Quarter 2, 2021
UNITING THE GLOBAL WILDLAND FIRE COMMUNITY

WILDFIRE®

An official publication of the INTERNATIONAL ASSOCIATION *of* WILDLAND FIRE

OUTTHINKING WILDFIRE

SAFETY SUMMIT | PYROSKETCHOLOGY | INDIGENOUS EXPERTISE

WHEN THE WORLD DEMANDS MORE,

AIR TRACTOR DELIVERS.

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

IT'S TIME YOU DEMAND MORE.

NEWS AND OPINION

FEATURES

WILDFIRE
An official publication of the International Association of Wildland Fire

Wildfire ANALYST

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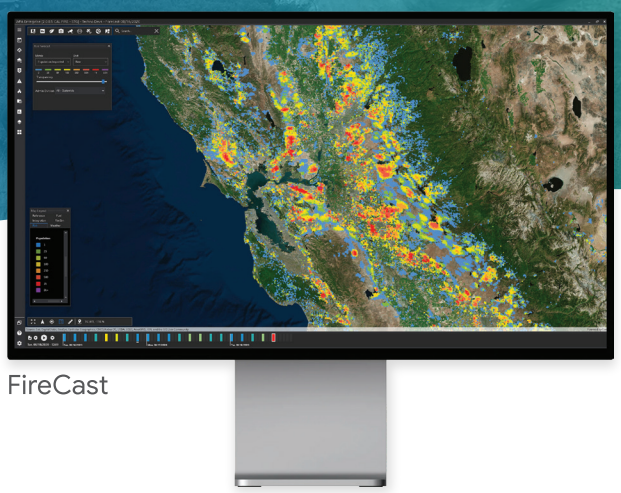
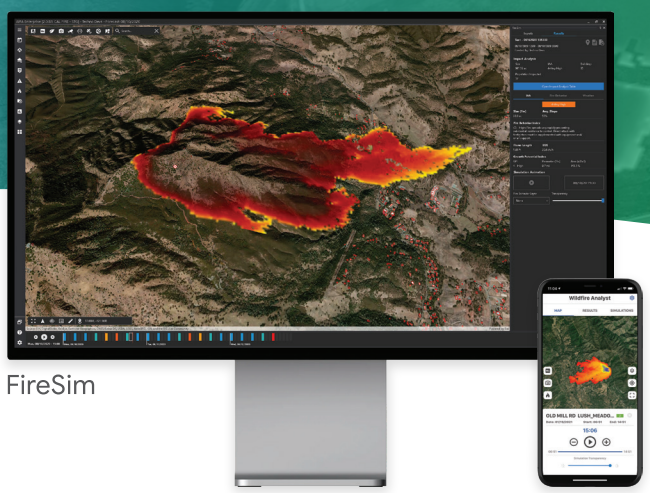


FireCast



FireSim

Wildfire Risk Forecasting & Spread Prediction Subscription Service

Wildfire Analyst Enterprise is software that provides real-time analysis of fire behavior including on-demand spread predictions. Through seamless integration with IRWIN, fire spread predictions are automatically generated for every incident.

Advanced tools also allow specialists to tailor predictions to incorporate local observations and data. Each prediction includes impact analysis and an initial attack assessment, providing needed intel for operational decision making and prioritization.

Millions of fire spread predictions are also generated nightly through integration with advanced weather prediction systems to derive a 100 hour risk forecast each day. This is ideal for setting readiness levels and resource allocation planning.

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TACTICAL ANALYST

technosylva

fiRESPONSE

WHEN FIRE WORLDS COLLIDE

A few months back, I came across a Twitter post by my friend, colleague and IAWF board member Michele Steinberg, about the managing editor's position with *Wildfire Magazine*.

I was intrigued, and excited.

For more than I decade I had edited Canada's premier fire publications, *Fire Fighting in Canada* and *Canadian Firefighter* magazines, and I was missing the editorial world of rewrites, deadlines and mad scrambles to find high-resolution photos to go with stories. (Yes, really!)

In the last few years, as the public-education representative for the National Fire Protection Association in Canada, I've broadened my work in wildland fire, chairing FireSmart Canada's Wildfire Community Preparedness Day campaign, and, separately, as FireSmart's national communications advisor.

Putting my hat in the ring for the managing editor's position seemed logical, and, wonderfully, the IAWF executive agreed!

Thanks to the strength of the IAWF communications team, and best practices developed by former editor Ron Steffens, assuming the managing editor role has been (almost) seamless, but also challenging as I navigate global time zones, publishing schedules and an array of new acronyms!

The focus of this Q2 issue was to be the **16th International Wildland Fire Safety Summit and 6th Human Dimensions of Wildland Fire Conference May 24-27.** We're pleased to bring you conference highlights on pages 7 throught 19, but given what I'm learning about global postal systems and delivery lags, we've ensured that this edition is also full of fabulous feature stories that are relevant no matter when your issue arrives in the mail.

We're also shaking things up a bit by anchoring our back pages with the popular Thoughts on Leadership column, adding a news section, and tapping our associate editors around the globe for more content. (By the way, we're seeking associate editors, so if you have a hankering to put pen to paper, drop me a note at **laura@iawfonline.org**).

Our objective in upcoming issues is to provide stories, opinion pieces and information about the topics identified in the recent IAWF member survey: climate; decision making and policy; firefighter health and safety; human dimensions; public education; training; and science.

To that end, our cover story – Outthinking Wildfire, which happens to be written by the aforementioned Michele Steinberg (you see how the worlds collide!), explains a ground breaking, thought-provoking and status-quo challenging policy initiative meant to rattle conventional thinking about who is responsible for reducing the carnage caused by wildfire. The story is U.S.-focused, but the principle – that organizations and people need to shape the agendas of policy makers – applies globally and, I'm confident, will be adopted or mimicked in other jurisdictions as Outthink Wildfire™ plays out across America.

Lastly, a word to IAWF members and readers: a magazine is only as good as its audience. And to meet your desires for data, assuage your curiosity, and fill your cups with relevant and inspiring stories, we need – and value – your input and feedback. Tell us what you like, what you read, what you don't (nicely, though!), what we're missing, and what we can do better.

Here in Canada, as I write this in April, we're entering a second COVID-affected wildfire season. My lens this year will be broader, as I focus on the people in the thick of things, and their stories, everywhere.

The wildfire world is cohesive, the challenges are similar no matter where you are, the people are passionate, and the need for timely, accurate information to be safe, efficient, and effective is global. I'm delighted to help.

LAURA KING
Managing editor
Wildfire Magazine

WILDFIRE SMOKE HARMFUL

Pollution from wildfires has a greater impact on people's health than similar levels of pollution from other sources, according to a study published March 5 in the journal *Nature Communications*. The study analyzed hospital admissions data in Southern California from 1999 to 2012 and found that air pollution from wildfires has a 10 times greater impact on health than a similar amount of pollution from other sources. The 2020 fire season was the worst in California's history, with 4.1 million acres burned, and five of the state's six largest fires on record.

CLIMATE CHANGE INCREASES U.K. RISK

Dry conditions that put parts of the U.K. in the most severe danger of wildfires once a century could eventually happen every other year due to climate change, new research shows.A study led by the University of Reading shows that parts of eastern and southern England may be at the highest danger level on nearly four days per year on average by 2080, compared to once every 50 to 100 years now. In the driest regions, this could put habitats at risk for up to four months per year on average, the scientists found. The study was published in the journal *Environmental Research Letters*.

DATA SHOWS THAT MITIGATION EFFORTS WORK

Property owners who clear vegetation from the perimeter of their homes or buildings can almost double the likelihood of those structure surviving a wildfire, according to a report by climate-risk company Zesty.ai and the Insurance Institute for Business & Home Safety. Zesty and IBHS studied more than 71,000 North American properties involved in wildfires between 2016 and 2019 to assess the relationship among vegetation, buildings, and property vulnerability. Researchers leveraged a combination of computer vision and AI to analyze high-resolution satellite and aerial imagery of the properties that fell within the wildfire perimeter, which allowed them to determine what effects a property's physical environment had on its likelihood of survival. The analysis determined that buildings with a high amount of vegetation within five feet of the structure were destroyed in a wildfire 78 per cent of the time – a rate nearly twice as high as those with small amounts of perimeter vegetation.

MELBOURNE EXPERIENCES QUIET SEASON

After the horrific Black Summer bushfire season on 2019-2020, the season just ended across southern Australia was one of the quietest on record. Cool and wet summer weather that kept wildfires in check was attributed to La Nina. In New South Wales alone, the state hardest hit in Black Summer, bushfire callouts were less than half this year than in 2020. The New South Wales Rural Fire Service reported 31,000 hectares burned this year compared to 5.5 million hectares in the Black Summer fires.

ALBERTA LAUNCHES WILDFIRE APP

Alberta Wildfire launched an application in March for those who want to know more about wildfire in the province. The AB Wildfire Status app allows users to search for information such as fire bans and advisories, and select map layers that show fire danger ratings or even the location of mountain pine beetles in the province. The app provides wildfire information in real time, in a one-stop shop format. By using the GPS function, users can instantly know if a fire ban is in place in their area or if there is an active wildfire nearby. Users can also get see the current wildfire situation with the home view, subscribe to forest-area notifications, and stay on top of emerging situations in areas of interest.

PACIFIC GAS & ELECTRIC CHARGED

A California prosecutor filed 33 criminal charges in April accusing troubled Pacific Gas & Electric of inadvertently injuring six firefighters and endangering public health with smoke and ash in a 2019 fire blamed on its equipment. The nation's largest utility denied that it committed any crimes even as it accepted that its transmission line

sparked the blaze. The Sonoma County district attorney charged the utility with five felony and 28 misdemeanour counts in the October 2019 Kincade Fire north of San Francisco, including recklessly causing a fire that seriously injured six firefighters.

BLACK SUMMER FIRES WARMED THE STRATOSPHERE

Smoke pollution from the Australian wildfires of December 2019 and January 2020 warmed the stratosphere by 1°C for six months, according to a study. The Black Summer bushfires destroyed about 14 million acres of trees, bush and homes, and are estimated to have killed almost three billion animals. Smoke from the fires reached a height of more than 20 kilometres and the flames sent 900,000 thousand metric tonnes of smoke particles into the stratosphere. Researchers at Jinan University in China found that the fires resulted in enough smoke particle pollution to increase the temperature of the stratosphere over the southern hemisphere.

EUROPE EXPERIENCES HOTTEST YEAR ON RECORD

Europe experienced its hottest year on record in 2020, while the Arctic suffered a summer of extreme wildfires partly due to low snow cover as climate change impacts intensified, the European Union's observation service said in April. Europe's average annual temperature in 2020 was the highest on record and at least 0.4 degrees Celsius above the next five warmest years — all of which were in the last decade, the Copernicus Earth observation service said. The winter of 2020 was the hottest on record, at 3.4 degrees Celsius above the average European winter temperature since 1981.

WILDFIRE SMOKE LINKED TO SKIN DISEASE

Wildfire smoke can trigger respiratory and cardiovascular symptoms from a runny nose and cough to a potentially life-threatening heart attack or stroke, according to a study in the journal *JAMA Dermatology*. The research indicates that the dangers posed by wildfire smoke may also extend to the skin, the largest organ in the human body, and the first line of defense against outside threat. The study found that during the two weeks in November 2018 when wildfire smoke from the Camp Fire choked the San Francisco Bay Area, health clinics in San Francisco experienced an increase in patients visiting with concerns of eczema and general itch, compared to the same time of the year in 2015 and 2016. The findings suggest that even short-term exposure to hazardous air quality from wildfire smoke can be damaging to skin health.

CALIFORNIA HIRES EXTRA FIREFIGHTERS

California Governor Gavin Newsome on March 31announced he was setting aside more than $80 million in emergency funding for fire fighting in preparation for the 2021 wildland fire season. Newsom's office said the $80.74 million includes money to hire almost 1,400 Cal Fire firefighters; most of the funding will go toward crews building fuel breaks and defensible spaces in vulnerable communities before the peak of the fire season. The money will provide for 1,256 seasonal firefighters through June 30, Newsom's office said.

LAWMAKERS PUSH FOR YEAR-ROUND CREWS

Senators and members of Congress in California have sent a letter to the Departments of Agriculture and Interior asking that wildland firefighters be available year round to fight out-of-season wildfires. The lawmakers said climate change has made wildfires a nearly year-round problem. Full-time wildland firefighters are needed nationwide, the lawmakers said, and to reduce wildfire risk and spread.

CONFERENCE GOAL TO DEFINE SUSTAINABLE WILDLAND FIRE PARADIGM

BY TODDI STEELMAN
IAWF PRESIDENT

The 16th International Wildland Fire Safety Summit and 6th Human Dimensions of Wildland Fire Conference is the IAWF's most ambitious virtual conference to date. Spanning four days – May 24-27 – over three continents and even more time zones, we tackle the safety and human dimensions issues that our wildland community faces during this challenging time.

We want you to join us in this path-breaking conference **(https://firesafety-humandimensions2021.com)** as we continue to pursue IAWF's mission to define a more sustainable wildland fire paradigm. If you are asking yourself whether you should attend, the answer is a resounding, "Yes!" In attending, you will benefit from and help us connect across sectors, fields and disciplines in our wildfire community, create regional and international impact through our partnerships, and contribute to a sense of community among our diverse geographically dispersed wildland fire members. Never has achieving our goals been as challenging or as important as it is during these COVID-affected times.

Almost 25 years ago, IAWF initiated a safety summit to explores lessons learned and best practices among Australia, Canada and the United States, and address how to keep our workforces and communities safe. It is hard to imagine a topic more salient given the safety risks we face with COVID-19, challenges from more extreme weather and fire behavior, and expanding human exposures, not to mention the cumulative consequences of these issues to physical and mental/behavioral health.

Almost 15 years ago, IAWF initiated the Human Dimensions of Wildland Fire Conference to address the social, political, economic, psychological and cultural aspects of dealing with wildland fire in our communities, across our landscapes and within fire management. We know that addressing human dimensions is essential to finding enduring solutions to the challenges we face. In 2015, the IAWF brought these conferences together to capitalize on obvious synergies. This year, we expand on this tradition, but with a twist; we are adapting to the moment by going virtual so we can reach more of our community all over the globe with keynote talks, international panel discussions, deep dive workshops and more.

For this conference, IAWF places great emphasis on COVID-19 and the pervasive impacts the disease has had on all aspects of wildland fire and our professional communities around the world. Every country, region, state, province or locality has had to contend with the virus and its impacts in diverse ways. Our conference will showcase different responses, approaches and lessons learned to enhance learning for our entire community as we prepare to live in a world with endemic virus risks. And while COVID and its lessons will be front and center, that is not all we will address.

Editor's note: *Some IAWF members will receive hard copies of the magazine after the conference due to logistical issues and the global nature of the association. All presentations will be available after the conference to view online.*

16th INTERNATIONAL WILDLAND FIRE SAFETY SUMMIT
6th HUMAN DIMENSIONS OF WILDLAND FIRE CONFERENCE
MAY 24 - 27 2021

Here are some topics you will find if you join us to in our virtual community:

- Wildland firefighter psychological behavioral health and tools to address these important issues
- How to improve communication and information flow and learning under highly dynamic conditions
- Strategies for promoting greater wildland fire use, prescribed fire and creating a new generation of prescribed fire managers
- Solutions and approaches for dealing with complexity, uncertainty and risk
- Minimizing operational risk for firefighters
- Leadership lessons, insights and practices
- Organizational learning from accident, injury, and fatalities on wildfire incidents
- Lessons learned from Indigenous fire approaches
- Imagining different firefighting futures
- Creative mitigation and adaptation strategies
- Natural hazard planning processes and decision making
- More effective strategies and tactics for wildland fire management
- Evacuation decisions and risk perception
- Changes to wildland fire policy, management and governance
- Post-fire recovery
- New technologies for firefighter and community safety.

In addition to the robust program schedule, we have planned for a variety of creative and interactive networking options, a virtual exhibition space to talk with the broader industry, and poster presentations. Our deep dive sessions will feature interactive workshops, breakout groups and opportunities for more participatory engagement. We very much look forward to seeing you there, wherever you are.

Toddi Steelman is president of the International Association of Wildland Fire and Stanback Dean of the Nicholas School of the Environment at Duke University, North Carolina, USA

VIRTUAL CONFERENCE TACKLES REAL-WORLD ISSUES

Join us on a trip around the world through the lens of wildland fire. During four days in May, the IAWF presents real-world risks and opportunities in an online environment. We will connect a truly international audience, with global topics and speakers from around the world, on different continents and time zones. The IAWF 16th Wildland Fire Safety Summit and the 6th Human Dimensions of Wildland Fire Conference will address the issues that make the global wildland fire community safe, smart and supported.

We will use PheedLoop as our virtual platform. You can navigate Pheedloop like you would any type of website or social-media networking site. There is a home page, or lobby, navigation tools, social-media feeds, graphics, and videos. Participants will make their own personal, customized profiles upon registering; this provides greater opportunities for networking and connecting with other attendees! Much like Facebook and LinkedIn, participants can view other attendees' profiles, send direct messages, participate in the lobby chat room, and more!

Register now at https://firesafety-humandimensions2021.com/register

FOLLOW US ON TWITTER **@IAWF**
FOR CONFERENCE HIGHLIGHTS.
#IAMIAWF #FirePeoplePlanet21

MAY 24 - 27, 2021

16th INTERNATIONAL WILDLAND FIRE SAFETY SUMMIT
6th HUMAN DIMENSIONS OF WILDLAND FIRE CONFERENCE

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 24 | 4 P.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 25 | 12 A.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 25 | 8 A.M.**

SUCCESS AND SACRIFICING DECISIONS IN THE FIELD; HUMAN PERFORMANCE AND HINDSIGHT

Sidney Dekker, Ph.D., *professor and director of the Safety Science Innovation Lab, Griffith University, Brisbane, Australia, and professor, faculty of aerospace engineering, Delft University, Netherlands.*

Dr. Dekker will run through how sacrificing decisions (while being tentative but decisive in the field) under uncertainty and resource constraints, how capacities in a team can help make things go well despite this, and how, in hindsight, we might avoid second-guessing firefighters' sacrificing decisions under pressure, in part by being clear(er) about agreed decision criteria or 'freedom in a frame' upfront.

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 25 | 12 A.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 25 | 8 A.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 25 | 4 P.M.**

SUCCESS AND SACRIFICING DECISIONS IN THE FIELD; HUMAN PERFORMANCE AND HINDSIGHT WILDLAND FIRE MANAGEMENT UNDER COVID-19: RESULTS OF TWO GLOBAL SURVEYS

Cathelijne Stoof, Ph.D., *assistant professor, Department of Environmental Sciences, Wageningen University, Netherlands. Creator and leader of PyroLife, Innovative Training Network on integrated fire management.*

This talk summarizes the results of two global surveys that were conducted at the start of the pandemic and in February 2020 to clarify implications of COVID-19 impacts on wildland fire management. These surveys were held to collate any plans, protocols or procedures to generate generic guidance for wildland fire professionals in developing and developed countries, and to stimulate sharing of best practices among agencies, regions and countries. Results of the two surveys allow comparison of expectations and lessons learned about fire management during the pandemic. Topics explored include COVID-19 effects on general fire management, sharing of resources, fire-suppression strategies, challenges and advantages of the new situation, and effects on training, readiness and recover. An important focus is the mental health and work-life balance, to provide guidance on any support that may be needed for wildland fire professionals in these challenging times.

To view the survey, visit **wur.nl/en/project/The-impact-of-COVID-19-on-wildland-fire-management.htm**

MOUNTAIN DAYLIGHT TIME. . . . . **MAY 25 | 8 A.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 25 | 4 P.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 26 | 12 A.M.**

CONVERSATION WITH FELIPE GONZALEZ, FORMER SPANISH PRIME MINISTER (1982 - 1996)

Felipe Gonzalez *is one of the key political figures in the history of Spain in the second half of the twentieth century. A leading player in the democratic transition, he was the third president of the Spanish government since its reinstatement in the late 1970s and has been the longest-time president (four legislatures in 13.5 years). The modernization of Spain and its complete integration into the European concert took place between 1982 and 1996. Although he is retired from the political profession, the former president remains active in various current focuses at European and Latin American level.*

JOE BUFFONE

MOUNTAIN DAYLIGHT TIME. . . . . **MAY 26 | 12 A.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 26 | 8 A.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 26 | 4 P.M.**

WHAT CAN WE LEARN FROM VICTORIA'S RESPONSE TO COVID IN THE AGED-CARE SECTOR?

Joe Buffone, *director general of Emergency Management Australia (EMA), was recently deployed to Victoria to establish and lead the Victorian Aged Care Response Centre to co-ordinate the response to COVID outbreaks n the aged-care sector. Joe led the centre for three months until the situation was stabilized and transitioned to recovery. Joe has been with EMA since December 2016 and has held multiple roles within the organization. As director general, Joe is responsible for overseeing Australian Government Crisis Coordination Centre, coordination of Australian government disaster assistance (non-financial), physical security for Australian holders of high office, major events security and commonwealth disaster recovery funding. Joe has more than 30 years' experience in security and disaster management and has held a number of key senior positions.*

AMY CARDINAL CHRISTIANSON

BRADY HIGHWAY

MARGO ROBBINS

BHIAMIE WILLIAMSON

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 26 | 4 P.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 27 | 12 A.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 27 | 8 A.M.**

RECOVERY AND REVITALIZATION OF INDIGENOUS (WILD)FIRE FUTURES

MODERATOR:
Amy Cardinal Christianson, Ph.D. *Métis, fire research scientist, Canadian Forest Service*

PANELISTS:
Brady Highway, *Asinīskāwitiniwak, leads a project on behalf of the Indigenous Leadership Initiative developing a national strategy for Indigenous Guardians entering this critical function of resource management.*
Margo Robbins, *Yurok Tribe, co-founder and executive director of the Cultural Fire Management Council (CFMC).*
Bhiamie Williamson, *Euahlayi, is a research associate and PhD candidate at the Centre for Aboriginal Economic Policy Research, Australian National University.*

Indigenous Nations and territories worldwide have diverse relationships with fire that evolved through time. Today, however, they are increasingly affected by modern megafires with harmful and lasting impacts. While dominant narratives often describe Indigenous Peoples as vulnerable to wildfire, many Indigenous Nations are leading wildfire preparedness and recovery processes that are grounded in cultural and land-based health and well being; these processes range from continuing or reintroducing cultural fire to adopting Indigenous FireSmart™ principles to planning and implementing eco-cultural restoration initiatives following wildfire events. Through these processes, Indigenous Nations are able to center their knowledge, language and traditions in support of cultural revitalization. However, many Indigenous Nations continue to face challenges in leading (wild)fire recovery and revitalization; this is particularly the case in settler-colonial countries, where modern fire and landscape management systems remain grounded within Western colonial and scientific frameworks. This keynote panel brings together Indigenous community leaders, fire practitioners and researchers from Australia, Canada and the United States to highlight examples of Indigenous-led revitalization and reflect on the changes needed to overcome the challenges that remain. Critically, this panel will discuss shifting the narrative away from vulnerability and toward the panelists' vision of revitalized Indigenous-led (wild)fire futures.

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 26 | 8 A.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 26 | 4 P.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 27 | 12 A.M.**

THE POWER OF PURPOSE

Dan Cable, PhD, *Professor, organizational behavior, London Business School*

We will discuss why purpose is important to humans in the context of our neurological seeking systems. The seeking system creates the impulse to look for the effects of our actions, and extract meaning from our circumstances. When we follow the seeking system's urges, it releases dopamine – a neurotransmitter linked to motivation and pleasure – that makes us enthusiastic, curious, and resilient. This is why purpose is so critical to leaders: it inspires employee commitment and resilience and helps people speak truth to power. Thus, purpose is particularly important when change, commitment, and creativity are necessary. Purpose also promotes health: when we don't feel a sense of purpose, our immune cells are less effective, leading to earlier death. We will discuss how leaders can help people feel more purpose by enabling them to play to their strengths and innovate at work, and personalize their stories about purpose in their work. (For more about Cable's presentation, see *Understanding Why* on page 14.)

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 26 | 4 P.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 26 | 12 A.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 27 | 8 A.M.**

WILDFIRE LEADERSHIP IN UNCERTAIN TIMES

PANELISTS:

Allyson Lardner, *regional manager, Forest & Fire Operations, Department of Environment, Land, Water and Planning, Victoria, Australia*
Reinard Geldenhuys, *manager, Emergency Services, Overberg District Municipality, Western Cape, South Africa*
Ángela Iglesias Rodrigo, *general directorate of Biodiversity, Forests and Desertification, Ministry of Ecological Transition and Rural Development, Madrid, Spain*
L. Kaili McCray, *PhD, MPH, MHE, DOI Wildland Firefighter Medical Standards, U.S. Department of the Interior, Office of Wildland Fire, Boise, Idaho*
Julie Tompa, *director, Natural Resource Magement, Parks Canada*
Peter F. Moore, Ph.D., *fire management specialist, Forest Officer Fire Management, Food and Agriculture Organisation (FAO), United Nations*
Bea Day, *incident commander, Portland National Incident Management Organization, USDA Forest Service*
Murray Carter, *executive director, Rural Fire Division, Department of Fire and Emergency Services, Western Australia*
Lara Steil, *co-ordinator of the Department for Interagency and Burning Control, Brazilian National Center for Prevention and Fighting Wildfires, Brazil*

In these volatile and complex times, we are being tested: longer fire seasons; managing through a pandemic; political disruption; and communities looking to their leaders to find a way forward. We need to look beyond traditional approaches and solutions for wildfire management. We need to think creatively and adaptively. Join our expert global panel to hear how countries are moving forward in these dynamic times to improve safety of communities and fire personnel, including mental health. Communities, fire management organizations, academics and front-line fire managers should tune in to this unique and relevant discussion.

MOUNTAIN DAYLIGHT TIME . . . . . **MAY 27 | 8 A.M.**
CENTRAL EUROPEAN SUMMER TIME. . . . . **MAY 27 | 4 P.M.**
AUSTRALIAN EASTERN STANDARD TIME. . . . . **MAY 28 | 12 A.M.**

FIRES AND STORMS AND COVID, OH MY!

Jennifer Symonds, D.O., *fire & aviation management medical officer and fire medical qualifications program manager, USDA Forest Service, Washington Office, Fire & Aviation Management*

Besides responding to floods and tornadoes from massive storms, United States federal agencies that also respond to wildfires had to react to the emergence of the SARS-CoV-2 virus just as the time of year when wildfire numbers typically increase drew near. Bringing hundreds to thousands of resources from across the nation to a single fire camp with the threat of being a COVID-19 super-spreader event, the agencies had to creatively think of ways to modify these camps. The Federal Fire Management Board created a team of individuals to provide evidence-based guidance and called it the Medical and Public Health Advisory Team, or MPHAT. The team includes medical officers from various agencies as well as federal public health specialists familiar with wildfire response. This team's job was to supply data-driven advice and instruction to the agencies on how to prevent infection with, as well as spread of, the virus. Team members also provided guidance on how to reduce common fire issues that would increase the risk of a poor outcome if fire personnel were to become infected. I attended calls or virtual meetings to supply updates on what guidance was coming out from the Centers for Disease Control in somewhat real time. As the year drew to a close, part of my job became discussing vaccination for SARS-CoV-2 and encouraging employees to receive the vaccine while giving real-time updates on what fully vaccinated individuals can or cannot do.

POP-UP WORKSHOP

MOUNTAIN DAYLIGHT TIME
PART I: . . . . . **MAY 24 | 2:30-3:30 P.M.**
PART II: . . . . . **MAY 26 | 2:30-3:30 P.M.**

CENTRAL EUROPEAN SUMMER TIME
PART I: . . . . . **MAY 24 | 10:30 A.M.-11:30 A.M.**
PART II: . . . . . **MAY 26 | 10:30 A.M.-11:30 A.M.**

AUSTRALIAN EASTERN STANDARD TIME
PART I: . . . . . **MAY 25 | 6:30-7:30 A.M.**
PART II: . . . . . **MAY 27 | 6:30-7:30 A.M.**

NATURE JOURNALING FOR FIRE SITUATIONAL AWARENESS – LOOK UP, DOWN AND AROUND

Miriam Morrilll, *Pyrosketcholgy, consultant in fire education, nature journaling, and illustration*

On Day 1, participants will be introduced to key nature journaling concepts and practices that can be used to increase fire situational awareness leveraging the National Wildfire Coordinating Group Incident Response Pocket Guide's Look Up, Down and Around criteria. The exercises are intended for place-based experiences that help map multiple sensory observations to key fire conditions. Techniques include mixed learning languages (words, numbers and pictures) to engage different parts of the brain for a deeper more deliberate learning process. To integrate these place-based exercises, students are expected to do "homework" before the second session, which allows them to go outside and experience the journaling techniques. During the Day 2 session, participants will share and discuss their observations to create a shared learning experience. There will also be tips to personalize this approach into an ongoing practice that can strengthen situational awareness, build trauma-resilience skills and improve field observation and documentation capabilities.

POP-UP WORKSHOP

MOUNTAIN DAYLIGHT TIME
OPTION I: . . . . . MAY 25 | 2:30-3:30 P.M.
OPTION II: . . . . . MAY 27 | 3:30-4:30 P.M.

CENTRAL EUROPEAN SUMMER TIME
OPTION I: . . . . . MAY 25 | 10:30-11:30 P.M.
OPTION II: . . . . . MAY 27 | 11:30 P.M.-12:30 A.M.

AUSTRALIAN EASTERN STANDARD TIME
OPTION I: . . . . . MAY 26 | 6:30-7:30 A.M.
OPTION 2: . . . . . MAY 28 | 6:30-7:30 A.M.

AN INTRODUCTION TO USING STORYMAPS FOR WILDFIRES

Chris (Fern) Ferner, *Esri Wildland Fire GIS specialist*

Join us for a hands-on introduction to ArcGIS StoryMaps. StoryMaps are very useful tools for disseminating information prior to, during and after wildfire events. Attendees will enjoy an introduction including examples of StoryMaps created for recent fires, a short demo and time to build a StoryMap. Resources will be provided to help participants move forward with StoryMaps, and there will be lots of time for questions.

UNDERSTANDING **WHY**

What do you think you are doing right now, as you are sitting there reading this? We all have an answer to this question all the time, even if the answer is not salient to us, is not in the forefront. Even if it is not directly accessible to us. Almost all of us could say, honestly, "I am sitting and moving my eyes." Because it is true, if you are sitting and reading this. And if you answered this way, you would be emphasizing what your body is doing. Psychologists would call this a "low level of construal" because you are emphasizing the "what" element of the question, what in terms of what you are doing with your physical body.

You could also answer, "I'm reading" and if you answered this way, it would shift the emphasis from your physical body into an activity with a purpose. Yes you are sitting and yes you are moving your eyes across the page, but these activities are in the spirit of something bigger, which is reading a book. This answer would invoke not only your external physical body but also would have some implications for your brain and how it is processing some input. It would bring cognitions into the picture.

We read for different reasons, however. Some of us might answer "I'm reading this homework," because it is assigned for a required class, and it is due tomorrow. This would be a very different answer than "I am learning." The homework answer does put some emphasis on the brain, but in a very light way as you would need to be able to recreate the concepts but you don't need to let the concepts touch you. For example, perhaps you are working on your MBA, and this is required reading in a required class. But the learning answer would imply that you are comparing the ideas you read to the ideas that you already hold in your brain, and the deciding whether you want to update anything. This is a much more active process, and could even bring emotions into the question like awe for the power of ourselves to interpret and adapt and take on new ideas; awe for what our human brain in capable of; love of new ideas that infect and change us; or regret for the times you read without actually processing the ideas. You could even say "I am trying to make myself better." This answer has a lot more to do with the big picture, personal why.

One of the most interesting facts I have ever learned is that each of these answers can be true, and we get to personally decide which truth we believe. We get to make up the narrative of our actions – what do our actions mean to us? The "why" is a higher level of "construal" than the "what," and research shows that the higher the level, the more we will stick with it when it gets hard. The better you understand your "why," the greater your level of stamina when the going gets hard.

DAN CABLE *is a professor of organizational behavior at London Business School.*

DRAWING ON EXPERIENCES

MIRIAM MORRILL EXPLAINS HER ART, VISION AND PASSION TO WILDFIRE EDITOR LAURA KING

Artist Miriam Morrill defines pyrosketchology as the study of fire through the lens of art, illustration, and journaling practices.

According to Morrill's website, **pyrosketchology.com**, nature journaling is a practice that can enhance observation skills, analysis, and engagement with elements of nature and the fire environment.

"Nature journaling," Morrill says, "is an ongoing personal record of thoughts, experiences, observations and information. Through these practices, we can enhance memory retention, situational awareness and information relevance of the fire environment.

"Nature journaling practices include different information languages such as words, numbers, and pictures, which help engage different parts of the brain."

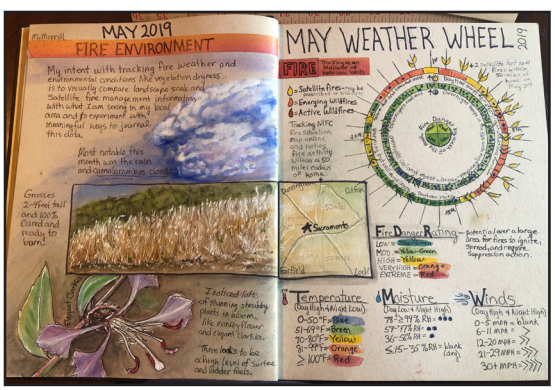
At the end of 2020, Morrill left a government career to explore place-based fire education approaches. Morrill believes these approaches can help people enhance situational awareness and build a sense of place, which includes fire— practices that rekindle human-nature relationships and develop a deeper sense of fire. Combined with other fire education and readiness efforts, these practices may help in the development of fire resilient communities.

Morrill grew up in northern California, with most of her time spent in Butte County. At one time or another, Morrill lived within the footprint of the 2018 Camp Fire, including the communities of Pulga, Concow, Oroville, Paradise and Chico.

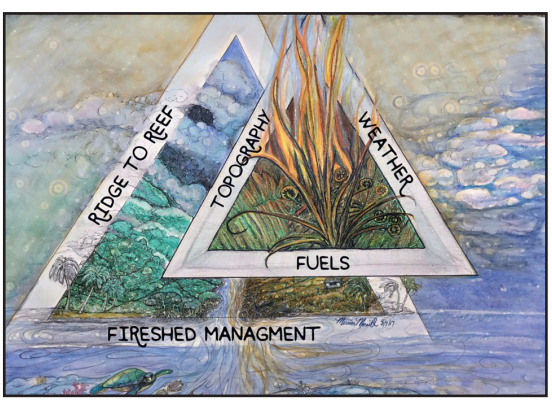
Morrill studied environmental biology and zoology at

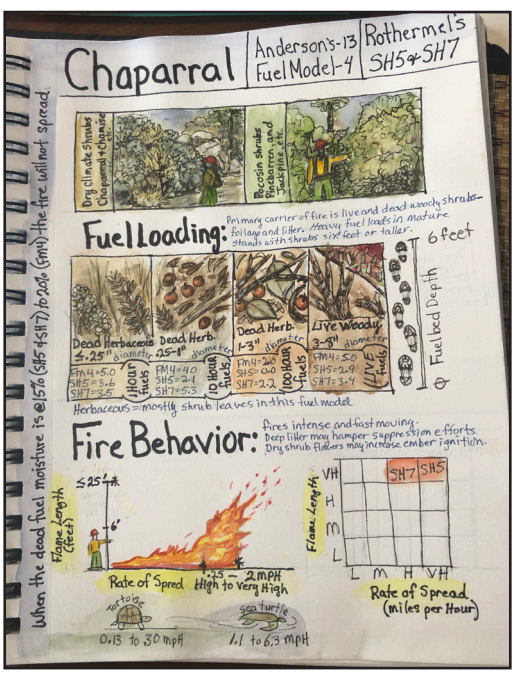
BEFORE FIRE

Track the temperature, moisture and wind in your area. You can also combine and compare with red-flag weather conditions or historic climate trends.



Create local fire behavior and fuel models with visuals that resonate with the local area.





Reference fuel model guides and create your own visual version with local vegetation; use as a reference for potential fire behavior associated with various local vegetation types.

DURING FIRE

Humboldt State University but gained the bulk of her knowledge from 27 years of experience and training in natural resource programs with the US Forest Service, Bureau of Land Management (BLM) and US Fish & Wildlife Service.

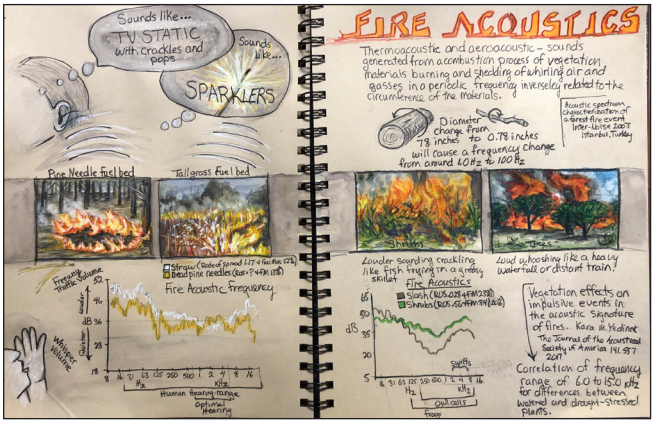
Morrill has enjoyed working in a wide range of positions including wildlife biologist, fire mitigation and education specialist, wildland urban interface co-ordinator, co-operative fire protection specialist, public-affairs specialist, and climate change adaptation planner.

Clearly, there has been one common theme in Morrill's career. and that has been fire. Whether fire fighting, habitat surveys for prescribed fire projects, endangered species consultations for fire planning, public information officer on an incident management team, or overseeing fire prevention and mitigation programs, fire has always been a focus of Morrill's work.

A common theme in Morrill's life has been art and visual communications. From hobby sketching and painting wildlife to enhancing communication efforts for her fire communication projects, Morrill has always needed a creative outlet and approach to communicating; this approach was especially helpful on international assignments during which she wanted a low-tech and relatable approach to communicate.

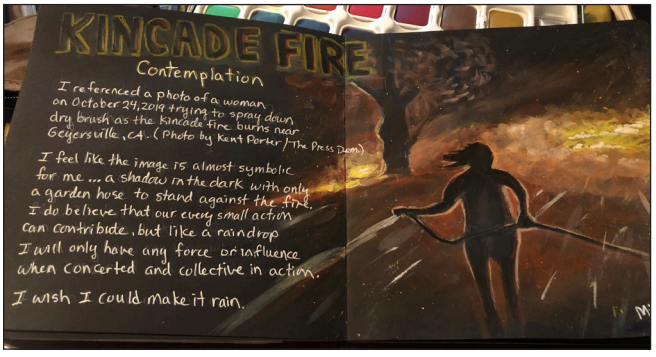
Only recently did Morrill start to use nature journaling to understand and communicate about fire. In 2017, Morrill and her husband decided to prepare to retire in the next couple of years and live full time in an RV. Morrill wanted to find a more mobile creative practice, and nature journaling was the ticket. As Morrill explored the nature journaling practice, she realized that creating art was a very small part of this engaging and deep way of learning. After the 2018 Camp Fire, Morrill realized that this tool could be valuable in teaching people how to become more aware and responsive to their fire environments; this may sound like a stretch, but Morrill believes that using place-based exercises that help enhance observations and awareness skills, and that map senses to environmental conditions, can create a powerful connection to place and awareness of changing conditions.

In 2019, while working for the BLM in California, Morrill partnered with The Nature Conservancy, Western Klamath Watershed group and the Karuk tribe to pilot a nature journaling prescribed fire workshop, while shadowing a Prescribed Fire Training Exchange (TREX) event. The fire team, local community and nature journaling participants were all very inspired to see how this practice could create an enhanced



Journaling that enhances sensory observations is a great tool. Create sketches, notes and even icons to help represent what you hear, smell or see.

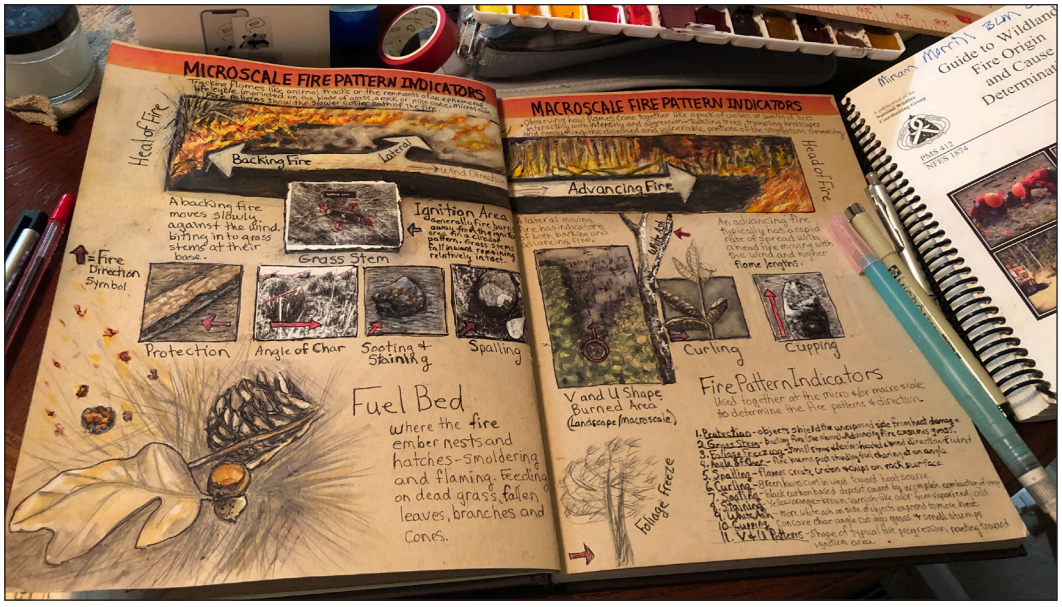
Create simple of elaborate diagrams that can help visualize fire and smoke over time or use creative ideas to represent differences over time, such as smoke jars.



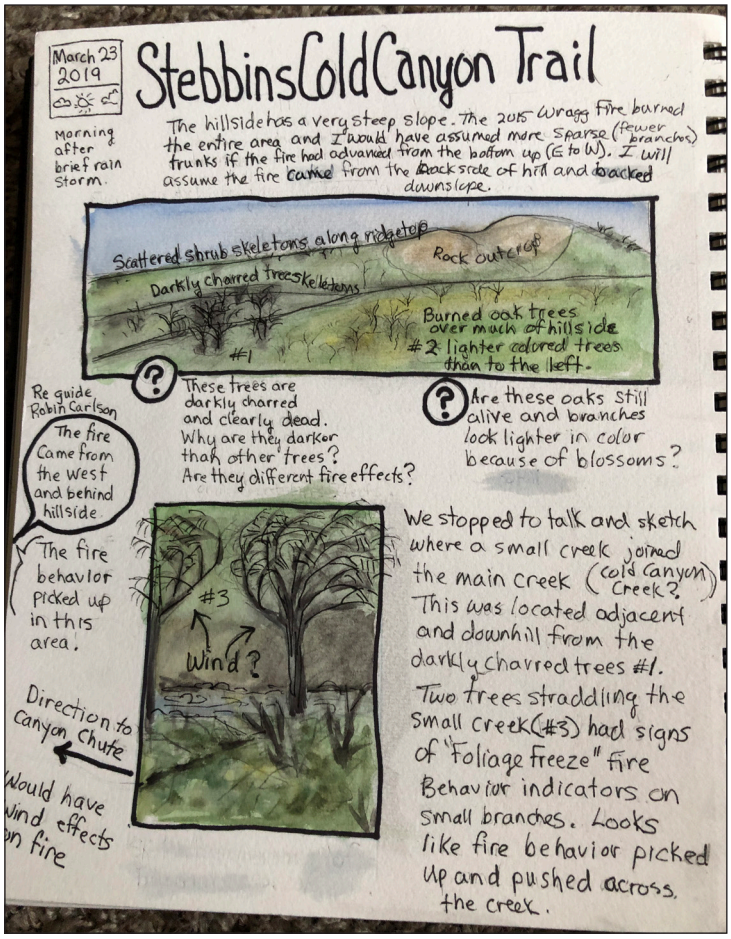
The artist used photos from the news and journaled about her feelings of helplessness during the Kincade Fire. "I felt like I wasn't doing enough and liked the visual symbolism of the small hose facing a raging fire," Morrill says.

MAY 24 - 27, 2021

POST FIRE



Wildland fire investigators use fire pattern indicators to help determine how and where the fire started; these indicators are best seen immediately after a fire but some can be seen years later and provide interesting information about the fire behavior.



It is powerful to observe and journal about vegetation changes over time.

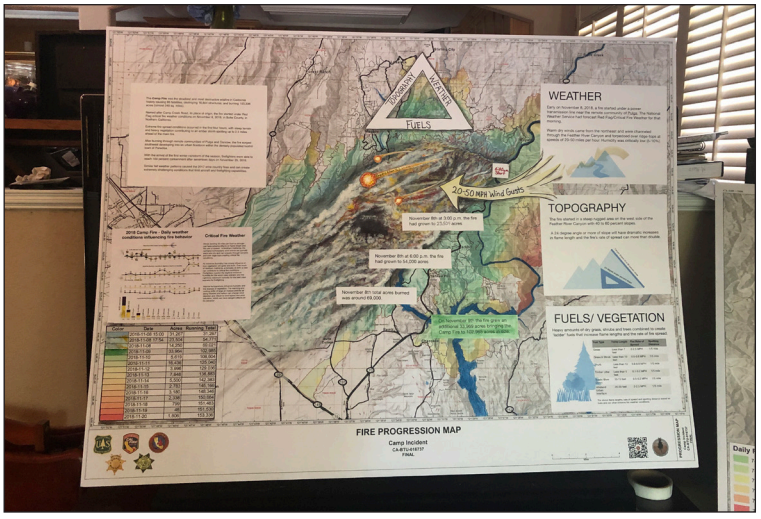
learning environment. The experience confirmed Morrill's personal feelings about nature journaling and motivated her to continue practicing and exploring this approach into retirement.

Since the start of this year, Morrill has done several virtual workshops applying nature journaling approaches to Ready-Set-Go and evacuation planning, for a number of fire-adapted communities and networks. Morrill is currently working with the Butte County Fire Safe Council in northern California to develop a youth nature journaling fire guide and program.

Morrill has other projects scheduled over the year and is excited to work with the IAWF to provide a workshop that explores nature journaling as a tool to enhance firefighter situational awareness, during the International Wildland Fire Safety Summit and Human Dimensions of Wildland Fire Conference. This workshop will introduce participants to nature journaling and provide examples and exercises applied to the Look Up, Down and Around situational awareness fire weather and field observations.

16th INTERNATIONAL WILDLAND FIRE SAFETY SUMMIT 6th HUMAN DIMENSIONS OF WILDLAND FIRE CONFERENCE

POST FIRE



Use incident information and mapping to enhance and visualize the fire story. The artist used a fire-progression map of the Camp Fire and local weather information about daily fire growth.

For more about Morrill's nature journaling fire approaches and activities, visit **Pyrosketchology.com.** You can also find Morrill on Facebook, Twitter and Instagram under the handle **@pyrosketchology.**

Artist **Miriam Morrill** defines pyrosketchology as the study of fire through the lens of art, illustration, and journaling practices.

BOARD MEMBERS ELECTED TO EXECUTIVE POSITIONS

Steve Miller was elected IAWF vice president by the association's board of directors at the March board meeting. Miller had served as secretary since 2017. Miller is the regional director of fire and aviation for the USDA Forest Service Region 9 in Milwaukee, Wisconsin.

Sara McAllister was elected treasurer. McAllister is a research mechanical engineer with the U.S. Forest Service at the Missoula Fire Sciences Laboratory in Missoula, Montana.

Michele Steinberg was elected secretary. Steinberg is the wildfire division director at the National Fire Protection Association in Quincy, Massachusetts.

Thank you to outgoing vice president **Euan Ferguson** and outgoing treasurer **Michael Gollner,** who both remain on the IAWF board.

BUTLER NAMED OUTSTANDING EDITOR

The reputation and performance of a journal's editorial board is vital to maintain quality and continually improve the stature and visibility of the publication. On this note, we are pleased to announce that Bret Butler is the recipient of the Outstanding Editor Award of the *International Journal of Wildland Fire* for 2020. Please join us in congratulating Butler for his many years of dedicated and exceptional service to the Journal as an associate editor.

Bret Butler hopes to remain in touch with wildland fire research, but looks forward to spending time with his wife Suzanne. Photo courtesy Bret Butler.

Butler began his career with the USDA Forest Service in 1992 when he was hired by renowned researchers Dick Rothermel and Don Latham. Butler's initial focus was to manage the experimental program directed at developing a new fire-spread model. In 1994 Butler worked with his colleagues at the Fire Sciences Laboratory and the Missoula Technology and Development Center to complete the fire behaviour analysis of the 1994 South Canyon Fire in Colorado. This was a watershed point in Butler's career and led to his subsequent focus on developing more quantitative guidelines for firefighter safety zones and escape routes. Butler's analysis also led to his efforts to develop a tool for simulating winds at a fine spatial resolution and eventually the development of the WindNinja wind modelling tool.

In the mid-1990s Butler worked to save the IAWF and IJWF, which had fallen on tough financial times. Butler was part of a team that organized several international conferences, supported the reinvigoration of the IJWF, and assisted in publishing a backlog of accepted but unpublished papers. Butler was a member of the board of directors of the IAWF for several years and has been a member of the editorial advisory committee as well as an associate editor for the IJWF since that time. We are pleased to add the 2020 IJWF Outstanding Editor Award to Butler's impressive list of achievements, and whole-heartedly thank him for his exceptional service to the Journal.

In retirement, Butler hopes to remain in touch with wildland fire research, but looks forward to spending time with Suzanne, his wife of 33 years, exploring our marvellous world.

WILDLAND FIRE CANADA CONFERENCE
OCTOBER 25-29, 2021 | EDMONTON, ALBERTA

CANADIAN CONFERENCE OPENS CALL FOR SPEAKERS

The IAWF seeks presentation proposals for this year's Wildland Fire Canada Conference Oct. 25-29; the deadline for submissions is June 1.

The Wildland Fire Canada Conference brings together wildland fire management agencies, partners, and collaborators from Canada and around the world. Canada has a multiplicity of fire-prone environments that create unique wildland fire challenges and opportunities.

Conference organizers are optimistically planning a hybrid conference and will evaluate restrictions and safety to determine whether to pivot to a fully virtual conference.

NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY Workshop

STRATEGY WORKSHOP OPPORTUNITIES AVAILABLE

The fourth National Cohesive Wildland Fire Management Strategy Workshop will be held in Asheville, North Carolina, Oct. 4-8.

This interactive workshop will provide practitioners and decision makers with tools and ideas that support positive fire outcomes, and identify opportunities for accelerated implementation of the U.S. National Wildland Fire Cohesive Strategy. The workshop program will focus on our theme: the hard truths of risk that are inherent in implementing cross-boundary, large landscape, and community-wide implementation.

Organizers are planning in-person and virtual sessions but will evaluate the pandemic and vaccine situations in June and decide whether to pivot to a fully virtual learning opportunity.

If you are unsure whether you can present in person, please do not hesitate to submit a proposal; there will be some remote live and pre-recorded presentations regardless.

INTERNATIONAL ASSOCIATION OF WILDLAND FIRE
Fire&Climate
IMPACTS, ISSUES & FUTURES
MAY 23-27, 2022 | PASADENA, CA, USA
& JUNE, 2022 | MELBOURNE, AUSTRALIA

FLAGSHIP EVENT IN 2022 TO FOCUS ON CLIMATE

The IAWF plans to hold a flagship international conference in Pasadena, California, May 23-27, 2022, and Melbourne, Australia, June 2022. Fire & Climate: Impacts, Issues & Futures, will concentrate attention on one of the most important forces shaping wildfire and better prepare to respond to this formidable challenge. Mark your calendars!

WORKFORCE RESILIENCE IGNITE TALK SERIES.

VIEW ARCHIVED IGNITE TALK SERIES

The IAWF workforce resilience sub-committee is a part of IAWF's diversity and inclusivity committee. Each month, the sub-committee offers presentations as part of the Workforce Resilience Ignite Talk Series. Previous talks are listed below; the recordings are on our webpage. **www.iawfonline.org/events/webinars.**

Watch for announcement for future talks in your email.

Emotional Intelligence for Wildland Fire Professionals. Why it matters and why you should care
Presented by Kelly Martin, (ret) Chief of Fire and Aviation, Yosemite National Park, National Park Service

Nine Insights from Living with PTSD: From Darkness to the Light, a Wildland Firefighter Perspective
Presented by Marc Titus, Nevada Division of Forestry's Fire Adapted Communities

Mindfulness-Based Stress Reduction: A Practice for Challenging Times and All Times. A way of being happy
Presented by Michelle Reugebrink, Certified certified mindfulness-based stress reduction teacher and master coach.

Leading towards a more inclusive wildland fire community: "Just because it has always been does not mean it has to continue to be"
Presented by Terry Baker, CEO, Society of American Foresters

FEEDBACK ON DIVERSITY AND INCLUSION TRAINING

The IAWF partnered with the Canadian Centre for Diversity and Inclusion to provide diversity and inclusion and unconscious bias training for board and committee members, partners and association members who expressed interest. The course was well received and feedback was positive.

I completed these two courses . . . They were very informative and clear and the links to other resources were very good. It is a very worthwhile initiative and I recommend that it continues. [The courses] are ideal for anyone making decisions or recommendations in relation to IAWF business and activities – the board, committees, conference planning and programs, awards, publications etc. The time required is minimal and they are easy and enjoyable to do.

Thanks for the opportunity. It's great to be involved in an organization that is providing leadership in this space.

Regards,
Trevor Howard
W. Australia

I completed the training [recently]. I found it to be very informative, and better than the same subject matter training we have utilised locally.

Very worthwhile, and I am thankful of the opportunity.

Kind regards
Mark Gunning, Commander
Country Fire Authority
Victoria, Australia

APPRECIATION FOR MENTORING PROGRAM

As a part of the IAWF mentoring program, we conduct periodic check-in calls via Zoom with our mentors and mentees. Here's some feedback from one of our mentees.

Ireland is by no means a big player in respect of wildfires, but we do have our share and we need to measure up to this. We also have lot of other challenges that require strong leadership competence. Fire can show us the way to this.

Fire is a powerful catalyst for focusing co-operation, learning and for developing people. The global wildland fire community is evolving around leadership and positive values and the IAWF mentoring program facilitates direct engagement with people who are solid examples of these values – people to measure up to.

I have really enjoyed the experience as a mentee from the outset, and as a participant, I can really see the full potential of mentoring approaches like this.
I am extremely grateful to IAWF for making this possible and to my own mentor for sharing his valuable time, experience and insights.

Many thanks for your own warm encouragement and welcome from the outset.

Best regards,
Ciaran Nugent
Ireland

FOLLOW-UP ON CALIFORNIA 2020 STORY

In the Q1-2021 issue of *Wildfire*, Joaquin Ramirez wrote a story titled California 2020: Worst Fire Season Ever, Again. Now What? An effort to dissect the California Fire Quilt.

Ramirez took a strategic look at the California fire situation and invited IAWF members and readers to participate in the development of a SWOT analysis to help define strength, weaknesses, opportunities and threats.

The best outcome, Ramirez said in the story, would be to create conversations that could help decision makers define strategies to improve the California wildfire situation.

To complete the project, Ramirez had the support of several of his California mentors. These individuals are seasoned experts – fire-behavior specialists with considerable scientific and practical experience fighting fires in the west.

Ramirez encourages IAWF members and all Wildfire readers to get involved by rating the importance of each item in the SWOT analysis and identifying the top factors for every category, to determine if the survey is robust and identify which factors apply to fire situations in other parts of the world.

Please take a few minutes and provide your input and expertise at **http://bit.ly/CaliforniaSWOTForm**

WE WANT TO HEAR FROM YOU!

Email us at **info@iawfonline.org**. **FOLLOW US ONLINE**
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Dauntless Air is an aerial firefighting company that exists to protect people, land and property. We fly to win the war against wildfires.

To learn more, visit our website at **dauntlessair.com** and download our vision paper, Transforming Aerial Firefighting for a Changing Environment, or reach out to us at **320-297-9088** to find out how you can strengthen your rapid initial attack capabilities.

ON A MISSION

RESEARCHER AIMS TO EDUCATE RESIDENTS ABOUT WILDLAND FIRES

BY DYLAN BRUCE

Peat fires can stealthily smoulder underground for months, all the while igniting blazes above ground and spewing emissions into the atmosphere.

It's these flammable phenomena that are the speciality of Núria Prat-Guitart, a researcher with the Pau Costa Foundation.

In Northeastern Spain, where the Pyrenees mountain range meets the Mediterranean Sea, lies Catalonia; this forested region is Prat-Guitart's home.

Prat-Guitart is also a member of the board of directors of the Association for Fire Ecology, and is involved with the PyroLife project, which is a PhD training program for the next generation of fire experts in Europe.

With degrees in geography, biology, and environmental science, Prat-Guitart's passion for wildfire started with her undergraduate studies of the impact of fire on soils.

"The peculiarities of peat fires attracted my attention as a young fire student," says Prat-Guitart.

Prat-Guitart's studies took her to Ireland, where she developed a PhD in peatland fire dynamics at University College Dublin.

"Years before moving to Ireland, I was involved in a research study looking at peat fires in Scotland," says Prat-Guitart.

"I was fascinated by the fact that despite being flameless and spreading so slowly, peat fires were capable of causing such particular impacts in ecosystems."

Prat-Guitart joined the Pau Costa Foundation in 2016 and now leads the projects and research area.

"Most of the research I am involved with focuses on consolidating and transferring knowledge from the fire community that is often not structured, or only available in a local language."

The Pau Costa Foundation is a non-profit organization with a focus on the prevention and management of forest fires, bringing together researchers, emergency services, and government.

Its namesake, Pau Costa Alcubierre, was a forest fire analyst who died in the Horta de Sant Joan fire in 2009.

The Pau Costa Foundation works to connect fire experts and researchers around the world so that knowledge, experience, and strategy can be shared.

"There is a lot that the fire community can learn from exchanging knowledge with peers around the world," says Prat-Guitart.

"Wildfires such as those in Australia in 2009, and Chile and Portugal in 2017, are examples of unprecedented situations pushing the fire community to rethink existing models, and to share and learn internationally. The lessons learned from those fires are very valuable for Spain."

The Spanish fire season is usually contained to the summer months, but it is becoming harder to clearly mark the beginning and end of the season.

"In Spain, like in other regions, the fire season period is expanding and every year there are fires with more extreme behaviours that are more difficult to control," says Prat-Guitart.

While fires in Spain are usually smaller and of shorter duration than those in other countries, they can often reach communities with intense ferocity shortly after ignition.

Despite the increasing threat of fires, Prat-Guitart says traditional management practices have been abandoned.

"Those lands that once were cultivated terraces around rural towns are now shrub-lands and young forests, which make excellent fuel for intense wildfires," says Prat-Guitart.

"It is paradoxical that a Mediterranean country that has always had fire in its ecosystems lacks so much risk awareness and fire education."

Prat-Guitart says there are several initiatives addressing the lack of local awareness about fires in Spain, including the Pau Costa Foundation's educational program that teaches children about basic fire ecology and forest management.

Núria Prat-Guitart leads the project and research area within Spain's Pau Costa Foundation.

ABOUT THE AUTHOR

Dylan Bruce is a writer from Melbourne, Victoria, Australia. Contact him at **dylan_bruce9@outlook.com**

FIRED UP

Fired Up features those who have advanced and contributed to wildfire and bushfire operations, mitigation and prevention, and training and research. The IAWF invites members and the greater wildland fire community to submit recommendations for profiles of individuals or groups to **info@iawfonline.org.**

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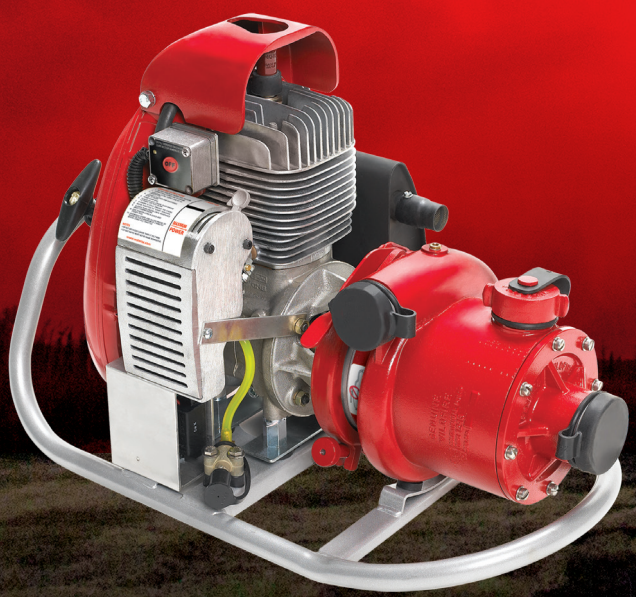

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OUTTHINKING WILDFIRE

NFPA TARGETS POLICY CHANGE TO END WILDFIRE DISASTERS

BY MICHELE STEINBERG

In a move that reaches beyond its usual advocacy role, the National Fire Protection Association has launched Outthink Fire™, a plan to end the destruction of communities by wildfire within 30 years through policy change.

Catastrophic fires that have devastated communities around the world have been a wake-up call to explore what organizations and individuals can do differently to end losses from wildfire.

Outthink Wildfire is a new approach, but its five tenets – which must be supported by all levels of government in the United States – are familiar. The plan calls for more care to make homes and businesses ignition resistant through new building and land-use requirements, and through retrofitting and mitigating existing structures policymakers and governments to take the needs of local fire departments seriously by providing wildfire training and personal protective equipment government to pick up the pace on hazardous fuel management across all lands more public education about how to protect homes and families, and strategies to motivate people to talk to elected officials about concerns.

If this sounds like the same old thing, the truth is that everyone who has anything to do with wildfire has talked a lot about these ideas, but no one has pushed hard enough on the levers to transform talk into action.

In the last three years, more than 40,000 structures have burned and more than 100 people have died in fires in the United States. Today there are almost 45 million homes in the wildland urban interface. Structure loss due to wildfire has increased more than 163 percent in the past decade.

Outthink Wildfire acknowledges two important facts: the first is that wildfire, as a natural part of the environment, is here to stay; the second is that during wildfires that threaten hundreds or thousands of homes simultaneously, there no chance for firefighters to respond safely or effectively. Firefighters simply can't save everyone or everything during a major wildfire.

Outthinking wildfire really means understanding what fire is going to do when it impacts communities, homes, and businesses, and rethinking long-held assumptions about how to prevent disasters.

It's not enough for the public to know about wildfire – people must act. And it's not enough to rely on fire response; authorities having jurisdiction must alter practices in land use, construction, infrastructure development and maintenance, and more.

Municipalities need to take a hard look at what they are asking firefighters to do and bring fire departments to the table when development decisions are made.

This is where it gets difficult. NFPA and its collaborators are going to ask policy makers and elected officials at the federal, state and local levels to make changes. Many of these changes will require public investments, whether in training and equipping firefighters, matching federal funds to collaborate on fuel treatment, or supporting disadvantaged residents to make safety upgrades to their homes.

These changes may require new regulations or amendments to laws that will have impacts on the costs of construction, roads, and water supplies.

NFPA and other advocates who want to end wildfire disasters must be equipped with facts and arguments to effectively push back against the naysayers. Anyone who supports Outthink Wildfire needs to counter the anticipated costs-too-much refrain with a stark accounting of the terrible prices paid over and over again in wildfire risk areas – lives, injuries, property loss and business failure.

The strategy does not call for the elimination of wildfires, which is impossible, or a ban on building in wildfire risk areas – equally impossible unless we can consistently identify, measure and standardize what constitutes a serious risk. Outthink Wildfire directs policy makers to implement fire science findings to reduce home ignitions from wildfire, and to employ strategies that have worked in a number of communities. Outthink Wildfire calls on advocates to engage the sectors that have traditionally played minor roles, or no role at all, in how people think about ending wildfire disasters. Municipal planners, transportation planners, watershed managers, architects, landscape designers, tree care specialists, building contractors, and many other professional groups can help have a significant impact on future outcomes from wildfire.

When policies and regulation support different ways of designing and building communities, training and equipping firefighters, ramping up fuels management work, and the need for home and landscape improvements, the private sector will respond to these needs by supplying the products and services this new approach will demand.

NFPA launched Outthink Wildfire in February, and is focusing on legislative proposals in California, Colorado, Oregon, and Washington; these states experienced significant wildfire disasters in 2020 and legislators are highly motivated to act, evidenced by a flurry of bills making their way through each state's capitol.

NFPA has begun to provide comment and testimony onsuch proposed legislation and will take every opportunity to help educate policy makers about the importance of reducing ignition potential in communities.

As someone with 20 years of experience in wildfire education and outreach, I've been encouraged by the growth of public engagement through NFPA's Firewise USA® community recognition program, Community Wildfire Protection Plans, and the Fire Adapted Communities Learning Network.

In the United States, laws and policies such as the Healthy Forest Restoration Act of 2003 and the National Cohesive Wildland Fire Management Strategy have helped advocates make great strides in coalescing partners across public and private lands, and implementing much-needed work in fuel management, firefighter safety and effectiveness, and public awareness and action.

Yet, for all this effort to reduce risk, there is no escaping the fact that the wildfire disaster problem is worsening. The loss of life and property is unacceptable. From the disastrous 2011 Bastrop Complex in Texas to the nightmare that was 2020 for California, Oregon, Washington, and Colorado, events in just the past 10 years signal a call to action that we must heed.

Advocates across the fire service, at forestry agencies, and in insurance trade associations are joining NFPA in outthinking wildfire.

The future of our communities depends on all of us working together to solve this problem.

THE FIVE TENETS OF OUTTHINK WILDFIRE

1. Require all homes and business in the wildland urban interface to be more resistant to ignition from wildfire embers and flames.
2. Current codes and standards, as well as sound land-use practices, must be in use and enforced for new development and rebuilding in wildfire-prone areas.
3. Fire departments for communities in the WUI must be prepared to respond safely and effectively to wildfire.
4. Government must increase resources for vegetative fuel management.
5. The public must understand its role and take action to reduce wildfire risk.

NFPA | OUTTHINK WILDFIRE™ WILDFIRE ACTION POLICIES

Visit **www.nfpa.org/wildfirepolicy** to learn more about Outthink Wildfire and interact with the team.

THE THOUGHT PROCESS

Q and A with NFPA's Michele Steinberg

Wildfire Magazine: **What was the catalyst for Outthink Wildfire, the event or action that pushed NFPA to say OK, it's time to do something different?**

MS: The past few years of huge property losses and increasing death tolls from wildfires have been a major impetus. We realized that in spite of all the good work of our outreach and education programs, using that approach alone was not changing the results in terms of lowering risk to enough people and places fast enough to outpace wildfire impacts. NFPA had recently created the concept of a Fire & Life Safety Ecosystem and we realized that we were not activating most of the elements of that ecosystem. We were trying to fix a complex, multifaceted problem with a singular approach. We had to look at what more we could do.

WM: **Why the title Outthink Wildfire?**

MS: NFPA's approach is aligned with the philosophy of our many partners who work in fire and land management. We know wildfire is part of nature, and is here to stay. So we didn't want a campaign about banning or eliminating fire. Given that our society has a lot of information and knowledge about wildfires and how they interact with the built environment, we decided to focus on a knowledge-based approach. The title challenges us to be creative and draw on research and intelligence and what's already known in order to do things differently. The title is also an invitation to collaborate and brainstorm with us, to bring what's known to work in public policy to bear on this difficult problem.

WM: **Influencing legislation is a heavy lift. What resources is NFPA pulling together to achieve the goal of ending the destruction of communities by wildfire by 2050?**

MS: Launching Outthink Wildfire in spring 2021 has been fortuitous timing. As we note, the ideas behind the policy planks are not new – many have been talking about and even acting on these ideas for a long time. Given the disasters in fall 2020 in our first four target states (California, Colorado, Oregon and Washington), and the fact that spring is legislative season, we're reviewing many proposed bills in each of these states, providing testimony, and seeking ways to help educate legislators along with partner organizations. NFPA has a Fire & Life Safety Policy Institute, and its director, Meghan Housewright, has been crafting testimony to support various bills. NFPA's regional managers are attending briefings and meeting with interested groups and legislators.

WM: **Educating the public is one of the five tenets of Outthink Wildfire. What can wildfire agencies and organizations do to help achieve that goal?**

MS: If an agency or organization is not directly educating the public on wildfire safety, they can help by supporting programs and partners that undertake that work. We need to reach all the people in the tens of thousands of communities at risk to wildfire in the United States, and that will take collaboration and partnership. Consistent and clear messages are key to helping people understand risk and what they can do about them, from preparing their homes to being able and ready to evacuate on a red-flag day. Support of more social-science research will also help guide us on the most important things we can do to help the public learn and act.

ABOUT THE AUTHOR

Michele Steinberg is the director of NFPA's wildfire division and writes the wildfire column for NFPA Journal. NFPA is a global nonprofit dedicated to eliminating loss, injury and death from fire, electrical and related hazards. Steinberg also serves as secretary of the IAWF board of directors. Contact Steinberg at msteinberg@nfpa.org and follow her on Twitter @Michele_NFPA.

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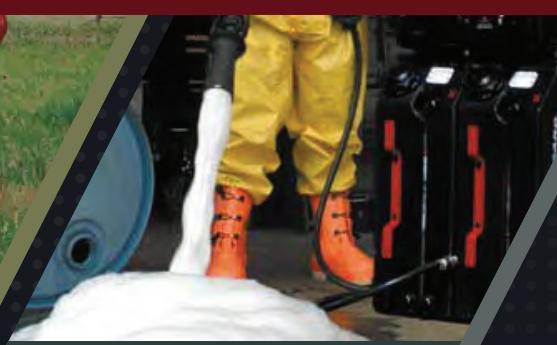

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PUTTING PEOPLE FIRST
USING SOCIAL SCIENCE TO REDUCE RISK

BY PATRICIA CHAMP
CHRISTOPHER BARTH, HANNAH BRENKERT-SMITH, LILIA FALK, JAMIE GOMEZ, JAMES MELDRUM

The director of West Region Wildfire Council stood before council for the Town of Mountain Village in southwest Colorado with community social data in hand. Over the course of the next hour, Lilia Falk presented key points that refuted the dominant assumption that local residents were not concerned about wildfire, nor were they willing to cut down trees on their properties to mitigate wildfire risk.

Falk's data from a 2014 community survey showed that most Town of Mountain Village residents were indeed willing to remove trees to reduce wildfire risk. However, almost half of the residents viewed local homeowner association restrictions on tree cutting as a barrier. The availability and presentation of locally relevant social science did two things: first, it changed the conversation in the community; second, it identified a path forward for the town council.

The lesson learned? Locally tailored social science can foster needed transformations in local and regional conversations about new, sustainable pathways toward reducing wildfire risk to communities.

A future with more large wildland fires in western North America and the central role of the wildland-urban interface (WUI) is well established. Though fire is a natural and important part of many ecosystems, a wildland fire becomes disastrous if it results in substantial harm to social and natural systems. WUI residents, who occupy the areas where wildlands meet and mix with human development, are both contributors to and recipients of the disastrous effects of wildland fires. WUI residents contribute through fire starts, flammable homes, unmitigated properties, opposition to mitigation on nearby public lands, and land-use planning efforts; they also lose their homes, inhale smoke, and suffer economic losses.

What is the best way to avoid wildfire-related community destruction? Fire science and experience suggest that the success of suppression efforts in the context of high winds, low humidity, and dry vegetation characteristic of recent wildfires in the western United States is limited. Clear guidelines on how to create ignition-resistant homes and how to reduce fire transmission immediately around homes have been established and tested. If home ignitions

Research team member Jamie Gomez presents survey results to community members in Town of Mountain Village, Colorado. Researchers determned that homeowners were willing to remove trees to reduce wildfire risk but many viewed homeowner association restrictions on tree cutting as a barrier.

are central to community destruction during extreme wildfires and the solution is known, why do wildfires continue to devastate communities?

There is a significant gap between established guidelines and persuading WUI residents across diverse communities to implement changes on their parcels. Our view is that the social aspects of wildfire risk reduction have received too little emphasis. It is not sufficient for science to provide solutions without considering the path to science implementation. This gap can be addressed with systematic, rigorous co-productive social science that can guide and measure action. Successful, sustainable wildland fire solutions are only possible if the WUI residents are engaged. While wildfire research and policy recognize that people and the communities that they live in are diverse, there has not been enough attention to how social data can guide action.

Efforts to build community wildfire resilience often focus on the biophysical aspects of fire science, which provides guidelines on how to reduce the likelihood of homes igniting during a wildland fire, through such actions as changing structure characteristics or managing vegetation near the home.

However, the value of biophysical fire science is determined by the extent to which residents in fire-prone communities implement the guidelines. To date, implementation has fallen short. In addition to the social aspects of wildfire risk reduction not being sufficiently recognized, little of the social science research to date has prioritized the provision of actionable results to guide local risk reduction efforts.

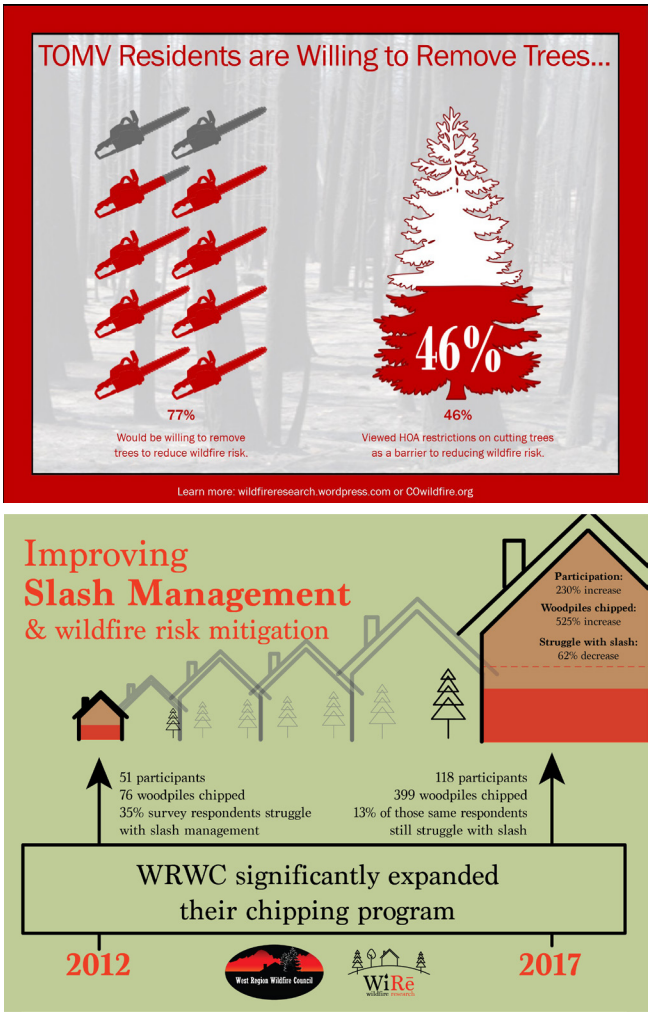
Understandings of human behavior within a social context can provide evidence needed to move biophysical fire science guidelines from theory to practice. General understandings about human decision making under risk are a good start but insufficient for incentivizing action across diverse populations. For example, cost-sharing programs that defray the cost of vegetation removal on private land directly allocate resources to residents to incentivize mitigation.

However, there is little evidence about whether cost-sharing programs are the right tool for WUI residents or how large the cost share needs to be to incentivize mitigation.

When we examined the issue in a the community of Log Hill Mesa, we found that both financial and informational factors influenced participation in a local cost-sharing program. Compared to those living on lower-risk parcels, the residents living on the properties with the highest wildfire risk ratings were less likely to participate in the cost-sharing program. In other words, a cost-sharing program was not found to be a good tool for targeting high-risk parcels in that study community. Further, the residents who were willing to participate in the program expressed a willingness to bear a larger share of the cost than the program required at that time. Based on these results, the local practitioners, who were involved throughout the research process, redefined the terms of the local cost-sharing program.

Government policy, local ordinances, land-use planning, and insurance companies are all important levers that can encourage fire risk mitigation on private land. Nevertheless, community-based wildfire programs are often the key resource in moving WUI residents to mitigate wildfire risk.

Despite operating under widely varying funding and staffing conditions, wildfire practitioners usually have competency regarding the latest biophysical fire science and experience-based insights into local residents and the social dynamics within the community. However, limited resources often impede



Researchers learned that locally tailored social science can foster needed transformations in local and regional conversations about new, sustainable pathways toward reducing wildfire risk to communities.

"For example, cost-sharing programs that defray the cost of vegetation removal on private land directly allocate resources to residents to incentivize mitigation."

practitioner engagement with the entire community. Instead, a small but vocal subset of residents may drown out the voices of the broader community. Lacking local data, practitioners often depend on knowledge extrapolated from other contexts. As a result, programs are often unduly influenced by anecdotes rather than evidence.

We argue that locally relevant, standardized social science that is co-produced with practitioners can be a foundational element to successful community wildfire programs. Without the broad-scale implementation of vegetation management and structural hardening on private land, wildfire solutions will remain elusive.

A project partner and resident work together to reduce vegetation.
Photo by J.T. Shaver, Colorado State Forest Service, Salida Field Office

ATTRIBUTES OF AN EFFECTIVE EVIDENCE-BASED MODEL

Social science takes many forms, from qualitative inquiries to quantitative survey-based methods to analyses based on big data. We describe an evidence-based quantitative social science model that builds from wildfire social science to provide practitioners with locally relevant information that empowers them to implement effective programs, facilitate learning, and monitor change over time.

First, the model calls for social science that is conducted at the level at which the program is being implemented; this is critical. Social data must include an adequate number of observations within a community to be representative, informative, or actionable.

Social data collected at a national, state, or even county scale, for example, may not adequately downscale. Georeferenced and representative community social data can be merged with other data, such as parcel-level rapid wildfire risk assessments and/or property assessor data. Georeferenced data can also be embedded within a broader context of landscape conditions.

Second, the social data should be standardized across communities to allow for comparisons of similar communities in different locations, dissimilar communities near each other, and individual communities across time.

Third, co-production of knowledge by researchers and practitioners will ensure the relevance and usefulness of results. Co-production requires trust between researchers and practitioners who may not initially frame the problem or potential solutions in a similar light.

Trust can be fostered if relationships are iterative and long-term. A truly co-productive process is best facilitated by honest conversations about tensions that arise when researchers and practitioners view problems differently. While co-production usually requires substantial effort, the rewards include credible, relevant results and evidence-based practice.

AN EXAMPLE

We are wildfire practitioners and researchers (the Wildfire Research or WiRē team) who have been working together more than 15 years to support evidence-based wildfire risk mitigation programs. How the team engages is almost as important as the outcomes of the engagement. We work together to define the issues, develop research designs that allow for learning, interpret results, and integrate research into programs.

Parcel-level rapid wildfire risk assessments of all homes within a community or a fire protection district are a common tool used by community wildfire programs. While the assessments vary, they usually include coarse measures of the ignitability of structures and vegetation on the parcel, attributes related to the location of the parcel – for example, slope, proximity to dangerous topography –

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and the ability of the fire department to access the parcel.

The WiRē approach pairs social surveys to the georeferenced parcel-level rapid wildfire risk assessments. Pairing biophysical and social data goes beyond providing a snapshot of risk to providing insights into why a parcel may or may not be mitigated, differences in the perspectives of the wildfire practitioner and the parcel resident, and which programmatic tools are best suited to diverse community residents. In other words, the results provide evidence about the nature of the social issues related to wildfire in a community.

Residents take action to mitigate wildfire risk based on their perceptions of that risk and wildfire practitioners administer community wildfire programs based on their notions of the parcels at greatest risk within a community. Pairing social survey data with parcel-level rapid wildfire risk assessments allows for measurement of gaps between the risk perceptions of residents and wildfire practitioners.

In a 2015 study, the WiRē team found evidence of gaps between many attributes of a parcel-level risk assessments conducted by a wildfire practitioner and parcel-level risk assessments self-reported by residents. The wildfire practitioner's assessment and residents' self-reports of overall parcel risk ratings diverged on average, as did judgments about many specific property attributes and the relative contribution of these attributes to a property's overall level of risk.

When there was agreement, for example the presence of an ignitable roof, residents underweighted the importance of an ignitable roof on a parcel's overall risk compared to the wildfire practitioner. Subsequent unpublished evaluation has demonstrated the consistency of these general results across a wide variety of communities and contexts, but with important local nuances. Understanding the nature of these kinds of risk-perception gaps can serve as the basis for targeted communication by wildfire practitioners.

Wildfire community programs often struggle with metrics to show progress toward wildfire adaptation. The number of acres or hectares of land where vegetation has been removed to mitigate fire risk is a commonly used metric that may not reflect actual risk reduction, much less social progress on mitigating wildfire risk.

The WiRē approach was implemented in 2012 and repeated in 2017 in the Town of Mountain Village. In 2012, 35 per cent of the survey respondents said they struggled to get rid of the slash that accumulated from wildfire risk mitigation work.

The local wildfire council acted on this information and expanded a program that chipped up slash from parcels. Five years later, 13 per cent of survey respondents cited slash removal as a barrier to mitigation. The wildfire council was able to report a 230 per cent increase in participation in the chipping program, a 525 per cent increase in woodpiles chipped, and a 62 per cent decrease in residents who struggled with slash removal. Comparing standardized data over time provides evidence of program success.

There is a tendency to want to scale up successful local efforts. However, our view is that in the context of wildfire mitigation across diverse WUI communities, there is more value in scaling out to learn which findings are location-specific and which might transcend location.

The WiRē approach has been refined through repeated applications across space and time. While each effort is shaped by the needs of the local program, core data are standardized across applications. This approach is relatively unique in the social sciences. Further, the team has developed a comprehensive dataset that is updated each time the WiRē approach is implemented in a new location. Analyses of the comprehensive data provide insights into which results generalize across communities and which are location specific. For example, aggregating social data from 68 communities across six counties in southwestern Colorado, we found that general attitudes about wildfire and what can or should be done about it were similar across different communities and counties. However, the social characteristics of a community that can guide programs such as where residents get information about wildfire, expectations about what will happen in the event of a wildfire, and measures of mitigation and preparedness, were found to vary substantially across communities.

In sum, our position is that social data collected at the scale of local programs, standardized to allow for replication across space and time, using a co-productive process that intertwines research and practice, help assure that the science is useful and actionable.

ABOUT THE AUTHOR

Patricia Champ is a research economist with the USDA Forest Service, Rocky Mountain Research Station in Fort Collins, Colorado. Champ's wildfire non-market research has contributed to understandings about the economic costs of wildfire smoke exposure and the effects of wildfire risk on home sales prices. Champ's primary wildfire research focus is on the intersection of community wildfire education programs and wildland-urban interface homeowners' risk mitigating and wildfire preparation behaviors. Champ is a founding member of the Wildfire Research Team (WiRē), a collaboration of researchers and practitioners that conducts innovative applied wildfire research to help communities adapt and become resilient to wildfires.

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This piece first appeared in The Conversation, February 2021

INDIGENOUS EXPERTISE

BUSHFIRE-REDUCTION PRACTICES ENCOURAGE COLLABORATIVE APPROACH

BY KAMALJIT SANGHA, ANDREW EDWARDS, AND WILLI RIOLI SR

Northern Australia is by far the most fire-prone region of Australia, with enormous bushfires occurring annually across thousands of square kilometres. Many of these vast, flammable landscapes have precious few barriers to slow down a fire. Infrastructure and resources are limited, and people are widely dispersed across the region.

Fire risk reduction in the recent past included very local prescribed burning operations. The overall effect was small, with huge greenhouse gas emissions from out-of-control savanna wildfires.

So, what might a better approach look like?

Our team at the Charles Darwin University's Darwin Centre for Bushfire Research has been working with Indigenous land managers, conservation, research and government organizations in northern Australia for the last 25 years to find more effective ways to manage wildfires.

These collaborations have led to a new approach, blending modern scientific knowledge with traditional Indigenous land-management practices to reduce bushfire risk.

How? By reducing fuel load through a patchy mosaic of small, low intensity, burns early in the fire season that cut the risk of late dry season fires when greenhouse gas emissions are much greater.

By collaborating with Indigenous ranger groups, this experience shows Australia can develop economically sustainable long-term solutions to manage bushfire risks – and shows what might be possible for other natural hazards such as cyclones and floods.

Such collaborations deliver benefits such as:

- reducing the risk of wildfires and other natural hazards
- engaging widely with dispersed remote communities
- building community resilience to bushfires and other natural hazards
- reducing greenhouse gas emissions (which soar when savanna fires get out of control)
- saving government costs
- protecting biodiversity and
- conserving water.

By collaborating with Indigenous ranger groups, Australia can develop economically sustainable long-term solutions to manage bushfire risks and shows what might be possible for other natural hazards such as cyclones and floods. Photo courtesy Waanyi Garawa Rangers (Jimmy Morrison)

When done well, a collaborative approach to emergency management can create opportunities on country, enhance cultural and learning opportunities for Indigenous peoples and deliver environmental benefits for everyone.

MAKING FIRE MANAGEMENT ECONOMICALLY SUSTAINABLE: A CASE STUDY

Indigenous fire management skills and traditions have long been practised in Australia but part of the challenge, as one study put it, is "finding the economic means to reinstate this type of prescribed strategic management." In other words, how do we pay for it?

After Australia ratified the Kyoto Protocol in 2007, there was renewed focus on reducing wildfires in Australia's tropical savannas due to their significant role in creating greenhouse gas emissions.

In collaboration with Indigenous land managers and others, our collective efforts helped to develop what's known as the savanna burning methodology. This system incentivises management of fire in the north.

Under this method, Indigenous land managers in tropical savannas can earn income for managing fire on their land to reduce greenhouse gas emissions. This is done through a tightly controlled system in which their emissions savings are measured in terms of carbon credit units.

GLOBAL AND LOCAL BENEFITS

This approach has allowed a new carbon economy to bloom in remote northern Australia. As one study put it:

> Since the development of the first savanna-burning methodology determination in 2012, 25 percent of the entire 1.2 million square-kilometre eligible northern savannas region is now under formally registered savanna-burning projects, currently generating [more than] A$30 million per year.

These self-acquired funds go far to support Indigenous rangers to develop and improve skills so they can continue improving fire management across the north.

As Dean Yibarbuk, fire ecologist and senior traditional owner in West Arnhem Land has said:

> This fire management program has been successful on so many levels: culturally, economically and environmentally. Through reinstating traditional burning practices, new generations of landowners have been trained in traditional and western fire management, hundreds of thousands of tonnes of greenhouse gas have been abated, and the landscape is being managed in the right way.

A consistent and reliable flow of funds from carbon contracts, as well as other government and philanthropic sources, further offers many other socio-economic benefits. It has been instrumental in

Self-acquired funds from the system go far to support Indigenous rangers to develop and improve skills so they can continue improving fire management across the north. Photo courtesy Waanyi Garawa Rangers (Jimmy Morrison).

allowing art centres, weed and feral animal control businesses, rock art conservation projects, and bi-cultural schools to flourish.

INVESTING MONEY TO SAVE MONEY

This system shows what's possible with the right engagement and policy levers. Perhaps one day a similar approach could help reduce risk from other kinds of natural disasters, all while building community resilience.

In the future, could we have similar systems where flood mitigation projects or cyclone risk reduction projects are made economically viable for local communities?

This would reduce reliance on emergency services. It also makes it less likely cultural protocols are breached when non-local emergency personnel are sent in. For example, tree removal is a common cyclone risk reduction practice but it's important to know which trees are culturally significant in a community, and why you need to leave them alone.

For these approaches to work, genuine and ongoing engagement with Indigenous peoples and dispersed remote communities is essential.

As a start to this engagement, we brought together Indigenous leaders, government representatives, and emergency management agency personnel from across the north for a meeting at Charles Darwin University late last year, supported by the Bushfire and Natural Hazards Cooperative Research Centre.

Many of the key personnel in these groups were meeting for the very first time, despite having worked for years on trying to address the same problems.

With appropriate funding, we could make such gatherings regular events so it's easier for these stakeholders to work together. Long-term collaborations can reduce disaster risk for northern Australian communities who live there permanently, build their resilience, and cut significant costs for Australian governments.

Resources to cover training, transport, and logistics are crucial to implement such an integrated approach.

Long term solutions cost money. But by drawing on local Indigenous knowledge and expertise on disaster risk reduction, we can make huge savings in the long term.

This story is part of a series The Conversation is running on the nexus between disaster, disadvantage and resilience. You can read the rest of the stories at www.theconversation.com (search disaster and resilience series).

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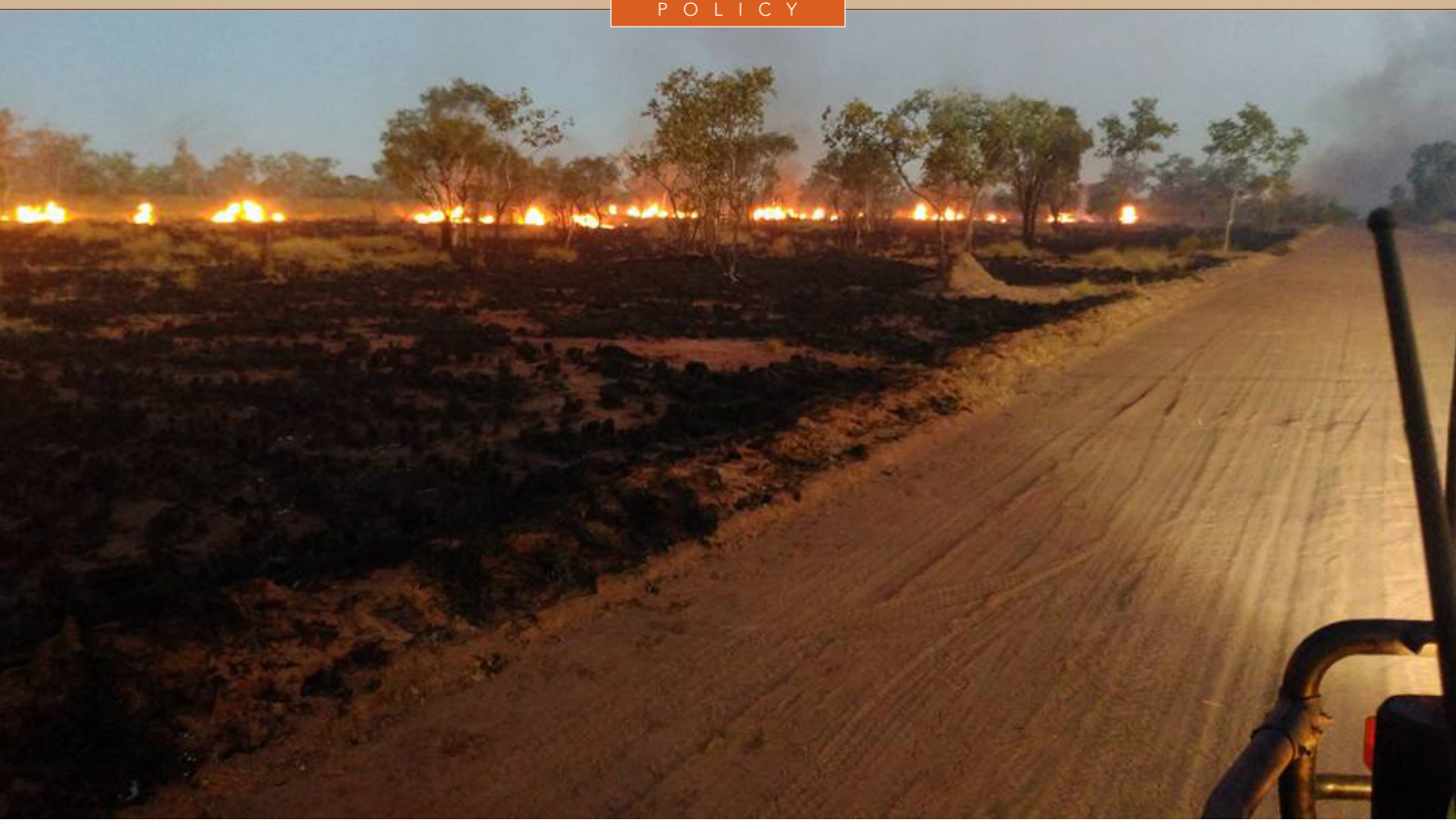
Willi Rioli Sr is the fire co-ordinator for the Tiwi Islands, Indigenous knowledge.

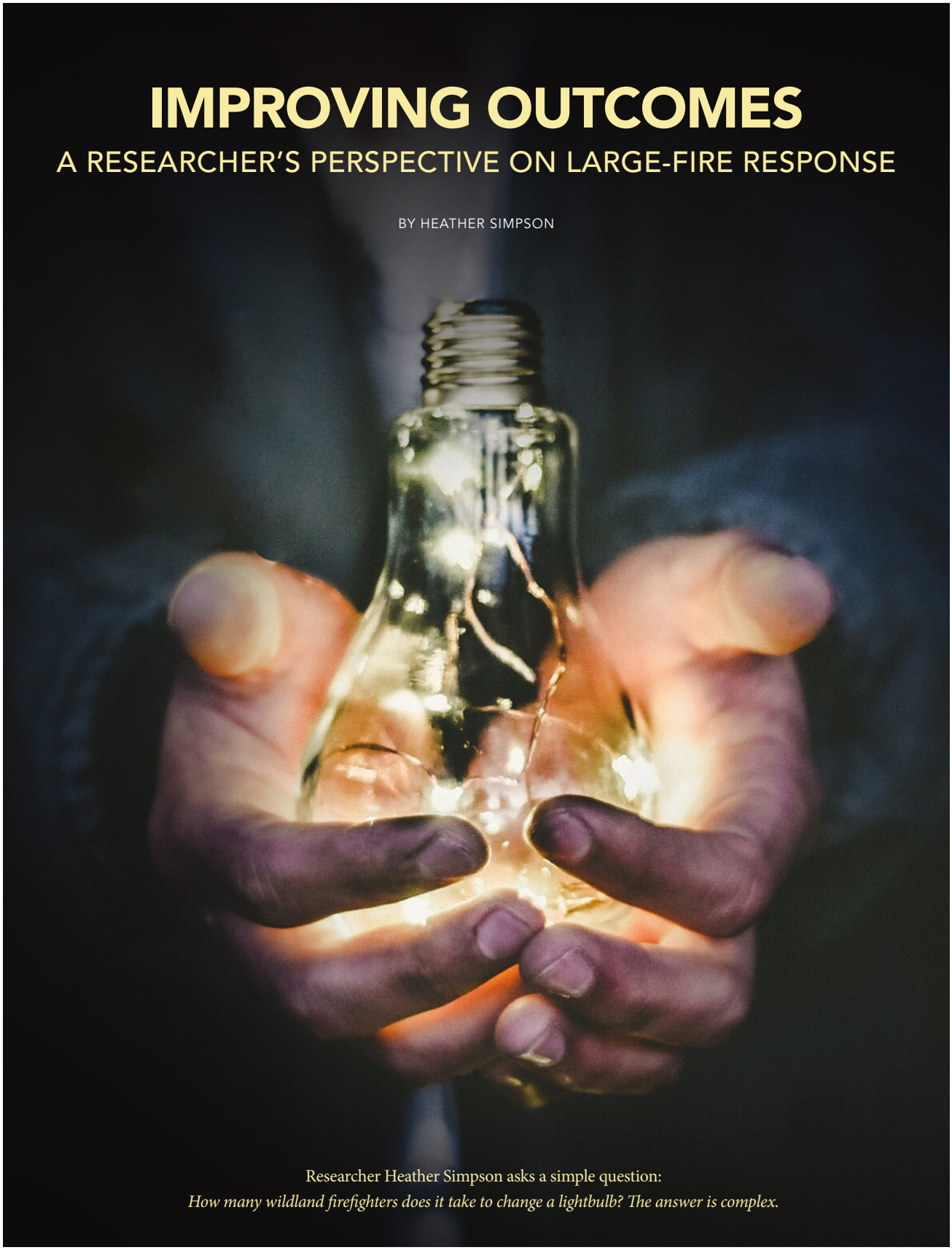


Northern Australia is by far the most fire-prone region of Australia, with enormous bushfires occurring annually in some places. Photo by Waanyi Garawa Rangers (Jimmy Morrison).

IMPROVING OUTCOMES

A RESEARCHER'S PERSPECTIVE ON LARGE-FIRE RESPONSE

BY HEATHER SIMPSON



Researcher Heather Simpson asks a simple question:
How many wildland firefighters does it take to change a lightbulb? The answer is complex.

People say once you get a taste for the smoke in your face, you're hooked. My hook was a tree candling: the sound, a crackling whoosh, not quite a roar. I felt the heat on my face and shielded my eyes from the glare of the flames. As quickly as it started, it was over, leaving me captivated by the power of the fire. Ensnared by a candling tree, my fascination grows when I think about firefighters' audacity and how we interacted with and controlled that fire.

I first set foot on the fireground as a 16-year-old girl. Growing up in a British Columbia logging town, I had not thought of myself as a firefighter. Yet in the summer of 1998, I became one. I remember that the Village of McBride, located just west of the Alberta border, north of Jasper, Alberta, was under an evacuation alert, and there was ash falling in the town like snow. I called my older brother, a firefighter, and told him about the fire. His response? A question that changed my life: "Why aren't you helping?"

I borrowed my mom's work boots and signed up alongside one of my girlfriends. As emergency firefighters, initially, we were more of a hindrance than a help. Logging was shut down during that hot, dry summer and many of the out-of-work loggers were hired as firefighters too. They had skills and experience in the woods, whereas the two of us were high-school girls armed with enthusiasm and not much else. Still, the BC Wildfire Service fit us into its suppression plans, and soon the fire was out. That one candling tree was a non-event in the context of a large fire, yet it changed my life trajectory. More than two decades later, I am still captivated by the power of fire and courage and capacity of fire fighting.

RELATIONSHIP TO FIRE

I have a close and lasting relationship with fire. Fire shares its warmth and light, it cooks my food, and it has purified my water. Fire is welcome at celebrations and birthday parties, and we sit together, camping with friends and family. Carelessly, fire burned me, but I healed. For 10 summers, I worked with fire to remove fuels and achieve containment; I've stood up smoke columns and burned the landscape to renew ecosystems. Now, fire takes centre stage in my research. Fire doesn't think, feel, nor perceive: people do, and people have been left out of the fire-behavior equation.

The fire environment was elegantly captured with the fire-behavior triangle back in 1972, by Clive Countryman, in *The Fire Environtment Concept*. A symbolic representation of the fire, fuel, weather, and topography interactions, the triangle's simplicity tends to obscure its profundity. This seminal work obscures another critical variable: the people. Countryman acknowledges that people impact the fire environment, yet he failed to make our impact symbolically explicit. With people external to the model, we can conceptualize fire as the wild other, an opponent to fight. This is evident in our language and our management, and reflected in our research. Within quasi-military organzational structures, we define command and control environments to battle blazes. Yet, our effect is mostly unquantified. We spend billions of dollars globally on suppression every year, the vast majority on large fires. We assume that there must be an effect. If not, why would we devote so much time, money, and effort? As we move past harmful fire elimination strategies and recognize fire as an intrinsic part of the ecosystem, can we see ourselves in the fire ecosystem as well?

> WHEN YOU LIFT AND TURN THE TABLE TO CHANGE THE LIGHT BULB, MAKE SURE SOMEONE ACCURATELY RECORDS THE EVENT – PROVIDE CLEAR DOCUMENTATION OF YOUR PLANS, OBJECTIVES, OUTCOMES, AND OBSERVATIONS.

Our knowledge of fire has been shaped and influenced over time by past doyens. We can trace the fire-behavior triangle's iconic symbology (fuel, weather, topography) to another iconic triangle in fire management, the fire triangle (heat, fuel, oxygen). The fire triangle predates Countryman's fire-behaviour triangle by two decades. These concepts were derived when people viewed fire as a menace – an era with a dogged emphasis on the initial attack and simplistic fire elimination strategies. The fire-elimination strategy was codified with the 10 a.m. concept – extinguish all fires by 10 a.m. of the day following discovery – in 1935. These tenets have reverberated through fire-management agencies for generations. Agencies have excelled at the initial attack and have irrevocably changed ecosystems. With more toys, tools, and technology, it is now possible to be even faster in the initial attack. The question is, should we?

Many fire-management agencies have become response focused. Yet, response (fire fighting on unplanned fires) is part of a broader fire-management equation; it sits together with planning, preparedness, and recovery. When you add resilience, you will arrive at integrated fire management. With our adversarial suppression focus, we continue to escalate our spending on the response, in absolute terms and as a budget proportion in agencies worldwide. We create professional firefighters to headline in a title fight. We ban the community from interacting with fire while amplifying a hero-firefighter culture in a vicious cycle that inevitably sidelines planning, preparedness, recovery, and resilience to post-match commentary.

When I started fire fighting, large fires were described simply as large. Then some of these fires were differentiated as extreme and mega fires (100,000 acres or more). More recently, the fire community coined the term gigafire (more than 1 million acres). Once rare events, these large fires are now standard, with impacts such as smoke and resource shortages felt worldwide. Climate change plays its part in this escalation. It's also clear that fire-exclusion policies have an impact. People have always been part of the fire environment. We cannot walk away from the relationship because the landscape still needs fire. Integrated fire management is fire inclusion; we choose the when, where, and severity of the fire. We also choose who will be involved. People are integral to the fire environment. To be effective, we need to co-ordinate many perspectives and balance disparate interests.

HOW MANY FIREFIGHTERS?

And now I ask, how many firefighters does it take to change a lightbulb? A joke and outwardly a simple question. I ask people this question because their answers illustrate the many human factors at play in the fire environment. My favourites thus far:

"Only one; the firefighter will hold the bulb, and the world will revolve around them."

"It depends; you first have to know whether the lightbulb wants to be changed."

Or a classic that I think we can all understand:

"Seven: one firefighter to stand on the table and hold the bulb, four firefighters to safely lift and turn the table, one to direct operations, and one to record the events."

One firefighter can change one lightbulb. On a small fire, you put the wet stuff on the hot stuff, smother it, burn the fuel, or create fuel-free barriers and let it burn out. As the fire grows, basic firefighting principles are unchanged – remove one side of the triangle. The challenge is when you have to co-ordinate efforts with other people; then, you need to understand the human factors. With good co-ordination, we share the load and effortlessly lift and turn a table and teach the rookie how to change a lightbulb.

For integrated fire management to succeed, we need to understand ourselves better; this requires the integration of a wide range of perspectives, which is especially challenging during time-critical events. People belong in the fire environment, and I'd like to see our effect explicit in the fire-behavior triangle.

THE TEN-FIRE PROJECT

Historically, response research focused on the simplicity of the initial attack, and thus our large-fire analyses are woefully inadequate. There is a growing body of fire-behavior focused case studies. While capturing fire behavior is crucial, we need to examine how we change fire behavior and how fire behavior changes our response. We can examine the complexity; on the human side, there are helpful tools available, such as the Cynefin framework to evaluate decisions. On large fires, the human factors, ecology, and fire behavior all come together. Large fires burn across borders, and through fuel types, weather conditions, and management teams.

I have a research idea that is currently a mere spark, yet, in the right conditions, one spark can change the landscape. The idea that I call the Ten-Fire Project is a day-by-day comparison of large fires from agencies worldwide to examine the firefighting response at a division or sector level. Fire-management agencies would need to contribute information about 10 fires, which would allow the research to step beyond the case study and gain statistical power. With fire, we shape our environment, and our environment also shapes us. A global examination of fire management requires a comparative analysis of our effort.

The aim is to assess the impact of the human effort. To do so, we have to assess whether one firefighter can be equated to another. Does a South African firefighter working with a fire-beater equal a U.S. hotshot with a Pulaski? What about the cultural context of the agencies? Are the efforts of the BC Wildfire Service, an agency spawned from the logging industry, comparable to the Rural Fire Service in Australia, a volunteer agency that stems from mateship and rural necessity? What can we learn by comparing the firefighting practices on taiga fires in Russia to Indonesia's tropical fires? What about the myriad countries in which Indigenous fire use has been banned or vilified? The Indigenous voices are still there; we need to listen. We already deploy firefighters and resources worldwide, and we know that fires are getting worse; we need to identify universal and shareable good practices.

The Ten-Fire Project aims to examine the large-fire response. It would need to be a multi-disciplinary project that examines fire behaviour, fuels, weather, topography, and the human element to complete the fire-behavior triangle. If this project were to come to fruition, I'd ask for three things from the people involved in fire management:

1. Generate quality data.
2. Share your perspective.
3. Connect.

The data is what you record during fire management. I use operational data (for example, situation reports, operations notes, plans, resource tracking – the data generated during response) to reconstruct what happened during a fire. I applaud the expansion of spatial resource tracking data, which is valuable for its accuracy and improving situational awareness and safety. I know the fire response needs to be fast. Firefighters often work with incomplete or inaccurate information, and uncertainty is part of the job. Response can be flexible, but research needs precision and accuracy.

When you lift and turn the table to change the light bulb, make sure someone accurately records the event – provide clear documentation of your plans, objectives, outcomes, and observations. If you know about errors, correct them and then make the data accessible. The value of this extends beyond this idea of mine: accurate records and detailed descriptions make for smooth, effective operations, and numerous other fire researchers ask and answer many questions with fire data.

I encourage you to share your fire-management perspective, especially if you've ever found yourself saying, "you had to be there." Over time we develop tacit knowledge, which is the knowledge gained through experience. These are the skills and abilities that are difficult to codify and transfer to other people. Invite people to experience what you do. Take the time to teach them and keep them safe. To truly understand the fire environment, we need to share the fire. Have a conversation, give a talk, bring a researcher along to a wildfire or prescribed burn, arrange a ride-along for a journalist. Pass the torch.

Finally, please reach out and connect with any number of existing research groups and organizations. My proposed Ten-Fire Project joins a global movement to improve fire-management outcomes. At this point, it is an idea, a spark, a way to start a conversation. We all recognize that the current situation is unsustainable. Stretching fire seasons and the omnipresence of the word unprecedented tells us that we can't keep doing the same thing, but harder. Let's rekindle the fire environment and examine our effect on large fires.

ABOUT THE AUTHOR

Heather Simpson has hands-on experience that bridges the gap between the scientific pursuit of answers and a boots-on-the-ground understanding of fire. For 10 seasons, Simpson worked as a firefighter with the BC Wildfire Service; she started as a unit crew member and progressed to fireline command roles, such as division supervisor. Simpson is now PhD candidate with a rambunctious toddler and an Australian husband who is examining the suppression of large fires in Victoria, Australia.

LEADING FOR SAFETY
RATHER THAN COMPLIANCE

BY MICHAEL DEGROSKY

Firefighter:
a person extensively trained to extinguish hazardous fires that threaten life, property, and the environment

Safety:
the condition of being protected from or unlikely to cause danger, risk, or injury

The science tells us that the vast majority of workplace accidents are activated when unsafe behaviors, often deeply ingrained in the workforce, interact with flawed work processes, hazards in the workplace, or both. The wildland firefighting environment is filled with all of the above; deeply ingrained unsafe behaviors, faulty work processes, and a damned dangerous work environment that just keeps getting more dangerous. We dodge a lot of bullets in wildland fire; fooled by our luck, until environmental conditions and unsafe behavior align and tragedy visits.

Every wildland fire organization I know has some collection of rules, regulations, policies and procedures providing the foundation of a safety program. We like our rules, and we put a lot of resources into enforcing rules; sometimes losing sight of the real goal; which is not to assure that our personnel follow the rules, but preventing them from getting hurt.

I certainly don't consider myself a firefighter safety expert; I have just been lucky enough to have worked on firefighter safety a lot in my career, including some major initiatives and work with people who are, in fact, experts. Two things stand out for me from those experiences. First, meaningful improvement in firefighter safety requires behavioral change; specifically developing safe work habits that replace unsafe work habits and strengthening both personal and collective safety skills. Second, bringing about behavioral change that makes firefighters safer requires engaged, focused and confident leadership.

Leaders committed to practical, meaningful improvement of the safety of their firefighters will use influence, training, education and coaching to help their personnel develop safe work habits that go beyond rule compliance. While rules, regulations, policies and procedures all have their place; they are just words on paper without the influence of effective leaders. So how does one lead firefighter safety?

WE NEED TO KEEP SIGHT OF THE REAL GOAL, WHICH IS NOT TO ASSURE THAT OUR PERSONNEL FOLLOW THE RULES, BUT TO PREVENT THEM FROM GETTING HURT.

First of all, reader-leaders, we need to know what is going on, and you can only do that by engaging. Be present at the pointy end of the spear on a regular basis; watch, listen, talk to the people who do the work about their safety. Be ready; a hard and honest look at our firefighters' work habits often reveals some harsh realities. We just hope against hope that we uncover those realities before they interact with other realities of our high-risk work environment.

In every work unit where I see a healthy, functioning safety culture, I see the same leadership influences at work. Leaders at all levels of the organization are focusing their energy on engaging firefighters, educating them, and helping them strengthen their personal safety skills. They understand and accept their influence and consistently model desired behaviors; wearing proper personal protective equipment in the workplace and visibly following safety procedures themselves. They make their commitment to safety personal, making completely clear that safety is a particular value for them. When they encounter unsafe behaviors; they assertively but positively correct, instruct and coach. By doing these things, they build a culture that supports continuous safety improvement and fosters desired behavior over time.

In work units with strong safety cultures, I see leaders driving their safety message without compromise. They make the safety of their personnel a core value, demonstrably and confidently allow safety to influence their decisions, and encourage the people they lead to do the same. They are not jerks about it and are not wild-eyed safety zealots. They just maintain a steady focus and expect subordinates to match their level of focus. By doing so, they get people to apply their energy to improving safety.

Finally, I've observed that leaders of work units with healthy, functioning safety cultures know what they need to do to support the people they lead and get them the resources they need. There is a shared vision and a sense of both alignment and collaboration. People are working together; taking practical and actionable steps toward shared goals, and the organization's leaders have provided people with what they need to do their job without undue danger, risk, or injury.

Leaders interested in enhancing firefighter safety should be seeking alignment with the people they lead around the importance of workplace safety and how to achieve it. When people minimize unsafe behaviors and flawed work processes the hazards in the work environment matter less and it is much less likely that the holes in the Swiss Cheese will line up on any given day.

We need to keep sight of the real goal; which is not assuring that our personnel follow the rules, but preventing them from getting hurt. Meaningful improvement in firefighter safety requires behavioral change; and bringing about behavioral change that makes firefighters safer requires engaged, focused and confident leadership. That requires engagement and being present with the people doing the work on a regular basis. It takes focused attention on people; educating them and helping them strengthen their personal and collective safety skills. It means knowing what people need and getting them resources. From what I have seen, that's how you lead firefighter safety.

MIKE DEGROSKY is 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 Mike on Twitter @ guidegroup or via LinkedIn.

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