one climate era, these 2022 floods mark the new era — the hydrocene joins with pyrocene, all courtesy of our Anthropocene.

The injured infrastructure and landscape should raise welts in our humility. But beyond the road-closing floods and fires, I've come to observe climate change every summer day, rainy or dry.

In my work as a fire monitor and fire analyst in Grand Teton, I have sampled fuel moistures twice a month for 30 summers. We identified seven sites, representing different components of the ecosystem and its burning patterns. Among the fuels were sagebrush, lodgepole pine, mixed conifer. Season after season our team made our small cuts, clipping and weighing the wet weight, putting the samples in the 100 C drying oven, calculating the difference from wet to dry.

Some summers the fuels cured earlier, some they barely cured at all between the rains (and snow) of June, July and August. Sometime around 2000 this began to change and by 2010 the air and the ground felt and smelled like drought. The sticky sweet terpenes of sagebrush and lodgepole were drier, losing a bit of perfume, and carried less water weight.

I came to know climate change, here in the Tetons, as a lead fire monitor, a position no longer funded directly but somehow (thankfully) the park finds a way to fund my role each spring.

One of my duties is to collect fuel moistures and track the potential impact on each season's fires; this research supports a long-term commitment to wildland fire use – a strange phrase to anyone who doesn't work fire in large, fire-adapted landscapes, although it's no stranger than prescribed natural fire, the term that framed my early seasonal career.

It's 2022. Researchers with decades in the climate analysis world warn we have less than five years to fix our mess — though Michael Mann has observed that if we act swiftly there may be a quicker resilience and recovery than predicted.

Perhaps it's time to simply accept that all flames in vegetation and non-built environments are climate fires. (Just as we should label any release of greenhouse gases as climate destroying.) Some fires may help us maintain ecosystem services, fixing carbon in the roots and in carbon-balanced, fire-adapted landscapes.

These are beneficial fires. Some may burn hotter than currently adapted normals — wounding the functions of ecosystems and releasing more carbon than sequestered. These are destructive fires. All are fires burning within a climate that's changed and changing exponentially from prior burn conditions, those amazing natural fires of my middle years.

The phrase from the 1988 fires in the Tetons and Yellowstone was "Burn, baby, burn," an exclamation of awe about fires burning on a 150- to 300-year cycle. At what may have marked the beginning of the closing of the "natural fire" era, these fires burned at a historic yet normal scale. We are now at an abnormal scale. The phrase for the 2022 fires and beyond? Perhaps "If it hasn't burned yet, just wait."

For me, the natural fire era began in 1984, when I first worked fire. Later jobs at Saguaro National Monument (now Park) helped me gain trust in fire as a force that humans and the landscapes could live with.

Much is similar each season, some changed. I'm greeted each spring by a marmot who lives under the seasonal cabin's porch, a moose who prunes the cottonwood by the creek. We've endured and mostly absorbed beetle kill in the mixed conifer and are more concerned with the blister rust killing high elevation white bark pines.

And twice each month we sample the fuels, when we aren't interrupted by snow or rain, limited staffing, or responding to fires. We sample live herbaceous and live woody and dead fuels at seven sites around the park, representative of sagebrush and lodgepole and mixed conifer habitats.

The analysis: fuels are more available

When we analyzed the first two decades of data, from 1992 to 2022, we began to observe a drying trend that began around 2000. This was most noticeable in the heavy dead and down logs, the 1,000-hour fuels that require 1,000 hours (roughly 40 days) to significantly dampen or cure. These fuels were reaching an availability to burn a week earlier and later each season, and averaged drier each season.

After 30 years of sampling, we asked our questions slightly differently. For all related fuel types in the sagebrush and forests, we charted whether an entire sampling season overall was wetter or drier than average. And for the 10 to 12 sample periods each season, what was the ratio of sample weeks that were drier or wetter than average for that specific period?

And what we're observing and experiencing matches the

analysis and projections of researchers, the field samples match the probabilistic-focused.

The graph of the 1,000-hour fuel moistures illustrates the trend we discovered in all fuel types and habitats. After around the year 2000, each season was trending below average. And the ratio of the number of dry sample weeks compared to wet sample weeks was trending toward drier.

To act – informed by what we know and predict

What do we do as fire managers? What do we do as environmental leaders (and isn't that the obligation we have as park rangers)? And as citizens?

Monica Turner and others, in a 2022 paper, support a combination of commitment and monitoring, focused specifically on this locale but with advice applicable anywhere:

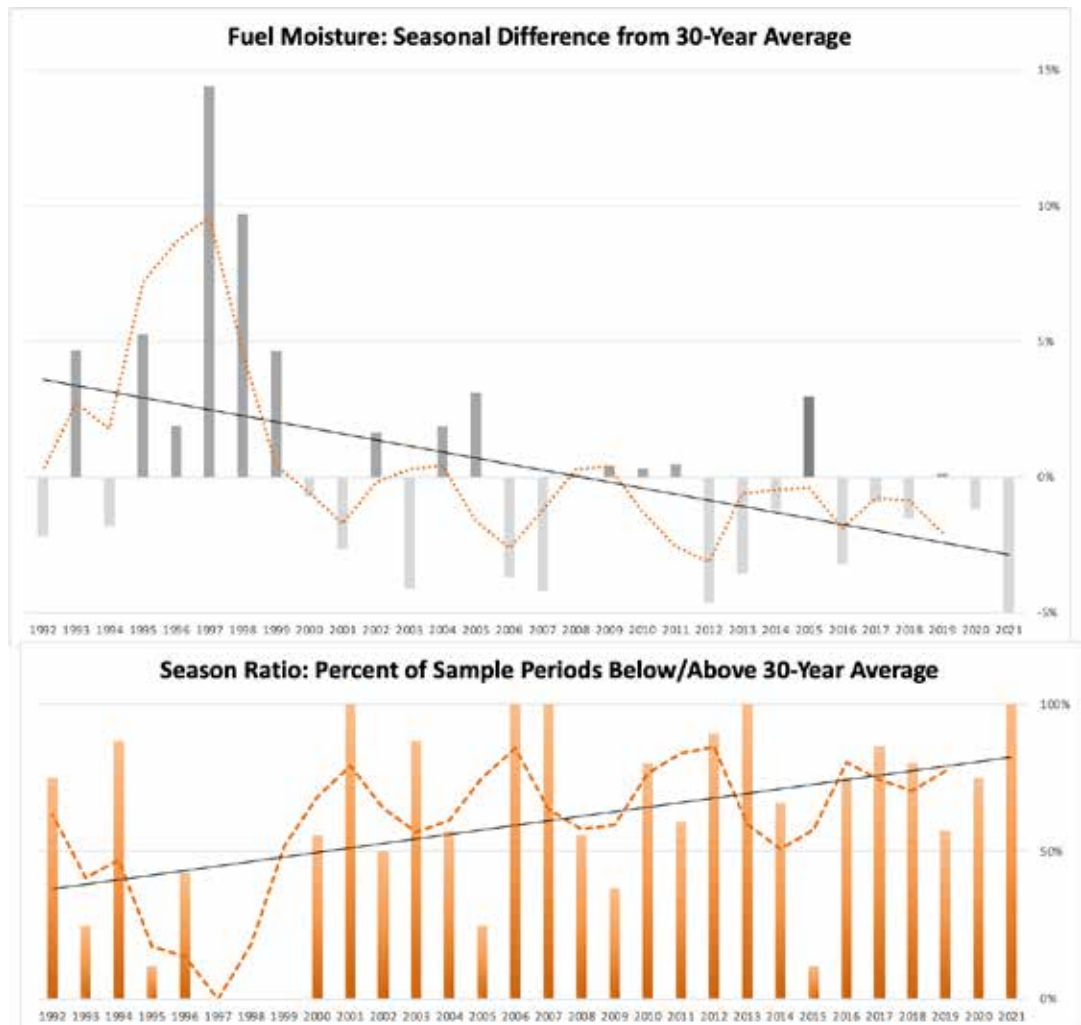
"If current [greenhouse gas] emissions continue unabated (Representative Concentration Pathway 8.5) and aridity increases, a suite of forest changes would transform the GYE

[Greater Yellowstone Ecosystem], with cascading effects on biodiversity and myriad ecosystem services. However, stabilizing GHG concentrations by mid-century (RCP 4.5) would slow the ratchet, moderating fire activity and dampening the magnitude and rate of forest change. Monitoring changes in forest structure may serve as an operational early

warning indicator of impending forest decline."

It's good to hear the confirmation — the role of monitoring can support our management. But in many ways, our park (and National Forest) monitoring programs, from pre- and post-fire effects, and of the fuel moisture that helps determine fire return intervals and intensity, already offer an operational early warning.

Some of this monitoring occurred in the learning landscape of fire in the north half of Grand Teton. The Berry Fire of 2016 burned through two recent fires, from 1988 and 2000 (and as incident commander I issued one of two orders to close the road to Yellowstone that summer). Six years later, the research and associated monitoring support the likely scenario that forest regeneration will be diminished if the fire return intervals become drastically shorter than the habitats have adapted with. The Yellowstone and Tetons we know and cherish (some 4 million visitors each year) will remain a living and learning landscape. Yet some of the splendor we cherish will change.



One-thousand hour fuel moistures illustrate drying trend in Wyoming's Grand Teton National Park fuel sampling sites. GRAPHIC: RON STEFFENS

We might ask — and we are asking — how might the monitoring, these early warnings, help us adapt our fire operations, next year and next decade? Or we might ask, how might the fires and floods of this symbolic yet very real landscape help us face and manage our climate crisis?

When the flames and waters cross the highways we face a physical reality: our roads are compromised by the very vehicles we seek to drive.

Who would drive into a flood or fire? Though at times I have driven through the smoke and spot fires, we don't knowingly drive into the inferno. Yet that is what we're doing, every day.

I continue to sample fuels. This summer, a late winter's drying trend didn't appear in our spring-time fuel moistures.

Green-up seems normal, though some have predicted a potential flash drought later this summer, even as we deal with the aftermath of the flash floods. And I sample the fuels

— clipping swigs of redolent lodgepole and sagebrush to help us prepare for our burning times, while driving the most fuel-efficient vehicle in our fleet, while asking, where are our EVs? And asking, can we please apply the lessons of the Yellowstone ecosystem, the place that has come to symbolize "nature," in our lives and policies? This summer, not next decade, as each day our seasons are twisting toward extremes — hotter and drier, or warmer and wetter — and we still have the days to act. To re-route our lives before all the roads are closed by our floods and fires.

ABOUT THE AUTHOR

Ron Steffens (ron.steffens@prescott.edu) has managed and studied wildfire use and climate fires on five continents. He's a past IAWF board member, past editor of *Wildfire* magazine, and teaches emergency management and communication at Prescott College in Arizona. This is a reflection written in no official capacity or intent.

Collecting lodgepole pine sample on Timbered Island. Photo by Ron Steffens



A post-fire sampling team. Photo by Ron Steffens

2022 IAWF AWARDS

2022 IAWF EARLY CAREER AWARD IN FIRE SCIENCE

ADRIAN CARDIL FORRADELLAS

Adrián Cardil is a graduate in forest engineering with honors (BS and MSc Extraordinary Award) from the University of Lleida, where he received a PhD in 2015 (Excellent Cum Laude; PhD Extraordinary Award). Since then, Cardil has carried out his research in national and international research groups through stays in Canada, the United States, Chile, Netherlands, Bulgaria, Germany, and Italy, establishing a broad network of international collaborators. Cardil is a prominent fire and forest scientist who has developed: (1) remote sensing methods for forest management (Airborne and GEDI Lidar, hyperspectral imagery from drones and satellites, satellite active fire data); (2) innovative fire behavior models and applications to better estimate the impact of wildfires on human fatalities and the environment; (3) analysis of adverse weather patterns and drivers leading to extreme wildfires in several continents and regions (Amazon, California, Europe). The scientific impact of the research can be scored by the large number of articles published in SCI journals (57) as well as the quality and the number of times these articles have been cited. Cardil has been determined to grow capabilities that can meet the needs of an increasingly sophisticated and complex environmental paradigm through his research activities. He has translated science to operational tools and services to the industry to facilitate decision making in fire emergencies through robust fire modeling applications based on remote sensing techniques applied in a large set of world-class fire agencies in the Americas and Europe, including CAL FIRE. Cardil has participated in several international projects founded by public entities – the PI of Tecnosylva in two of them (ITN EU Pyrolife 860787 > 3M€ member of the supervisory board; EU FIRE-RES 21.5M€ work package leader, member of the project management team).





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2022 IAWF FIREBREAK AWARD – EXCELLENCE IN FIRE MANAGEMENT

BRIAN SCHAFFLER

Brian Schaffler is the regional fuels program manager for the Eastern Region of the USDA Forest Service, Eastern Region (Region 9). Schaffler has a lengthy, extensive, and well-balanced fire career in both prescribed fire and fire suppression. Schaffler’s nominator referred to him as a fire management evangelist, because of his outreach efforts in shared stewardship to promote the benefits of and cross-jurisdictional approach to successful fire management. Schaffler uses all the tools available to expand the opportunity for fire to function as an essential ecosystem process on the broadest landscape possible, which speaks to his problem-solving skills. His leadership has enabled the Eastern Region of the Forest Service to expand its hazardous fuels program accomplishments from 80,000 acres in 2017 to 252,000 acres in 2021.



2022 IAWF WILDLAND FIRE SAFETY AWARD

SCOTT JONES

Assistant Chief **Scott Jones** retired from the Los Angeles County Fire Department (LACoFD) in 2005 after decades of dedicated service. Prior to his employment with LACoFD, Jones served as a firefighter with the US Forest Service (USFS). The LACoFD is the largest local government employer of firefighters in California and the western United States, and an all-hazards fire agency that responds to hundreds of thousands of emergencies each year. As a fulltime career firefighter, Jones had a reputation for excelling in all areas. However, based on his early employment with the USFS and his passion for wildland firefighting, he became a well-known subject-matter expert in wildland fire fighting, particularly in the wildland urban interface. Jones retired as the assistant chief of the Air & Wildland Division at LACoFD. The Air & Wildland Division is made up of dozens of handcrews, several bulldozers, and the most robust local government helicopter and aviation section in service then and today. Jones served on multiple local, state, and federal wildland fire committees. He was key in development and adoption of many of the policies and operational procedures in use today. It’s not a surprise that even though Jones retired in 2005, he has remained engaged in the area of wildland fire. Understanding the value of Jones’ experience and his talent for teaching/instructing, he was asked to work as a “retired annuitant” for LACoFD since his retirement and has trained hundreds of firefighters and supervisors in wildland fire operations and procedures, including fire aviation.



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IMPROVING THE HEALTH AND SAFETY OF WILDLAND FIREFIGHTERS

A WORKSITE PROGRAM READY FOR DEPLOYMENT

BY DIANE ELLIOT, SUSANNA EK, AND KERRY KUEHL

For almost 20 years our research team at Oregon Health & Science University in Portland has been at the forefront of designing, assessing, and disseminating safety and health programs for different occupations, including career structural firefighters and other first responders.

We were founding members of the Oregon Healthy Workforce Center (OHWC), one of the original five U.S. sites funded by the National Institutes of Occupational Safety and Health (NIOSH) as Centers of Excellence charged with combining workers' protection and their health promotion into single programs. The term Total Worker Health®, trademarked by the U.S. Centers for Disease Control and Prevention, refers to the synergistic combination of health promotion and worker safety.

The U.S. Federal Emergency Management Agency (FEMA), through its fire prevention and safety grants, supports research to reduce firefighter injuries and improve their safety, health and well-being. Assisting wildland firefighters is one of FEMA's research priorities. FEMA notes in its funding announcement that "the physical demands and fire environment, as well as the

tactics and equipment associated with wildland fire fighting differ from structural fire fighting. Research directed at mitigating the safety and health hazards associated with wildland fire fighting is encouraged."

We set our sights on designing a safety and health program for wildland firefighters, and in 2019 we were funded by FEMA to do just that. However, addressing the needs of wildland firefighters had unique challenges, and we looked to wildland firefighters to help us accomplish the task.

An obvious challenge is the increase in the size and number of wildland fires. Fire seasons are longer, with more and larger fires placing increased demands and risks on all those fighting wildland fires. A second factor is the many different types of individuals fighting wildland fires. In the United States, there are about 15,000 federal full-time and seasonal employees; 400,000 career structural firefighters involved in wildland urban interface (WUI) fires and deployed to fire camps; and 800,000 volunteer firefighters who comprise the majority of those protecting smaller, rural communities. Third was the need to have an engaging

and effective program applicable in all the different settings of this busy, often exhausted, workforce.

For the content of the program, we reviewed the literature on the adverse effects of wildland fire fighting and consulted experts in smoke exposure, nutrition, cancer risk and other topics. Studies of the health effect of wildland fires is growing but is much less than structural firefighting. For example, the leading search engine listed more than 500 publications in 2021 for structural firefighting, and less than 30 for wildland fires. Importantly, we conducted individual and group interviews with more than 150 wildland firefighters from sites across the United States, as well as those involved in training and certifying wildland firefighters.

Those interviews were used to prioritize content for the program. We had intended to visit sites to conduct the interviews in person. However, after visits to sites in Oregon, Idaho and Montana, Covid shut that down. While we missed getting to see training facilities and shake the hands of these hardworking individuals, we successfully re-tooled to finish the work through virtual meeting interviews.

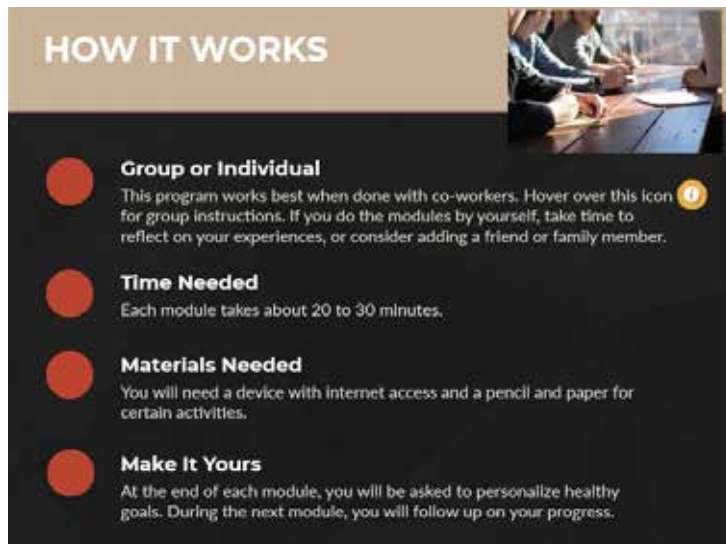
During the recorded interviews, we asked participants to tell us about the needs of wildland firefighters. To bring science to analyze findings from the interviews, we read the transcripts and tallied the comments made in specific topic areas. The highest number of comments related to mental health, followed closely by fitness and physical demands. Nutrition and fatigue issues were frequently mentioned. Surprisingly, risks for heart disease and cancer were rarely mentioned, despite the heightened risk for both among wildland firefighters. The findings identified safety and health needs and informed the program's content. For heart disease and cancer, we needed to include facts about why those are relevant and their potential long-term



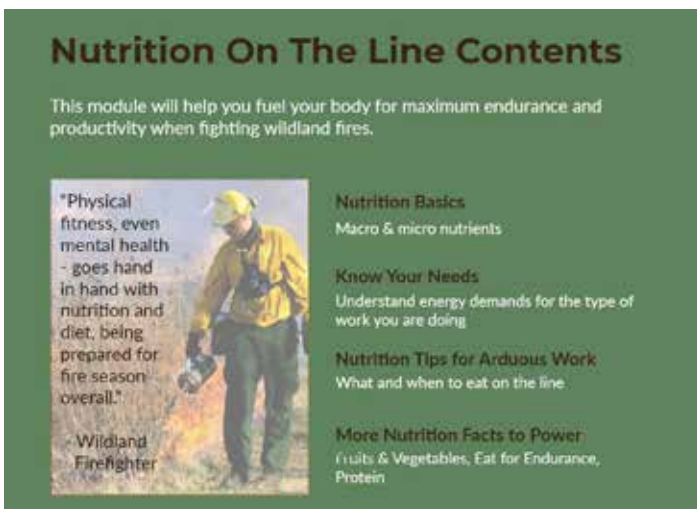
The opening slide sets the tone to advance the wellbeing of wildland firefighters.



Initial information showing the organizations partnering on the project.



An outline of the program explains the structure and expectations.



Examples of a single wireframe for the session on hydration and heat injury, nutrition on the line, and preventing injuries.

adverse consequences, as well as how those health risks could be mitigated. The final list of session topics is in Table 1. Six are the core topics, recommended for all those fighting wildland fires, with additional electives, including more information on mental health, fitness and nutrition. To underscore that, the program is designed “by wildland firefighters for wildland firefighters” their de-identified interview quotes were incorporated into each session.

Once we had the content, we needed a delivery format that would be versatile enough to be used by an individual, as a group, or in a training setting facilitated by an instructor. We wanted the program to be a fit during preseason training, when stationed at a fire camp, by station-based career structural firefighters and during training sessions of rural, mainly volunteer fire departments.

Wildland firefighters helped us determine how to deliver the content too. During the interviews we asked how wildland firefighters liked to learn and what training activities were most effective. Like most adult learners, the interviewees wanted activities that were engaging, relevant and provided explicit advice; they preferred bite-sized content that could be easily accomplished in limited time. Accordingly, we designed a series of 30-minute sessions that could be accessed on a computer, tablet, or smartphone. We built the program using Articulate 360, which is a well-established platform for e-learning course development; it includes access to hundreds of prebuilt games, reveals, and many other interactive features that can be modified for specific content. The program allows the addition of short videos and has thousands of stock photos that can be used.

Building a session was an iterative process of working and re-working the content. For each session, we started with an outline: What information and new facts did we want to present? What safety and health behaviors did we want to promote? We needed to translate those objectives into effective, fun activities using Articulate. As a result, each of the

sessions contains approximate 20 different images or wireframes. The wireframes provide the baseline structure to which the interactive features (e.g., games, reveals, videos and links to other content) can be attached. Wireframes from the initial component of the program, including acknowledgement of our partnering organizations, are shown in Figure 3

Our team worked on each session until we determined that the session achieved its objectives. When we had a near-final product, we asked local wildland firefighters to review the session and tell us what they were thinking while they worked through the content. This “think aloud” method is an accepted means to evaluate product usability. For example, we had a component during which firefighters were asked to type in answers, but the reviewers indicated that firefighters would likely skip over this section, and the activities needed to be more gamified with choices and buttons to maintain engagement. Videos longer than a couple of minutes generally did not hold reviewers’ interest, and sessions

TABLE 1
TOPICS FOR THE PROGRAM’S 30-MINUTE, SIX CORE AND EIGHT ELECTIVE SESSIONS

CORE 1	Heart Health
CORE 2	Hydration & Heat Injury
CORE 3	Physical Fitness
CORE 4	Nutrition on the Line
CORE 5	Sleep & Fatigue
CORE 6	Mental Fitness
ELECTIVE	Advanced Mental Fitness
ELECTIVE	Alcohol Science
ELECTIVE	Cancer Prevention
ELECTIVE	Effective Leadership
ELECTIVE	Injury Prevention & Treatment
ELECTIVE	Medical Check-up
ELECTIVE	Nutrition Off the Line
ELECTIVE	Supplements: Help or Hype

TABLE 2
RESPONSE TO POST-PROGRAM ITEMS

THE PROGRAM:	MEAN*
VALUABLE FOR IMPROVING HEALTH	6.3
EASY TO USE	6.4
SHOULD BE PART OF TRAINING	6.4
WOULD RECOMMEND TO CO-WORKERS	6.4

RESPONSE ON LIKERT SCALE
(1=STRONGLY DISAGREE TO 7=STRONGLY AGREE)

were structured to keep participants engaged with the material throughout the sessions. We included links to additional resources, and the reviewers liked the fact that the sessions were lean and provided the ability to click on links to learn more about topics of interest. Examples of one wireframe from the sessions on Hydration & Heat Injury, Nutrition and Injury Prevention are shown in Figure 4. Those pictures do not capture the dynamic and interactive aspects of the program, and they are only a single image from among the more than 20 wireframes in each session.

Each session follows a similar format. First, firefighters process the facts, new information and behaviors needed to improve safety and health related to the session’s topic. Each section ends with a “Bottom Line,” of the critical actions needed for safety or health, and firefighters are asked to identify personal opportunities to improve their safety and health. The next session begins with follow up on the prior session’s objectives. We know safety and health promotion is a process, and the program is designed to support and reinforce healthy actions. Our group has repeatedly demonstrated that this structure results in improved understanding and positive actions across different contents and learner groups from high school athletes to homecare workers, truckers, and structural firefighters.

To call the program evidence-based, we need to demonstrate that it works when used by individuals

fighting wildland fires. We are in the final year of this three-year project and completing data collection on more than 100 firefighters across the United States who have used the program. Early pre- and post-survey findings indicate significant positive outcomes. Initial results of selected post-survey items are shown in Table

TABLE 3
EXAMPLES OF WRITTEN COMMENTS SUBMITTED BY THOSE COMPLETING THE PROGRAM.

The course material kept me engaged and involved

It was good and useful course.

I learned a lot.

I think that this kind of material should become policy. Specifically, I think that the USFS and other agencies should be required to provide this illuminative data to their own employees.

Coupling solutions with the issues facing wildland firefighters is key.

Module 1 was great. I really liked the blood lipids page with the chart on cholesterol. I don't think may firefighters even know their cholesterol levels or what they even mean.

I really liked some of the statistics regarding specific issues, such as cardiovascular disease, and sleep.

Learning about rhabdo was new to me and a valuable thing to know from the first lessons.

I am a site medic at a plant so I presented and shared heat related injuries information to our operations team.

Love the bite-size learning and ability to dive deeper with additional resources if needed/desired.

2, and examples of the many positive quotes from program users are included in Table 3. When data collection is completed, we will share those findings and importantly, use the feedback from to fine tune the program before making it freely available for all those fighting wildland fires.

Later this year, we will work with the National Fallen Firefighter Foundation (NFFF) and First Responder Center for Excellence for Reducing Occupational Illness, Injuries and Deaths, Inc. (FRCE) to develop the program for the NFFF website. We appreciate the NFFF's and FRCE's partnership in disseminating the program, as well as all the many firefighters who helped with program development and assessment. When we worked with career structural firefighters our tagline was protecting the safety and health of those protecting us; with this project we extend that to those protecting us and our environment.

ABOUT THE AUTHORS

Diane Elliot, MD, is a professor of medicine at Oregon Health & Science University. She has worked to develop and disseminate evidence-based safety and health programs for several groups. Including high school athletes, younger workers, homecare workers, and structural firefighters.



Susanna Ek is a former emergency medicine technician and the research assistant responsible for coordinating this project.



Kerry Kuehl, MD, DrPH, MS is a professor of medicine at Oregon Health & Science University and chief of Health Promotion & Sports Medicine. He is the principal investigator on this project. Dr. Kuehl has a long history of working with first responders, including law enforcement and the fire service to improve their safety and health.



Acknowledgements: Our team at Oregon Health & Science University has worked tirelessly on this project including Jessica Ballin, MPH; Carol DeFrancesco, MFA, RD; Wendy McGinnis, MS; and Adrienne Zell, PhD.

STOPPING THE DESTRUCTION BY WILDFIRES STARTS NOW.

The relentless tally of losses makes it clear the US is facing a significant wildfire problem. Without a new approach, we are destined for more unmanageable loss of life and property. The time is now to face two harsh realities:

- Wildfires are going to happen.
- The fire service alone lacks the capacity to contain and extinguish these fires at their current pace.

OUTTHINK WILDFIRE CALLS FOR THE END OF COMMUNITY WILDFIRE DESTRUCTION BY 2050.

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AFTER *The* FIRE

HOW POST-INCIDENT STUDIES BRING INSIGHTS TO WUI SCIENCE

BY BENJAMIN GAUDET, STEVEN GWYNNE, ERICA KULIGOWSKI, NOUREDDINE BÉNICHOU AND ALBERT SIMEONI

Understanding the short- and long-term effects of a fire on people and the community, understanding patterns of life and property loss, determining the pathways of fire spread, and improving fire safety codes and standards are examples of the goals of WUI fire post-incident studies.

The complexity and scale of wildfires makes them difficult to counter or to study, both in real-time and afterwards.

However, the increasing severity of wildfires around the world has brought additional focus on the study of their interaction with the urban interface.

The most direct way to study a wildland urban interface fire, short of collecting information during the event itself, is a post-incident study; this type of study involves assembling and deploying a group of researchers to the fire location to collect information from a variety of sources immediately after the fire.

Organizations such as the National Institute of Standards and Technology (NIST) in the United States and the former Bushfire and Natural Hazards Cooperative Research Center (BNHCRC), now the Natural Hazards Research Australia (NHRA), have conducted post-incident studies – typically in collaboration with local authorities – for WUI fires and other natural hazards including tornados and hurricanes.

To date, NIST has studied four WUI fires since 2007, including the Camp Fire in California in 2018, which remains the deadliest wildfire in California history.

The seminal studies conducted by the BNHCRC involved the Black Saturday bushfires of 2009 and the more recent 2019-2020 Black Summer fires, among others.

In Canada, a post-incident study of the 2016 Fort McMurray fire was used to assess causes and effects of Canada's costliest disaster to date.

Post-incident studies provide a means to extract information pertaining to fire dynamics, fire spread

within the built environment, and the human impact and response; this information can then be used to inform firefighting tactics, evacuation protocols, building codes, and education of residents in areas of high fire risk.

IMPLEMENTING A POST-INCIDENT STUDY FOR A WUI FIRE

Since 2013, California alone has endured no less than 6,950 individual wildfires each year. Similarly, Canadian wildfires have numbered on average 6,000 per year over the past decade. The 2019-2020 fire season in Australia resulted in an area burned almost the size of Syria (72,000 square miles).

As wildfires have grown in intensity and size, a greater number of communities at the wildland interface have been affected. Since all fire events cannot practically be studied, specific ones must be selected to gain key insights. A decision to select and study a fire event balances the cost of allocating resources to that study with the potential of fulfilling research goals and answering meaningful questions that advance understanding of WUI fires. Understanding the short- and long-term effects of a fire on people and the community, understanding patterns of life and property loss, determining the pathways of fire spread, and improving fire safety codes and standards are examples of the goals of WUI fire post-incident studies. Researchers ask whether the fire being considered for a post-incident study can produce data that fills knowledge gaps related to these goals and, more broadly, the fire dynamics and human impact of WUI fires.

To obtain the reliable information needed to answer this question, researchers seek information from incident authorities who oversee the emergency response and recovery efforts, or researchers conduct reconnaissance trips to the fire location immediately after the fire. The incident authorities may represent levels from local

to federal and are responsible for responding to and managing fire events. Examples of major WUI fire incident authorities in the United States are the Federal Emergency Management Agency (FEMA) and California Department of Forestry and Fire Protection (CALFIRE). The Canadian Interagency Forest Fire Centre (CIFFC) organizes and coordinates responses to wildfires across multiple incident authorities. In Australia, fire service organizations on the state level, such as Country Fire Authority and the Department of Environment, Land, Water, and Planning in the state of Victoria, act as incident authorities for bushfires within their jurisdiction.

While wildfires can require days or weeks to be fully contained, their spread through a community can happen in a matter of hours. Similarly, the data on WUI fire impacts on a town or populated area are perishable in that they can be altered, destroyed, or forgotten in the days after the fire. Burn patterns, structure damage, and accounts of the fire from first responders and residents are examples of data types that can change or fade with time or be otherwise altered by the effort to rebuild. The perishable nature of WUI fire data means that collection begins as soon as possible. Hence, post-incident studies are often also referred to as rapid-response studies. Equally as important, the effort of researchers to study the fire cannot interfere with those overseeing emergency response to the fire, including local police and fire departments, state or provincial authorities, or other incident command entities. In fact, all post-incident studies conducted by both NIST and the BNHCRC involved collaboration between incident authorities and the researchers.

INFORMATION COLLECTED

The scale and scope of information needed to meet research goals and to draw meaningful conclusions from a WUI fire can require weeks or months of data collection. Dozens of data types from thousands of individual sources can be included in an analysis.

POST-INCIDENT STUDIES GENERALLY COLLECT INFORMATION IN FIVE MAJOR AREAS:

1. Fire event timeline
2. Local weather, topography, and wildland environment
3. Response of the structures and land parcels to fire
4. Emergency response actions
5. Human and community response to the fire.

A fire event timeline is how the fire progressed in both space and time and is the foundation for bringing the entire event into context. A completed timeline describes the path of fire movement from its origin in the wildlands to its spread to communities and structures, as well as its spread from structure to structure. Fire damage patterns among structures and vegetation, the local topography, first responder radio logs, time stamped videos and photos, automatic vehicle location (AVL) logs – which contain GPS tracker data of first responder vehicles, 911 call records, and a variety of other data sources are used to piece together an image of where, when and how the fire spread. Interviews with first responders, residents or other eyewitnesses are also critical sources of information.

Local weather, wildland vegetation and environmental information give context to fire spread and fire severity. For instance, hotter, drier conditions – especially periods of prolonged drought – are conducive to fire ignition

Burn patterns, structure damage, and accounts of the fire from first responders and residents are examples of data types that can change or fade with time or be otherwise altered by the effort to rebuild. The perishable nature of WUI fire data means that collection begins as soon as possible.



In Canada, a post-incident study of the 2016 Fort McMurray fire was used to assess causes and effects of Canada's costliest disaster to date. Photo: Wikimedia Commons

and spread. Fires spread more quickly among dry, dense vegetation and while moving uphill as opposed to downhill. Fire severity is also linked to how much time has passed since a prior fire in the same area. Terrain and elevation maps, fire history maps, aerial imagery of the community layout and wildland fuel maps can be used to indicate why certain areas of the community may have been more heavily impacted than others.

The response of structures and land parcels is studied to understand fire spread pathways, fire spread vulnerabilities and the effectiveness of fire mitigation measures. Mitigation measures include fuel load management, fire-resistant construction, and control of fire spread pathways. Using fire-resistant siding and roofing materials, reducing the presence of combustible vegetation directly next to a home, or keeping a roof free of dry debris are examples of mitigation measures.

The assessment of fire damage to structures and land parcels is also done in the context of defensive actions. First responders protecting a home is an example of a defensive action that can be the difference between one home being destroyed and another emerging unscathed, regardless of the presence of other passive fire protection measures or risk factors. Defensive actions also tie back to understanding the emergency response to the fire. First responder tactics and a timeline of first responder actions add context to where and why fire damage is present.

Interviews with fire survivors and emergency responders are often collected to better understand a community's response to a fire event. At the household level, questions are often posed to survivors about their demographics, knowledge and experience with fire, the cues and warnings that they received during the event, their threat and risk perceptions, and how they protected themselves. By understanding what people did and why (for example, why some people evacuated and others did not), potential areas of improvement to public education and preparedness as well as community planning can be identified. Also of interest is the role that official evacuation warnings and orders played in the public's response to the fire. Assessing evacuation messages for their content and dissemination methods can shed light on why the public may have responded in certain ways during the fire.

THE OUTCOME

Post-incident studies are a powerful tool for collecting direct information about a wildfire. In general, the information from WUI fire post-incident studies can be used to improve evacuation and emergency response

practices, anticipate and mitigate the pathways of fire spread within a WUI community and improve the fire resilience of at-risk communities in advance of future fires. The information from post-incident studies can also contribute to legislative code requirements. The impacts of advancing understanding of WUI fire disasters can be seen in the implementation and continual improvement of community resilience programs such as Firewise USATM in the United States or FireSmartTM in Canada. However, much progress can still be made. The purpose of post-incident studies in the world of WUI fire science is to provide fundamental knowledge to fuel this progress.

ABOUT THE AUTHORS



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Nouredie Benichou is principal research officer within the Fire Safety Group at the National Research Council of Canada. His research includes modeling and experimentation of fire resistance of structures, fire safety in buildings, fire risk analysis, and the impact of wildfires on the wildland urban interface.



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CHALLENGES AND HOPES

PEAT FIRE MANAGEMENT IN BORNEO ISLAND

BY DAYANG NUR SAKINAH MUSA AND XINYAN HUANG

Borneo Island – the third largest island on the planet – is shared by Malaysia, Brunei, and Indonesia, and has one of the largest tropical peat swamp forests in Southeast Asia. This island serves as Earth’s lung, alongside the Amazon, circulating the majority of oxygen to our planet.

Despite covering three per cent of the global land surface, peatland on the island stores about one-third of global soil carbon. However, Borneo Island now frequently experiences long-lasting peat fires, creating haze over the region and releasing massive soil carbon.

The peat becomes warmer and drier due to climate change, so fire is easier to ignite and become out of control.

PEAT FIRE PROBLEMS

Fire is not a natural process that frequently occurs on Borneo Island. With an intense tropical climate and precipitation all year, Borneo should not have fire-related issues. “However, land clearance activities such as slash and burn that were practiced by the local community are the main contribution to peat fire spread to forest reserve,” said Musa Salleh, the head of Malaysia’s

Sustainable Forest Management Division, Sabah Forestry Department, in an interview.

One piece of indirect evidence of human-caused fires in the peatlands is the fact that reported peat fires during the 2020-21 COVID-19 pandemic were the lowest in 30 years. Borneo’s lockdown policy forced people to stay home, and outdoor activity had been minimized since March 2020.

This change in human routines, and the seemingly related reduction in fires, is vital to help researchers

understand the role of anthropogenic activities on reported peat fire cases. The peatland may not burn by itself, regardless of the dry season; human activity is a key reason for the ignition of these out-of-control wildfires.

With an understanding of the impact of pandemic restrictions on human movement, researchers and forest managers now can develop a better understanding of annual peatland wildfire activities in Southeast Asia.

Humans have pushed the Earth’s lungs to their limit over the past few decades. Looking back at the strong El-Nino



Forest covers on Borneo Island. Photo courtesy of Sabah Forestry Department

A rehabilitation approach such as a tree-planting program will help this area recover and be more resilient to peat fires.

season in 1997-98, the dense smoke from peat fires in the region caused an international haze and air pollution catastrophe. The Kalimantan province of Indonesia in the Borneo Island peatland was one of the fire epicenters.

Decreasing rainfall and increasing temperatures created by El-Nino affects the Malay Archipelago region every 10 to 15 years. In another strong El-Nino season in 2015-16, Kalimantan experienced extreme wildfire that affected critically endangered species such as the Orang Utan. Sabah, Malaysia, was also on fire from December 2015 through most of 2016. The recent Indonesian initiative to move its capital to Kalimantan will hopefully increase awareness of fire

activities and reduce the number of peat fires on Borneo Island. To rehabilitate this area and prevent human-caused ignitions is a critical need, but it will take time and require global recourses to have an effect. A rehabilitation approach such as a tree-planting program will help this area recover and be more resilient to peat fires. Preserving forest areas in protected spaces is also very important to reduce further damage of land clearing and wildfire.

OIL PALM TREES

The growth of oil palm plantations on Borneo Island, especially in Central Kalimantan, Indonesia, has been well discussed. To facilitate palm oil production, deforestation has occurred, not only in peatland area but other type of lowland forest.

The oil palm tree originated in Africa and was brought to Malaysia by the British, and to Indonesia by the Dutch in the mid-1800s as an ornament tree. Massive farming

started in the early 1900s; Borneo's tropical evergreen forest is perfect for oil palm growth.

Following the introduction of farming, slash-and-burn activities have continued for more than a century in Borneo and on Sumatra Island; the slash-and-burn

processes constantly ignites the peat soil, causing never-ending underground fires, haze, and massive carbon emissions. Since the 2000s, more and more palm oil has been produced and imported to developed countries, particularly in the European Union, to meet their target of greenhouse gas reduction. Ironically, carbon emissions from the peat fires initiated by the slash-and-burn activities are at least

100 times more destructive to the environment than the savings of using palm oil.

Ecologically, palm oil trees cannot substitute the carbon storage or biodiversity of an evergreen forest, so sustainability cannot be achieved either. Now, both the international community and local government have developed an interest in growing palm oil more sustainably. Ceasing licensing of forest clearing for oil palm plantations in Central Kalimantan, however, is not an economically easy decision.

Sabah, Malaysia, is about to initiate a sustainable palm oil sector, as it has been the backbone of the local economy and improve the livelihood. The established oil palm plantation company was bound to a no-open-burning policy, thus is not a main factor for spreading the fire to the forest. With this revolutionary effort taking place, it is hoped that entire peat swamp forests can be protected by 2025.



Smoldering fires in peatland produce thick smoke. Photo by Dayang Nur Sakinah Musa

Now, people in Sarawak, Malaysia, also believe that sustainable palm oil must be produced, and have implemented a sustainable palm oil policy. Introduction of the Malaysian Sustainable Palm Oil (MSPO) Certification Scheme is a vision to sustainably transform the Malaysia palm oil supply for global market.

Malaysia and Indonesia pledge to halt deforestation by 2030; this is a hope to the conservationist, researchers, and forests manager for the forests on this island to recover. Eventually, this will reduce fire risk in peatland areas.

There is an initiative to protect this island that is recognized as the Heart of Borneo (HoB). This initiative was extended to Brunei Darussalam, Indonesia, and Malaysia. Many events related to the HoB conservation initiatives have been conducted in the past decade to protect the area. The initiative includes protecting the forest from wildfires. A high number of hotspots are often detected in the Kalimantan, Sabah, and Sarawak, especially in the oil palm farm. After all, protecting this area from a forest fire is to protect the lungs of the planet.



Oil palm plantation (right) and Binsuluk Forest Reserve (left) are side by side in Sabah. When a fire spreads to the oil palm plantation, the forest reserve will also be at risk. Photo by Dayang Nur Sakinah Musa

PEAT FIRE MANAGEMENT

Given the hot climate of Malaysia, the risk of an accidental ignition in the peatland is always high. Along with human activities such as open burning and land clearing for agricultural purposes, the dry season usually worsens wildfires in the peatland. Thus, competent peat fire management is crucial.

“This fire can smolder for a week up to months,” said Datu Khirudin Drahan, director of fire and rescue department of Sarawak.

Suddenly, it comes to our consciousness that in peat fire management, preventing the fire is the only way of managing this fire. This is not easy work, whether we try to prevent, control, or suppress it.

Monitoring the fire risk and a fast reaction to early-stage fire is often the first approach to control the situation.

Monitoring can be done by using a drone and helicopter or observing from a watchtower, and the Fire Danger Rating System is used to monitor hotspots in high-risk areas. Patrolling the high fire risk areas by forest officers also helps. Early detection is crucial, and it is one of the best practices to control peat fire. There is an urgent research need of smart and reliable technologies for detecting and fighting these invisible fires.

Moreover, the local forestry department and fire rescue department has found that maintaining a high-water table is one of the most effective prevention measures that has been conducted to prevent the peat fire from smoldering

below ground. The local fire service calls this strategy “total flooding.” Although the term is adopted from fighting building fires, it is more a fire-protection strategy for peatland. Sabah and Sarawak have installed more than 200 tube wells in the peatland to maintain the water table. These tube wells are the same as the water well placed in the peatland area where the fire frequency is high, to channel the water underground.

In the rainy season, the tube well will be ready to wet the land to prevent and combat peat fire. The tube well not only can moisten the peat layer but also supports the fire brigade to put out the peat fires. When the water table drops to a dangerous level that allows the upper layer of the peat to dry out, the local forest service will flood the area before observing any sign of fire, that is,

Malaysia and Indonesia pledge to halt deforestation by 2030; this is a hope to the conservationist, researchers, and forests manager for the forests on this island to recover.

identifying the most dangerous fire location and eliminating the fire risk, rather than suppressing the fire.

Other prevention measures are also crucial, such as establishing canal networks as fire breaks and regular training of the firefighters, villagers and workers of a company living surrounding peatland forests. The construction of a canal in the Klias Forest Reserve in Sabah is effective to prevent the fire spread to the forest, thus, the similar approach was implemented in the Binsuluk Forest Reserve.

FIGHTING PEAT FIRES

For the vast wildland in Borneo Island, no matter how many fire protection measures have been performed, peat fires still occurs every year although the cases are minimal. Once a fire occurs, firefighters will adopt direct suppression methods such as total flooding and portable water pumps on the ground. Water-bombing by aircraft and helicopters are also used to support firefighters. The heat, flame, and toxic smoke pose great danger to the fire brigade.

It takes tremendous courage and determination to fully control a peat fire. Afterwards, the fire brigade conducts mop-up operations to ensure the underground fire is fully extinguished. Firefighters often use a thermal image to continuously monitor the burnt area in case a “zombie” fire re-occurs. As the smoldering fire is invisible, more new technologies such as robotics and unmanned arial vehicles (UAVs) are

A canal as a fire break in the Binsuluk Peat Swamp Forest Reserve, Sabah, Malaysia. The 9.15 kilometre fire break was upgraded in 2020 for effective control of fire spreading to the forest reserve. Photo by Dayang Nur Sakinah Musa



An initial attack crew in action; smoke is coming out from the surface on the left and right sides of the peatland. Photo courtesy of Sabah Forestry Department

needed to help fight and manage peat fires.

Sabah Forestry Department has established an initial attack crew of 80 members.

“This is our elite team, and everyone is well trained for peat fire suppression,” said Musa Salleh,

In case of fire, this crew will be at the front line.

“We ensure that the incident command system as a safety

measure to be followed by the personnel, and our crew is in a good spirit during the suppression,” added by Daim Balingi, deputy of Sustainable Forest Management Division, Sabah Forestry Department.

Most often, the fire brigade has to wait for rain to help control a peat fire. Water shortages regularly occur during the dry season, and there is a lack of water for fire suppression.

“If we have a water shortage, we have to wait for the rain to pour down to help ease the peat fire,” Salleh said.

Nevertheless, despite the extensive firefighting and monitoring efforts and the massive rainfall in the rain season, zombie fires will strike as some fires still smolder in the deep soil layer. These hidden fire spots cannot be accurately detected or fully extinguished unless the water table increases.

Imagine the challenge when our forest fire managers and



firefighters are combating these invisible fires inside haze.

“Prevention is better than cure,” emphasized Datu Khirudin, the director of Fire & Rescue Department of Sarawak, Malaysia.

There is a hope that peat fires on Borneo Island can be controlled. The peat swamp forest is our great treasure. However, if we do not cherish it while spoiling the resource, peat fires will serve as a warning given by nature. Endless wildfire-fighting will be a zero-sum game unless we think about sustainability and learn how to live and prosper with nature.

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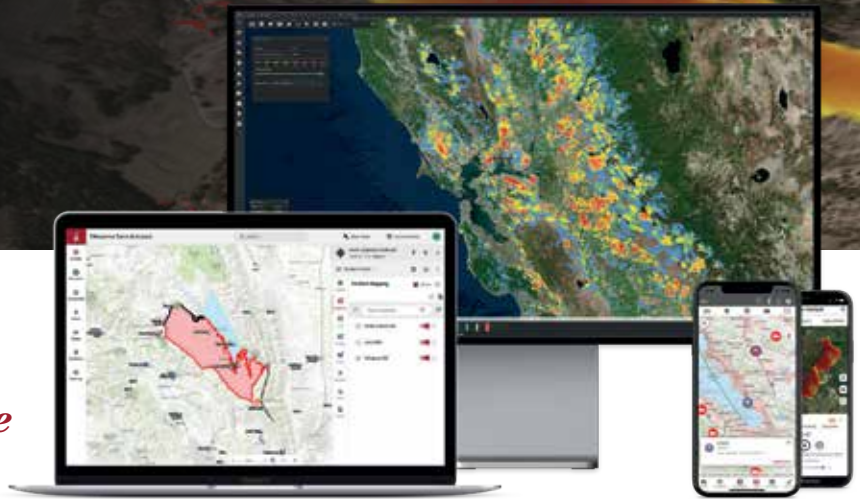


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A LEADER-CENTRIC PARADIGM CAN LEAD TO EVERYTHING FROM SELFISH LEADERSHIP STYLES, TO MICRO-MANAGEMENT, TO DESTRUCTIVE DARK LEADERSHIP

BY MIKE DEGROSKY

I casually participate in some online leadership forums. Lately I've noticed a bit of a fixation on "great leaders." Not Gandhi, Mandela, Mother Teresa, Churchill or other historic greats, but people possessing innate qualities that apparently make them the best, most successful leaders around.

We've all seen the lists – great leaders are this, and this, and this. Great leaders do this and that. Lately I've been resisting all this talk of leadership greatness for a number of reasons.

First of all, the so-called Great Man theory is where the study of leadership began, in the mid-19th century. By late in that century, people who studied leaders and leadership had abandoned Great Man theory in favor of its offspring, Trait theory.

By the mid-20th century, leadership scholars had largely moved on from both theories but trait theory remains stubbornly appealing to people.

What proved to be great leadership in one place or at one time may not work at all in another. All this great leader talk is problematic for a much more important reason. A great leader frame of reference perpetuates the mistaken idea that leadership is all about the leader; it keeps alive outdated but still surprisingly common leader-centric approaches. Granted, a model of leadership favoring dominant leaders may still make sense in certain contexts, and fire services still really like our chiefs on golden thrones.

However, the research is pretty clear. Adaptive, people-centered, participative, and distributed leadership is where the work world is headed and what large swaths

of the workforce want, need, and expect. A leader-centric paradigm can lead to everything from selfish leadership styles, to micro-management, to destructive dark leadership; the province of self-centered, impulsive, exploitative, and toxic people in positions of authority.

Unfortunately, dark leadership is more common and more tolerated than we might care to admit. I recently re-read a 2018 Harvard Business Review article citing research that found employees end up, on average, working two years longer for toxic bosses than nontoxic bosses. Fortunately, the author offered some resonant psychological explanations for a finding that many would find counter intuitive.

Another reason I find myself chafing at the bounty of "great leader" resources is that often, they are laundry lists combining personality traits, habits and practices that, while desirable, may or may not have a meaningful connection to the practice of leadership. Sometimes, the great-leader resources are little more than fine-sounding platitudes – the leadership equivalent of motherhood and apple pie. The popular press around leadership has always suffered from a tendency to offer up these kinds of sugary snacks. Years ago, while studying leadership in graduate school, I vowed to engage only evidence-based leadership thinking both in my personal leadership practice and in what I endeavored to teach others.

Ironically, sometimes the listed habits and practices are not those of "great leaders" but should be the practice of any leader who wants to be effective. Yes, the great ones probably do those things, but so should you and I, and so should any aspiring leader.



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We don't want emerging leaders thinking "Well, to be a leader I have to be great, I should be trying to be great, but if I can't be great, perhaps I should not try to lead at all."

I look at some of these lists of characteristics of great leaders and think "It would be tough for a young leader to find themselves here because they've not yet had an opportunity to do these things."

I can't help but think about what message that sends and how that message effects someone's perception of their own potential, or the potential of their peers, to be a leader. I don't like it.

So, what am I getting at? It's a turbulent world. There are lots of problems to solve from incredible workforce issues to – as IAWF recently highlighted at Fire & Climate 2022 in Pasadena and Melbourne – the influence that radical

climate disruption is having not only on our fire problems, but on the realistic range of solutions to those problems.

My advice to leaders working in these times? Don't try to be a great leader; try to be an effective leader. Don't focus on your greatness, but on the greatness of the results produced by people who you will serve with trust, vision, inspiration, compassion, and communication. Provide stability and hope. Help people produce results. Be the best leader you can be.

Do these things and there's a good chance that one day someone whose confidence you've inspired may say "You know something? You're a great leader."



ABOUT THE AUTHOR

Mike DeGrosky is the former chief of the Fire Protection Bureau for the Montana Department of Natural Resources and Conservation, Forestry Division. He taught for the Department of Leadership Studies at Fort Hays State University for 10 years. Follow DeGrosky on Twitter @guidegroup, or via LinkedIn.

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