

"Uniting Our Global Wildfire Community"  
AUGUST 2019 - VOLUME 28.4

# WILDFIRE

**THE FIRE GLOBE  
& CLIMATE CHANGE**

**ALASKA, BURNING**

**PLUS - WHO SPEAKS FOR THE CLIMATE?  
UPDATE FROM CATALONIA  
ISSUE DIALOGUE - COMPETING RESOURCES**



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



**MICHAEL YOUNG**  
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**AIR TRACTOR**

UP FOR THE CHALLENGE

"Perspective View." Artist: Josep Serra.



## Our Fire Globe & Climate Change

As we move further into the Anthropocene and our climate-change era, how will we, as fire professionals, respond? See our commentary and articles and issue dialogue for our thoughts.

ABOVE: An artist's interpretation of the Catalan fire challenge. Title: Perspective View. Artist: Josep Serra. For more, see "How to speak the same language: key ideas from the Forum on Catalan Wildfire Research."

**ON THE COVER:** One of the 37 tundra fires that burned in Noatak National Preserve in the summer of 2010. The Kaluktavik River fire (Fire #561) burned more than 23,000 acres in July.

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# WHO SPEAKS FOR THE CLIMATE?

By *Toddi Steelman*

Recent extreme weather events have catalyzed public belief in, and concern about, climate change, and boosted public support for government actions to reduce its harmful impacts. This gives us a window of opportunity when conditions are right to make great strides on climate if we are strategic about it.

As a wildland fire community, we could be doing a better job in exercising our collective voice about climate change and the consequences it has for the many men and women who strive to address these complex challenges, as well as the communities who strive to prepare for, respond to and recover from these events.

According to NOAA, since 1980, the U.S. has experienced 241 weather and climate disasters that each caused at least \$1 billion in costs and damages. The total estimated cost of all these events is \$1.6 trillion. In 2018 alone, three events — the California wildfires, Hurricane Michael and Hurricane

Florence — caused \$73 billion in losses and 208 deaths.

But the United States is not alone — other countries are also experiencing extreme weather events.

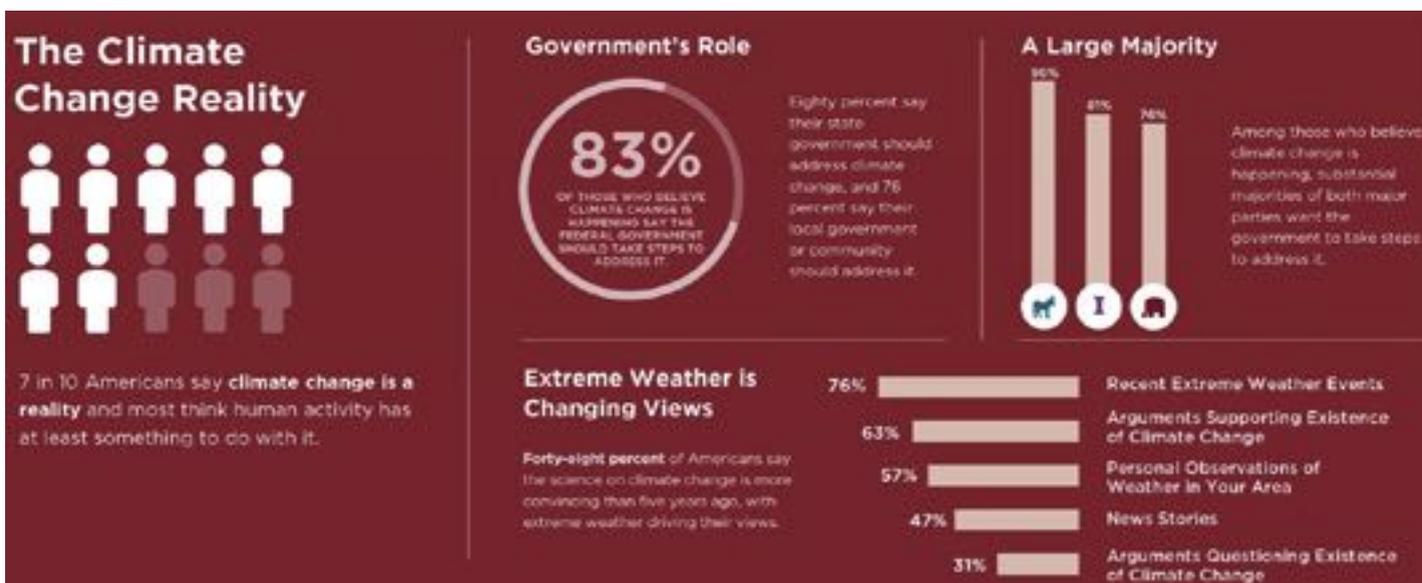
Fierce wildfires tore through a coastal area of Greece in late July 2018, resulting in 126 deaths. Fires in 2016 and 2017 in Australia, Canada, Chile and Portugal caused scores of deaths and burned thousands of homes. Wildfires are not the only disasters having an impact on human populations. Heatwaves and flooding have also resulted in high death rates in Pakistan, Nigeria and Japan in the last year.

In the World Economic Forum's 2019 Global Risks Report, nearly 1,000 decision-makers across the planet from the public sector, private sector, academia and civil society assessed the risks facing the world. They identified extreme weather, the failure to mitigate or adapt to climate change, and natural disasters as among the top risks facing the world.

These extreme conditions are having an impact on attitudes about climate change. According to a 2019 poll by the Energy Policy Institute at the University of Chicago, 72% of Americans now say that climate change is real and happening, and 61% of Americans want government to “do something” to address it.

We also see similar trends in Australia. The Australian National Centre for Public Awareness of Science (CPAS) and the Lowy Institute in two separate polls in 2018 identified that nearly 80% (CPAS - [https://www.industry.gov.au/sites/g/files/net3906/f/2018-10/the\\_australian\\_beliefs\\_and\\_attitudes\\_towards\\_science\\_survey\\_2018.pdf](https://www.industry.gov.au/sites/g/files/net3906/f/2018-10/the_australian_beliefs_and_attitudes_towards_science_survey_2018.pdf)) and 76% (Lowy Institute) of Australians believe climate change is occurring. Further, 60% of respondents in the Lowy Institute poll agreed that climate change is serious enough that “we should be taking steps now, even if this involves significant costs.” In 2012, only 36% of Australians were calling for action.

This evidence suggests that people understand the immediate



Climate Change Reality - from Energy Policy Institute. Infographic: <https://epic.uchicago.edu/news-events/news/infographic-where-americans-stand-energy-climate>.

Australian's opinions on climate change (Fig 12). "Lowy Institute Poll 2019." <https://www.lowyinstitute.org/publications/lowy-institute-poll-2019#sec37046>.

and tangible threats posed by climate-driven natural disasters such as droughts, wildfires and hurricanes, better than long-term threats posed by an abstract concept like climate change. When the climate chaos comes to us – the wildfires burning or waters flooding in your back yard – you take notice.

So what can we do? One option is to support a carbon tax. Nonetheless, there will still be people who say, "I don't want to pay another tax." Australia's experience with the carbon tax is instructive on this point.

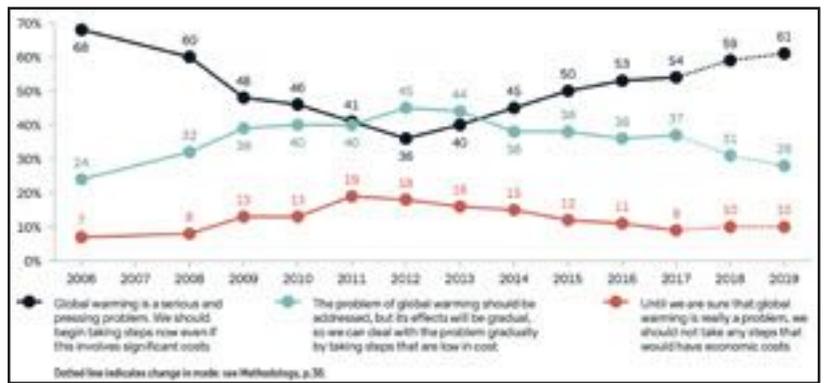
Passed in 2011, the carbon tax targeted the top 500 polluters in the country and led to decreases in carbon emissions in its first few years. It also faced heavy attacks framed as increasing costs to consumers and businesses. In 2014, Australia repealed its carbon tax. At the time it was repealed, a poll found that almost two-thirds of Australians believed there should be carbon pricing for major emitters, and yet 42% agreed with the repeal of the tax. These contradictions are unsettling for politicians and the public.

Some of it may be in the framing of how carbon pricing or a tax is presented. To make the risk of carbon and benefit of action more tangible, interventions can be framed as improving our security, creating a more sustainable future for our children and developing a more resilient economy. On the other hand, such actions can be denigrated as job killers – though a more appropriate frame may be that without action, climate change can cripple economic growth and be an actual killer.

Forty-four percent of Americans support a carbon tax – charged as a monthly fee on their electricity bill – while 43% say they oppose it, according to the Energy Policy Institute at the University of Chicago. But the support grows when people are told how proceeds from the tax will be spent. People like to know where their money will go. Support for a carbon tax climbs to 54% if the tax money collected will be used to fund public transportation. It climbs to 59% if the funds support R&D for renewable energy programs. And it climbs to a remarkable 67% – more than two-thirds of the American population – if the tax is used to fund the restoration of forests, wetlands, streams and other natural features.

Today, 84% of Australians agree that "the government should focus on renewables, even if this means we may need to invest more in infrastructure to make the system more reliable," according to the Lowy Institute poll.

This is testimony to the fact that people more easily understand, and respond more strongly to, concrete solutions. If we had better understanding of where proceeds would go from a carbon tax,



then maybe we could find greater consensus in addressing this challenge.

The men and women in the wildfire community have credibility with their respective publics around the world. We could be doing more to use our individual and collective voices to raise concerns about climate change, the visceral impacts we see from it and the potential ways we could think about it and address it.

When we talk about the impacts of climate change, we need to keep it concrete. It is about larger wildfires; stronger hurricanes; droughts that last longer; floods that occur in places where none have occurred in a hundred or more years. And when we talk about solutions, we need to be specific as well. What, exactly, would we like to change such that it could address climate change and the fire, flood, drought and storms we are facing? Is it more resilient infrastructure, forests, wetlands, streams restoration, renewable energy?

We need to tie our proposed climate solutions to the specific consequences of these and other impacts of a warming planet. The effects it will have on farms and forests. On our water supply. On human health. On jobs and economies at the local, state and national levels. And we need to reach across political, socioeconomic, geographic and ideological lines to build support around agendas that would focus on security, independence and prospects for our children. The future for all of us depends on it.

## ABOUT THE AUTHOR

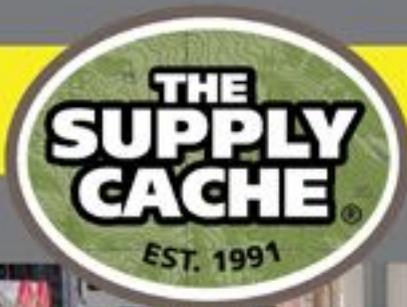
Toddi Steelman is vice president of the International Association of Wildland Fire and Stanback Dean of the Nicholas School of the Environment at Duke University, North Carolina, USA. For more on working to face global environmental challenges, see <https://global.duke.edu/qa-planning-duke-environmental-work-across-globe>.



## Response to fires in Brazil

The wildfires in Brazil are a catastrophe of global proportions. We do not take sides in the issue, but we have a duty to raise awareness about a problem not unique to Brazil. The fires in the Amazon Basin are the symptoms of complex social issues that encompass everything from the right of people to have a better life to greed, both corporate and individual, coupled with the climate change manifested in vegetation and soil dryness. Vegetation clearing and devastating fires will accelerate climate change globally. The key is in the word "globally," therefore the solution must be global. The IAWF pleads with international bodies such as the United Nations and the International Monetary Fund to take collective actions to prevent these disasters from happening. The IAWF can provide advice on fire management issues. However, this issue is far wider than wildland fire management and therefore the solutions must be broader.

- Alen Slijepcevic, IAWF President



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**OUR CLIMATE ADVENTURE IS HERE**

and this issue of *Wildfire* magazine is something of a "Pick your Own Climate Adventure" game. And while "game" may be too light a term for our challenge, the call to "adventure" feels right – since in the climate crises we face challenges and hazards to overcome, and we as fire professionals have been the ones traditionally who are called to face such challenges. But now it's not just the local bush, brush or forest fire but a global change to our fire regimes. And the flames ask, how will we respond to our climate crisis?

For answers, witness our cover image – of Alaska burning, representative of unprecedented fires this summer across the boreal and Arctic regions – and introducing our Fire Globe feature focused on Alaska's warming climate and the resulting change in landscape-scale fire.

Read on with two leaders in our field – Toddi Steelman, IAWF vice-president and Mike DeGrosky, a past IAWF president and longtime "Thoughts on Leadership" columnist. Toddi asks, "Who speaks for the climate" (and suggests that we can, and must); the Mike follows with advice on how to find the courage to speak from principle, whether the topic is climate change or development in the urban interface.

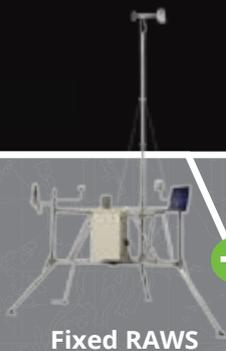
Continue into the issue for stories of those who operate

on principle – our IAWF award winners – and on to our third Issue-Dialogue Paper, focused on the challenge of managing "Competing Priorities and Demands," where climate change is one of many elements that increase the fire challenge beyond the scale we can manage with our current resources.

Move on into the details of Alaska and fire, and travel across the globe to Catalonia, Spain, where the Pau Costa Foundation shares news of the fire season and a call for greater collaboration amid our new fire challenges (which are exacerbated by climate change). And we close with a reflection by Johnny Stowe, IAWF board member and new *Wildfire* contributing editor, on a key fire-adapted species, the longleaf pine, and how its adaptation to drought and fire may be tested by a changing climate.

Adventure comes from the Latin *aventurus*, "about to happen," and earlier from *advenire*, "arrive." In the case of our climate hazards, we're already arrived. As the phrase "climate crisis" overtakes "climate change," after the hottest July on record, globally as well as for Alaska, this issue of *Wildfire* focuses on the topic in the air – how we are adventuring into the hazards and management of climate change and fire. In such times, as Steelman writes, we must do "a better job at exercising our collective voice about climate change." So here we share a collaboration of our voices – a rally of fire professionals to guide us as we act on our climate crises, globally, from Alaska to Catalonia to the Amazon, even as we're fighting the fires in our backyards. - RS

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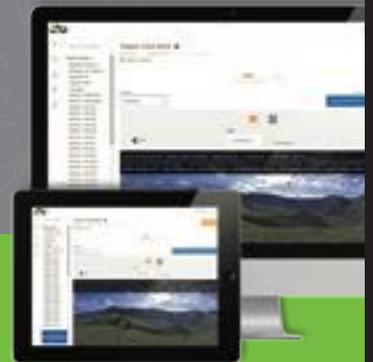
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# COURAGE AND COMMUNICATION: Essentials of Leadership

by Michael DeGrosky

Recently I witnessed a high ranking elected official, when asked by a reporter what was driving longer and more frequently severe fire seasons, calmly turn to the reporter and begin his response “Well, climate change.”

He then went on to show a notable grasp of both climate change and fire that was simultaneously well-informed, credible, articulate, yet down-to-earth. I was reminded in that moment of how leadership often requires courage and nearly always requires effective communication that connects leaders and the people they wish to lead. Witnessing that exchange also reminded me of how essential both courage and effective, credible communication are when influencing public opinion on big issues on which everyone may not agree.

In a place where acceptance of climate change still elicits everything from eye-rolling skepticism to open disdain from influential citizens and political leaders, to calmly attribute intensifying fire problems to it takes a little bravery; particularly for an ambitious politician. A couple of years ago, I read an article by Bill George (<https://hbswk.hbs.edu/item/courage-the-defining-characteristic-of-great-leaders>), a Senior Fellow at the Harvard Business School, who referred to courage as “the quality that distinguishes great leaders from excellent managers.” I liked that and it stuck with me. George wrote about how courageous leaders boldly take risks and go against the grain; and that their boldness both inspires people and puts them and their organization in the position of leading societal change. As importantly, he discussed how leaders needed courage to stick to their principles and not give in to the fear of facing criticism or even failing.

I see this need every day, all across the wildland fire service. The folks who are getting it done are those who are willing to get real with their constituents and their political bodies about, among other things, the climate, development in the wildland-urban interface, and the need for communities to adapt to fire.

While some Wildfire readers may accuse me of naiveté, I have been observing for years that people, ranging from individual private landowners to key members of important legislative committees, respect fire service leaders who act on principal, stick to their guns, and articulately tell them what they need to know, even if they don't really want to hear it. Too often, I see members of the fire service wilt at the first whiff of public opposition or, worse yet, self-censor to avoid it. When that happens, trust erodes. If you don't believe what you are saying enough to defend it, then why should I believe you? When trust erodes, credibility suffers. When we find someone less than credible, we struggle to respect them. If I do not respect a person, I struggle to see them as trustworthy and their thinking plausible.

It is quite clear that trust, credibility, and respect depend on effective communication. I have witnessed too many fire personnel, many with street cred coming out of their ears, struggle in critically important circumstances because of ineffective communication. In the exchange between the politician and the reporter the elected official, from his prominent seat at the head of the table, spoke directly to the reporter; used his

name; maintained good eye contact; and spoke in a clear voice at an appropriate volume and with good modulation of his voice. He smiled and seemed friendly without diminishing the seriousness of the subject at hand. Most importantly, he kept his remarks succinct, only saying what he needed to, and used words that were easily understandable by non-experts.

In our rough-and-tumble world, leadership often requires courage which, according to the Merriam-Webster Dictionary, is the mental or moral strength to venture, persevere, and withstand danger, fear, or difficulty. When it comes to leaders and leadership, I will always remember Bill George's observation that courage is “the quality that distinguishes great leaders from excellent managers.” In the exchange that I recently witnessed, an experienced political leader boldly took a risk, knowing that what he was saying rubbed against the grain of many of his constituent; he stuck to his principles and showed no apparent fear of facing criticism. However, courage and principles will only get you so far without the capacity to communicate. Effective leadership -- the ability to connect with the people we wish to lead -- nearly always requires quality communication.

I felt lucky to have witnessed the exchange between an experienced leader and a reporter from one of the state's largest newspapers. I was impressed with how that leader came across as well-informed, credible and articulate -- yet he also communicated in an easy to understand, down-to-earth style that connected, not only with the reporter, but with the rest of the people in attendance. Witnessing this exchange reminded me of how essential both courage and effective, credible communication are when influencing public opinion on big issues on which everyone may not agree.

It is quite clear that **trust, credibility, and respect** depend on **effective communication**.

**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.



# 2019 IAWF Award

## FIRE MANAGEMENT AND EARLY CAREER AWARDEES HONORED IN EUROPE, US AND CANADA

### 2019 Firebreak Award for Excellence in Wildland Fire Management Recipient

The “Management Award” was established to honor achievements and excellence in the management of wildland fire programs. This award recognizes someone who's made lasting contributions to program management and inspired others through creativity, innovation, leadership, application, guidance, and communication in response to challenging and controversial wildland fire management issues.



IAWF is proud to announce that the **2019 recipient of the IAWF Management Award is DETLEF MAUSHAKE.**

Detlef first became connected to the wildland fire community during a ride-along with the Los Angeles County Fire Department in California in 1997. The different approach of fighting fire with hand crews, aircraft, and the use of fire combined with the lack of specialized training in Germany aroused his interest.

Since this time, his is a story of passion, interest, and selfless commitment. He continued to travel to the USA usually taking vacation time and paying his own costs to learn and grow his skills. He also attended courses and rode along with local agencies.

Back in Germany, he spent time teaching local fire agencies how to safely attack wildfires and how to adapt US and German tactics to the local environment. This eventually expanded to the use of using live fire for real training scenarios. As part of a German disaster response team, he delivered a presentation at the 2009 10th Wildland Fire Management Safety Summit in Phoenix, Arizona, about the use of National Wildfire Coordinating Group (NWCG) based training to enhance firefighter safety fighting fires in Germany.

Forestry, fire departments, and other agencies were all working separately in Germany (and still do in some instances). Detlef's goal has always been to bring everyone to the table to discuss synergies, training principles, and tactics. His teaching methods and mentoring, not only as a student of fire but also as a leader, are well known in Germany. Many of his developments and suggestions to the agencies are based on the NWCG wildland fire and leadership materials which he adopted and translated so they would fit into the European system.

The disaster team responded for several missions to northern Portugal under Detlef's command to aid local resources in Vila Real and surrounding villages with a hand crew and engine support team. He taught the dangers of the Wildland Urban Interface (WUI) to local fire departments when asked to do so by the Fire Chief of the city of Vila Real.

Detlef has contributed to several articles and two books about vegetation fires in Germany and delivered numerous training sessions regarding the safe and effective use of handtools and mobile teams with backpack pumps and small diameter fire hose; a tactic seldom used in Germany until Detlef paved the way for increased use.

Detlef developed a proposal for ordering new fire trucks with a supplemental equipment package including small-diameter hose and backpack pumps. This has led to the reconfiguration of official standards for forest fire trucks in Germany.

In 2015, Detlef realized that the multi-functional disaster response team with a USAR team and other diverse goals was not meeting the goal of establishing a fully functional, mobile, tactical fire crew structure. So he formed new alliances, almost from scratch, that brought all stakeholders together to create a fully functional Type 2 Initial Attack crew.

This new association, Waldbrandteam Fire Crew, has been in existence since February 2015. Detlef has made major contributions to the equipment and training of the unit. The Waldbrandteam received recognition in 2017 in IAWF's *Wildfire Magazine* (Wildfire June 2017) as Fired Up honorees. All team members are volunteers and their contributions involve taking time away from regular jobs and families to go abroad and help others, often on their own vacation time. The guiding association for the Waldbrandteam is a Non-Governmental Organization that relies on membership fees and donations to help defray travel expenses and equipment. Their equipment ranges from a full set of hand tools, a small, self-sufficient fire camp with tents and mess equipment up to a Mark 3 pump with hose and nozzles. All of the equipment is either donated or purchased with money Detlef receives during presentations for fire departments and other agencies.

His teaching goes far beyond the borders of Germany. He teaches the leadership course “Helicopter Wildfire Support – Branch Leader” at the Tyrolean Fire Academy and other locations in Austria. His main topics are the use of the Campbell Prediction System and the effective use of helitack crews.

Being the President of an all-volunteer, non-profit wildfire team means investing a lot of time and enthusiasm apart from his fulltime job as a fire captain/paramedic for the Salzgitter City fire department in northern Germany and volunteering as a firefighter for the local fire company in his village.

There is no doubt that Detlef Maushake has spent the past 20 years thinking, living and teaching wildfire safety. His groundbreaking accomplishments with the Waldbrandteam and in operational and safety training are significantly advancing wildland fire operations in Europe and many other areas of the world.

## 2019 Early Career Award in Fire Science Recipient

The IAWF Early Career Award in Fire Science was established in 2015 to recognize a promising young professional who has demonstrated outstanding ability in any field of wildland fire science.



IAWF is proud to announce that the **2019 recipient of the IAWF Early Career in Fire Science Award is DR. SARA MCALLISTER.**

Sara has been a Research Scientist for the US Forest Service at the Missoula Fire Sciences Laboratory since 2009. She graduated from the University of California, Berkeley with a Ph.D. in Mechanical Engineering where she focused on spacecraft flammability for NASA. Her background in combustion and engineering has enabled her to bring unique insight into the physical processes controlling ignition, fire spread, and burning.

Since her arrival at the Missoula Fire Sciences Laboratory, she has performed ground-breaking experimental research on ignition criteria for live and dead wildland fuel materials, explored poorly understood convective heating of live and dead forest fuels, and extended knowledge and theory of burning rates of porous wildland fuel beds. It is rare that in such a short time, one researcher could have made so much progress in this direction.

Sara is the author of 28 refereed publications and 35 conference presentations and proceedings, as well as a popular university textbook, "Fundamentals of Combustion Processes" which is based on a course she co-taught while at UC Berkeley. She is a leader in the field, promoting wildland fire science in both traditional wildland fire organizations and the engineering community. Some of her recent leadership activities have included co-organizing the workshop "Large Outdoor Fires and the Built Environment", co-organizer of a special session for Forest Fire at the 8th International Symposium on Scale Modeling, section editor for the Encyclopedia of Wildland and WUI Fire for Springer-Nature, and leader of a special session at the AFE Fire Congress on "Physical Mechanisms of Wildland Fire Spread".

Recently, she was appointed as the scientific program co-chair for the 12th International Symposium on Fire Safety Science and also leads a new working group on Large Outdoor Fires and the Built Environment, helping to link the fire science and structural fire communities. She is active in the Combustion Institute, International Association for Wildland Fire (IAWF), Association for Fire Ecology, and the International Association for Fire Safety Science (IAFSS). In total, she's chaired or co-chaired 11 symposia and special sessions and serves as an active member of the Editorial Board for Fire Technology and Fire Safety Journal. All these activities demonstrate her continued commitment to linking the traditional building and wildland fire science communities together.

Sara is one of the most promising and impactful young researchers in the wildland fire community today. She has made outstanding scientific contributions and demonstrated leadership in the wildland fire community, and is incredibly deserving of recognition by IAWF with the Early Career Award in Fire Science.

# Third Annual NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY workshop

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The International Association of Wildland Fire is presenting this workshop in partnership with the Wildland Fire Leadership Council (WFLC) and the Western, Southeast and Northeast Regional Strategy Committees.



## 2019 Early Career Award in Fire Operations Recipient

The IAWF Early Career Award in Fire Operations was established in 2016 to recognize a promising early-career professional who has demonstrated outstanding ability in any field of wildland fire operations.



IAWF is proud to announce that the 2019 recipient of the **IAWF Early Career in Fire Operations Award** is **KELSY GIBOS**.

Kelsy started her fire career with ENSIS in New Zealand working as a fire behaviour researcher with a focus on fuel inventory and experimental burning. She then returned to Canada, working in Alberta on operational research topics such as technical evaluation of equipment

and suppression methods, and experimental burning and fuel measurement. During this time she completed a Masters of Science in Forestry (emphasis on Fire Behaviour) and worked on a pre-formed incident management team as a fire behaviour analyst. Her FBAN work has been highly praised by her peers.

She then went to Australia and spent four years working with the Victorian DSE and CFA where she was involved with research on Black Saturday fire behaviour, as well as firefighter and fire behaviour analyst operational response

work. After that, she returned to Alberta working as a Wildfire Management Specialist. Recently Kelsy served as a training specialist at the Hinton Training Centre (Canada).

Her mix of operational and research experience has given Kelsy unique tools to drive her high impact work. She made significant contributions toward developing an innovative Bushfire Predictive Services strategy for the state of Victoria (Australia). Key to the success of this work was how Kelsy was able to successfully liaise with a wide range of wildfire-related personnel and find ways to embed the best science into decision making.

She has also been actively developing and sharing her knowledge through fire behaviour research. She's authored or co-authored of a number of peer-reviewed papers focusing on rotary-wing thermal infrared service delivery, protecting wildland firefighters from smoke exposure, exploratory research into the existence of "humidity domes" created by wildfire sprinklers, reconstructing the spread and behaviour of the February 2009 Victorian Fires, and relationships between severe landscape dryness and large destructive fires in Victoria.

Kelsy continually shares information and helps people make and maintain connections. She has been a strong supporter of the IAWF Students of Fire concept, regularly promoting the concept and providing information for her peers. She's also participated in conferences and workshops around the world, including helping organise the IAWF Fire Behaviour and Fuels conference in Portland, and IAWF Safety Summit / Human Dimensions Conference North Carolina.

Kelsy is a highly productive and respected young specialist in wildland fire management throughout numerous countries. She's made outstanding contributions and demonstrated leadership in the community, and is incredibly deserving of recognition by IAWF with the Early Career Award in Fire Operations.

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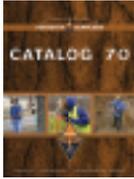
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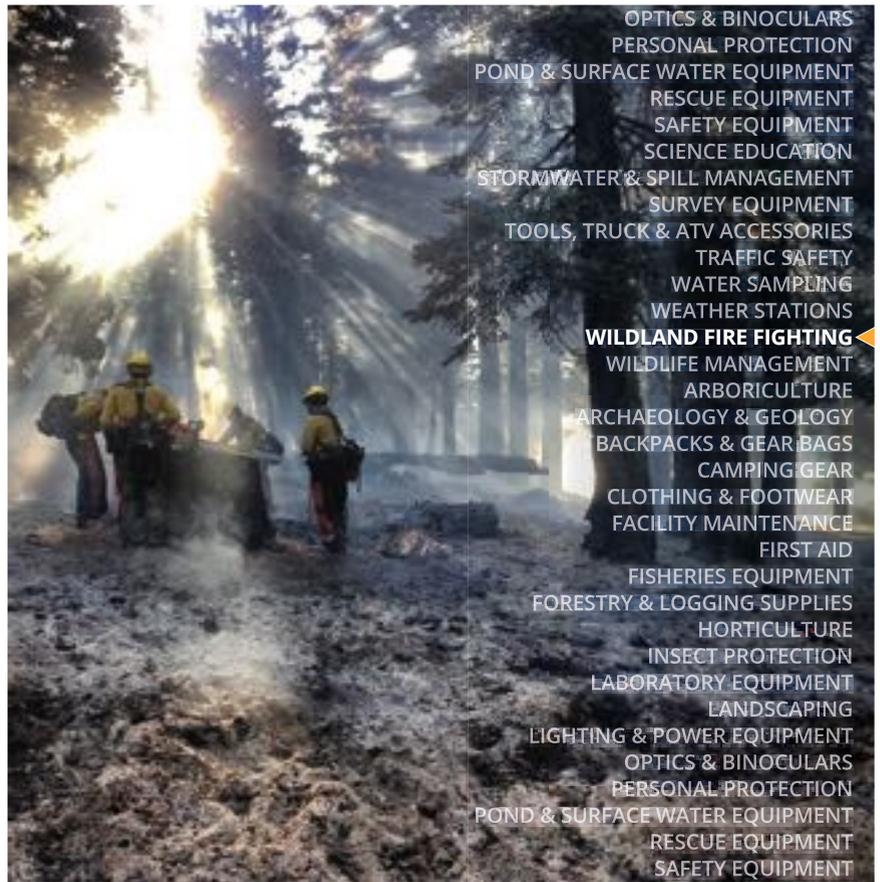
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**PART 3**  
IN A SERIES

A community response, fighting bushfires outside of Melbourne, Victoria (AU), circa 1962. The fire challenge has changed, but has our community fire contract evolved to keep pace? Melbourne Sun newspaper [Public domain]. [https://commons.wikimedia.org/wiki/File:1962\\_bushfires\\_-\\_Melbourne\\_Sun\\_Newspaper.jpg](https://commons.wikimedia.org/wiki/File:1962_bushfires_-_Melbourne_Sun_Newspaper.jpg).

IAWF WILDFIRE ISSUE-DIALOGUE

# COMPETING PRIORITIES AND DEMANDS

*IAWF's third Issue-Dialogue Paper focuses on competing and increasing demands on the focus and activities of wildfire professionals and community members, and the prioritizing and commitment of fiscal resources. How can we balance institutional, social, economic and political needs – this competition for resources and time -- to best manage our evolving fire challenge?*

## Background

The issues surrounding wildland fire are uniquely different from other landscape management issues. A review of what makes this challenge so unique includes:

- **Wildfire and bushfire are disruptive events.** Wildland fire events can be sudden, disruptive, and can directly impact communities.
- **Wildfire crosses boundaries.** Wildland fire affects and cuts across a broad suite of other landscape features and values.
- **Visible ...** The problem is visible when wildland fire cuts across the wildland-urban interface (WUI), and increasingly also visible outside the WUI.

- **Yet periodic ...** Wildland fire tends to be periodic. Between fire events, the prominence of the issue wanes and commitment and effort erodes.
- **A single solution isn't enough.** In the eyes of many (including legislators and governments), the solution is seen to be more money for response and fire suppression rather than for landscape-scale treatment, prescribed fire, community education, prevention, co-production and mitigation, as well as the research that supports evaluates this range of solutions. There are many reasons that this one-tiered approach is selected to solve a complex set of problems, including:
  1. Wildfire management is very complex. This is especially true for prevention. Without devoting the time to gain an in-depth balanced knowledge, legislators and governments (and likewise, citizens) can be misguided toward simplistic solutions.
  2. Fire suppression has immediately visible results, whereas successful prevention leads to fewer and less destructive fires, and hence we're more likely to forget about ongoing fire risk.

3. Fire suppression, as it costs more and involves more technological resources, is likely to receive much more lobbying by interested providers of such resources/services.

4. It is more convenient for citizens to favor strong suppression which is mostly done by professionals than to accept the shared responsibility associated with prevention.

- **Fire as add-on.** In some jurisdictions, wildland fire is an “add-on” to agency staff roles and responsibilities.
- **Funding and documenting long-term success.** Wildland fire mitigation is (generally) recognized to work under certain conditions. The challenge is getting funding and commitment that results in landscape outcomes and actions on the ground, which need to be practical and have tangible results that can be clearly reported on.
- **A need for shared stories.** There is room for a broader narrative - focusing on mitigation, shared responsibility and community resilience and economic cost (and consequences) of uncontrolled wildland fires.
- **Unique skills.** Wildland fire managers need a unique set of skills and capabilities that encompass both the natural and built landscapes within wildfire prone areas.

## KEY QUESTIONS FOR IAWF MEMBERSHIP

*We propose a number of key questions related to suppression tactics and strategies. We invite additional responses, and hope to engage your ideas and insights as part of a broader discussion. We have gathered initial responses to the questions posed below, based on input from IAWF review of this issue and related topics, but we recognize that there are varying viewpoints and perspectives. We hope to provoke ideas and insights as part of a broader discussion among the international wildfire community. Contribute your perspective by emailing your thoughts to [iawfwildfire@gmail.com](mailto:iawfwildfire@gmail.com) with "competing priorities" in the subject line.*

## Eight Key Challenges regarding Competing Priorities and Demands

### CLIMATE CHANGE AND GLOBAL FIRE TRENDS

1. A changing climate and severe fire weather is resulting in a greater area of wildland fire vulnerability and greater frequency and severity. What will the wildland fire challenges be in 50 years' time?

**RESPONSE:** Climate models suggest that temperature projections are trending toward the upper end of ranges of what the models predict. If so, this would mean anticipated temperature increases in the range of 6-8 degrees for 2-3 degrees c. If these projections are accurate, then additional resources will be needed (or existing resources will need to be prioritized) to address the challenges that will come with how climate change influences severe weather, which is associated with wildland fire.

2. Increasingly a global phenomenon: Changes in climate, in particular the increased occurrence of drought and se-

vere heat is resulting in wildland fire becoming a problem in parts of the globe where (in living memory) it has previously not been an issue. Parts of Europe, including boreal forests, are now susceptible to severe fire events and consequences. How do we ensure that nations collaborate and support each other as wildland fire risk increases and eventuates?

**RESPONSE:** As fire seasons lengthen and extend into a full fire year, the historical ability to share resources from the northern to the southern hemispheres and vice versa may be compromised. When all national resources are allocated during the peak of fire season, what resources will be available to share regionally and internationally?

### ENGAGING OUR COMMUNITIES

3. How do we frame a narrative about wildland fire that looks to longer term landscape outcomes? This includes new perspectives on wildfire prevention, mitigation, community resilience, consequence and landscape recovery activities (as distinct from short-term response and suppression activities)?

**RESPONSE:** Better modeling is needed to show changes in landscape over time; estimated losses in the future that looks into movement of population, changes in vegetation, changes in climate, different management options such as investment in mitigation vs. suppression, etc.

**RESPONSE:** This argument will eventually have to be won based on economics, as the suppression and recovery costs will by far exceed costs required to educate communities, undertake mitigation works and improve land use planning controls.

**RESPONSE:** In addition to economics the rising number of fatalities and damages to property is likely to engage the will of people to act for protecting themselves by participating in prevention efforts. Development in WUI areas must be limited and adhere to high construction standards. Unsafe houses constructed with burnable materials must stop being built – these are difficult to protect now and under the expected changes in climate it is questionable that they would be defensible in the future. However, even in Southern Europe where homes are generally built with non-burnable materials, weak points in the construction (e.g. roofing) and a public unprepared for conflagration have resulted in huge numbers of deaths in Portugal and Greece in the last two years.

4. How do we engage with, and involve, communities, industry and businesses? Community expectations are focused on fire agency and government activities. There is scope to shift to a community resilience and co-production model based on agency, industry and community shared responsibility and collaboration. Expectations need to shift to an effort that is collaborative, where responsibility for (good and bad) outcomes is shared. Effort needs to be sustained and past lessons need to be remembered and acted upon.

**RESPONSE:** In Australia the phrase constantly used is “shared responsibility.” This phrase can move beyond a slogan to be implemented, if communities and business understand risks, start owning risks and become a part of decision-making processes around community resilience and landscape management. The land and fire agencies are engaging with these entities; however, their input is often not considered in any meaningful way when making final decisions what mitigation actions are taken. This will need to change to improve the “social license” for the fire management agencies. Similarly, communities need to have a better understanding on what it means to carry their share of the responsibility.

**RESPONSE:** In the United States, states and localities are increasingly bearing the costs associated with wildfire, where historically the federal government had born most costs. In all likelihood, as localities and states bear more of these costs, there will be greater innovation in identifying locally driven solutions to deal with wildfire problems. Local financing mechanisms, like bonding authorities, may provide financial options to fund locally based work with returns paid in local jobs, losses avoided (such as watersheds and homes not damaged), and insurance claims not filed.

**RESPONSE:** In Southern Europe there are various paradigms regarding forest fires. Volunteerism for example varies greatly with countries like Portugal and Croatia being very strong on this while Greece and Cyprus lag behind. Further-more, communities mostly expect governments to come up with funds for fire prevention.

5. How do we tell the success stories when the potential fire intensity is managed by prescribed fire, mechanical fuel treatments, and the “good” wildland fires that support ecological and fuels benefits? (In particular, how might we balance the stories of the economic benefits of fuels management vs. the economic consequences of reactive wildland fire management)? When considering “good” fire, an important story often untold is the use of fire by native and indigenous peoples. How do we incorporate traditional burning into today’s prescribed fire tapestry?

**RESPONSE:** Prescribed burning, its positive outcomes, and the need for increased capacity and capability needs to be framed from an economic and well as a natural resource perspective.

**RESPONSE:** The positive outcomes of planned burning into to look a broad impact that considers secondary and tertiary impacts on business and communities e.g. long-term impacts on water yield and quality on communities, agricultural sector or long-term impact on tourism as a result of severely burnt landscapes.

6. Wildland fire should be regarded as a “whole of community”/“whole of landscape” challenge. Fire needs to be recognized in any natural resource management and disaster/

emergency management strategy. How do we frame wildland fire strategy in discussions about climate change, smoke, watersheds/water catchments, timber harvesting, soil management, biodiversity and single (threatened) species management, tourism and recreation? With a range of other threats and emerging vulnerabilities, how do we work with other disciplines to build a broader community resilience to natural disasters (of which wildland fire resilience is only a part of)?

**RESPONSE:** Communities and business understand risks, start owning risks and become a part of decision-making processes.

**RESPONSE:** A very significant investment needs to occur to produce systems and models that will be able to evaluate all values across the landscape and highlight areas where there is a conflict between management objectives and values so they can be negotiated with communities and businesses.

## DEMANDS ON OUR PROFESSION

7. There is a continuing need to foster and grow the current and the next generation of fire managers. Will these people come from existing forestry and natural resource management curricula or elsewhere? How do we record, learn from, and act on the varied approaches we’ve brought to our development of fire managers? To what degree can we utilize urban fire staffs and emergency service volunteers? How can we utilize the skills of indigenous people and agricultural traditions in the future?

Response: Fire management needs to be seen as a skill-set that draws more broadly than from just the traditional forestry and natural resource management sectors. The management of wildfire requires a range of other complementary skills in community engagement, economics and policy, and infrastructure planning and others.

Response: Fatigue, PTSD, depression and mental health issues are increasingly being seen among our wildfire community and first responders. As fires get bigger, severity worse and seasons longer, the challenge and sense of efficacy in the fire community is diminished. Better coping mechanisms and setting expectations more realistically, given how fire is changing could help. We need more holistic treatment of individuals and the community who invest in these careers to ensure their long term well-being.

8. Land and fire managers have multiple accountabilities and responsibilities for the lands they are managing. What are the experiences in your jurisdiction / organization / geographical area?

Response: This leads to internal workload pressures or shifting organizational focus. The issues occur during protracted fire season when resources (both physical and financial) are diverted from land management into fire management, but also during “quiet” years when resource flow in the opposite direction. That flow creates tensions between those parts of organizations.

Response: Fire managers in Australia, the United States and in many fire management jurisdictions their responsibilities are not just land managers. Increasingly, they have become emergency managers, covering many hazards such as bushfires, structural fires, HAZMAT, Technical rescue and so on. Landscape managers are increasingly involved in prevention and mitigation, and recovery activities as well as response and consequence management. As members of those organizations cover all the above, it means that organizations from a capability point of view have to cover risks associated with all hazards they are responsible for and develop their agency capability so. As financial resources are always limited, this creates continuous shifting of priorities and refocusing for organizations based on organizational priorities, stakeholder views including governments and communities or through reviews and formal inquiries.

### For background and more information

“The Future of Wildland Fire Management. Advance Briefing Report.” For the Quadrennial Fire Review Working Panels. The Brookings Institution January 15, 2008. <https://www.nifc.gov/PUBLICATIONS/QFR/QFRResearchAdvanceBriefingReport.pdf>

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[An example of strategic planning in process.]

“Planning for better bushfire management. Help us shape bushfire management strategies in your area.” Engage Victoria. <https://engage.vic.gov.au/bushfire-planning>.

Tom Zimmerman. “President’s Desk: Improving Wildland Fire Management Strategies.” Wildfire Magazine. February 2016. <https://www.iawfonline.org/article/improving-wildland-fire-management-strategies/>.

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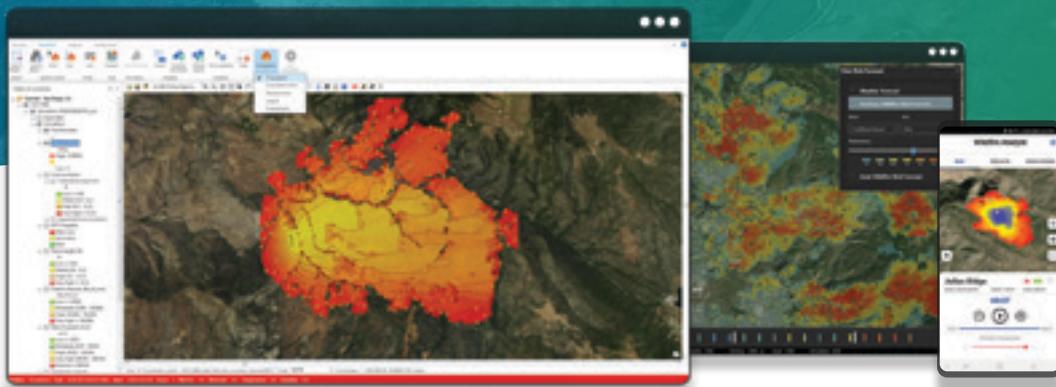
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# ALASKA'S FIRE ENVIRONMENT: NOT AN AVERAGE PLACE

*The following is a compilation of excerpts from the keynote presentation given by Robert "Zeke" Ziel at the Albuquerque location of the 2019 Fire Behavior and Fuels Conference. Zeke is currently the Fire Analyst for the Alaska Fire Science Consortium.*

One of the 37 tundra fires that burned in Noatak National Preserve in the summer of 2010. The Kaluktavik River fire (Fire #561) burned more than 23,000 acres in July.

*by Robert "Zeke" Ziel*

Alaska is nearly 18% of USA landmass. Its size is often unappreciated, as it's frequently shown in whole without other states as reference. It stores about 1/3 of US carbon, and is the only place in the United States where permafrost exists, as both a value and a hazard. Upon first inspection, fire behavior manifest on this landscape may seem typical. I hope to persuade you that the range of variability from year to year leaves "typical" wanting as a descriptor.

Like much of the boreal forest, fire in Alaska follows an understandable pattern – large stand replacement fires that are difficult to suppress on remote ground. Average depictions of Alaska fire seasons don't represent fire's impact very well, and there are few examples where the average tells our story.

In the last 25 years, over half of Alaska's fire disturbance came in the three much above average seasons of 2004, 2005, and 2015. In these exceptional years, hot and dry weather on a sufficient

number of days encouraged fires to burn freely, producing the impressive acreage impact that history has shown to be possible. In each of those exceptional seasons, Alaska contributed more than half the area burned to United States totals.

While this possibility is understood, Alaska fire managers anticipate each fire season with tremendous uncertainty. They prepare to protect dispersed values from unknown threats coming at a pace that cannot be planned for, compounded by a sense of impotence when these exceptional, extreme seasons come.

Add to this the reality that few of the assessment tools that are commonplace in the western continental United States are available or effective in Alaska. Fire managers, regardless of role, have called on innovation and self-reliance to try to fill that gap. We've been mostly successful with this approach. But as the climate changes, these challenges test our resilience, call into question the choices that have served us in the past, and force us to consider completely new levels of fire disturbance and impact.



*A fire burns into the Alaskan wildland-urban interface. Fire activity typically peaks around the June solstice (below), though this summer the fire season continued long into the summer.*

## HUMAN FOOTPRINT

Despite having 18% of US land area, Alaska is home to less than a quarter of 1% of the US population. However, the human imprint is much bigger than the numbers suggest.

Wildfire management is strongly influenced by land ownership and land management. Though most of our fires impact land well away from established communities and out of view, the demands of human values at risk drive many decisions even for remote fires. Between 1971 and 1980, federal legislation asserted that over 14 thousand very remote native allotments would receive fire protection regardless of their size and level of development. Point protection of these allotments from oncoming wildfires is an increasing challenge with each fire season.

### THE FAR NORTH LANDSCAPE

***Boreal Spruce: Alaska's Fuel of Choice***

Among fire managers, there is both reverence and hatred for the black spruce forest that makes up much of the boreal biome. It's the key element in some of the most spectacular fire events on the planet and a prolific spotter, allowing it to seek nearby patches for consumption so it can continue on



its way. It grows in expanses of short straggly trees, in dense, continuous thickets, interspersed with shrub and grass tundra or deciduous stands of trembling aspen and paper birch.

It's very hard to trust that only the more flammable black spruce will carry fire aggressively on hot, dry days during peak fire season around the June solstice. Other fuelbeds will burn, but they're usually calmed by declining solar radiation and rising humidity on most evenings and late summer days.

For the uninitiated, it's a challenge to expect a fire like the one in the photo above to stop abruptly. On many fires, patches of black spruce are burned completely while adjacent stands of hardwoods appear untouched.

The boundaries are not always distinct. Mixed stands of spruce



In this depiction, the grass is green, the hardwoods are leafed out, and the Stuart Creek 2 fire in the background burned 87,000 acres in late June and early July of 2013.

and hardwoods can be hard to detect, appearing as deciduous. But they can burn intensely, spread rapidly, and send embers spotting ahead, defying assessments from confused landscape depictions.

When weather factors moderate even a little due to clouds or smoke, the lush, green heat sink of hardwoods and tundra intermixed with black spruce can stifle active fire growth, producing an eerie, uncertain calm along the perimeter.

This green condition shows why the standard US methods for assessing the curing of fuels curing and scaling fire potential can be lacking for Alaska.

Burn scars are the most prominent fuel treatments of the interior, leaving behind charred tree boles, hardwood sprouts and seedlings, grasses, and shrubs. Historically, it's been assumed that these areas remain resistant to fire spread for many years, supporting only slow to moderate growth under most flammable conditions. Increasingly, we're seeing them support fire in spring before greenup and become flammable again when drought and late-season curing permit fire to spread across their expanse.

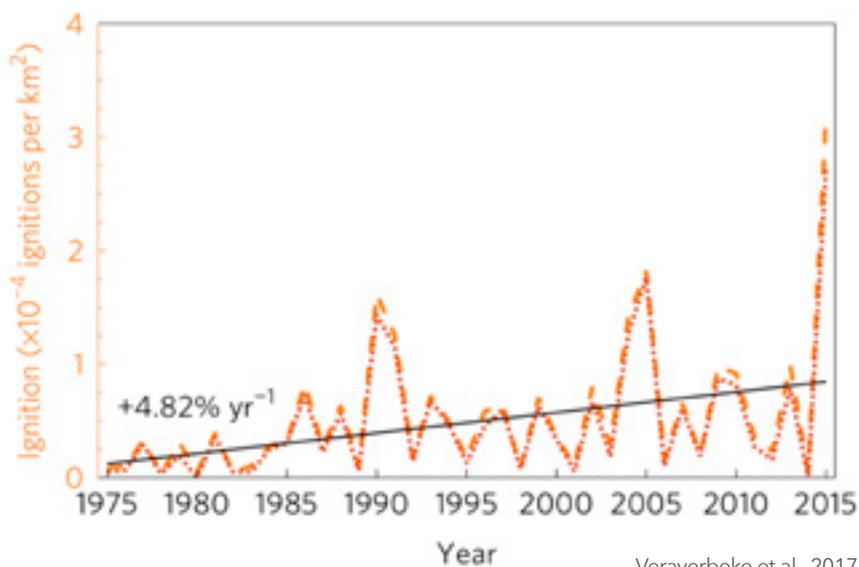
## TUNDRA JOINING THE FIRESCAPE

Though the arctic tundra ecoregion exhibits the longest fire return intervals, it appears particularly vulnerable to significant atmospheric warming.

Snow can come in any month, yet arctic tundra can be subject to warm sunny days with convective storms and lightning, like the lands to the south. Long days around the solstice can dry the surface layer well enough

to carry wind-driven fires many miles. There is a deceiving, hidden load of dead fuels across much of the tundra landscape, even during the peak of the short growing season. Fires in sedge and grass tundra can produce exceptional spread rates and an impressive ability to find a way through mazes of pothole ponds.

As the climate changes we see a quickening pace of fire return in the tundra; concerning us about carbon release and ecosystem resilience. The challenges associated with even trying to suppress these fires are significant. Most of the monitored fires in Alaska are on remote ground that makes it almost logistically impossible to staff and support the required resources. Consider as well, how difficult it is to ensure the safety of fireline personnel under conditions that can produce fire behavior shown below, with no escape routes and no safety zones.



Veraverbeke, et.al., 2017

The trend for lightning ignitions in Alaska.



### IGNITIONS - LIGHTNING'S HAND EXPANDS

Ignition source often determines the management response. Ignition frequency normally determines management imperative.

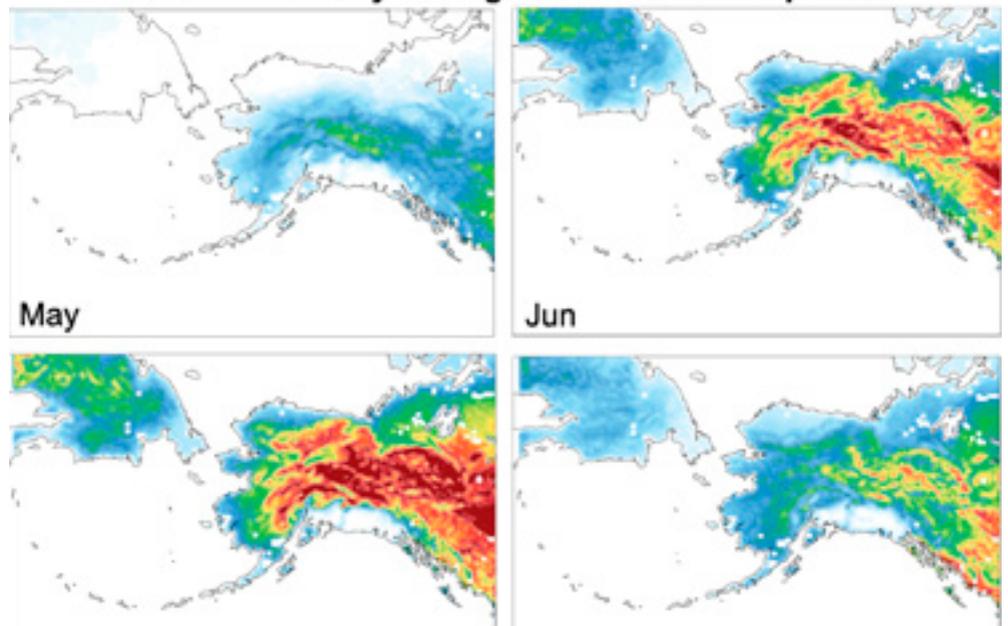
In Alaska, lightning ignitions result in the vast majority of area burned. They appear random and widely distributed across a largely unoccupied landscape. The graph below from a 2017 study shows a nearly 5% per year increase in lightning ignitions since 1975.

### PRECIPITATION ON THE RISE - EXCEPT SOMETIMES

Precipitation is increasing as well. Though patterns are irregular and difficult to forecast, this trend for interior Alaska suggests that summer rainfall has been rising since the extreme season of 2004.

But the Alaska paradox continues. Extreme annual rainfall deficits occur with some regularity, with four of them in the last 15 years.

1986-2015 Monthly Average Convective Precipitation



1986-2015 Monthly average convective precipitation



Fire ecologist Eric Miller examines a permafrost ice wedge exposed by fire-induced melting on a North Slope fire in Alaska.



10 years post-fire LiDAR study shows that surface roughness doubled or tripled in the burned area due to permafrost melt.

Permafrost loss can wreak havoc for whole stands of trees and ruin access routes.

## IMPACTS OF FIRE

### *The Departure of Permafrost*

Permafrost formed during the ice age over ten thousand years ago. In the far north of Alaska, arctic tundra has always insulated this underground ice from seasonal warmth. In the interior, discontinuous lobes and lenses of permafrost underlay both black spruce and tundra on north slopes and bottomlands. Alarming, permafrost is now thawing all across the state. Fires amplify that thawing and destabilize the ground in dramatic fashion.

Collapsed, subsurface hollows that form when permafrost thaws are known as thermokarst. The tundra landscape in the image to the left was charred by a single fire in 2007. Little thermokarsting was evident two years post-fire, but by 2014 significant collapse was evident. Examination of similar karsting in older fire areas shows that permafrost loss continues for decades. Often the surface water drains away leaving much drier tundra that's more susceptible to fire.



Fairbanks during the Smoke Emergency of Summer 2004

### Smoke

2004 is a summer that few in the city of Fairbanks can forget. The smoke emergency lasted into September, with 15 days at the top “hazardous” level, and another 31 days at “unhealthy” or higher.

But smoke like this has impacts well beyond health. Alaska’s transportation network and fire management operations are heavily dependent on aviation. Extreme smoke events like this bring air travel and fire management to a halt.

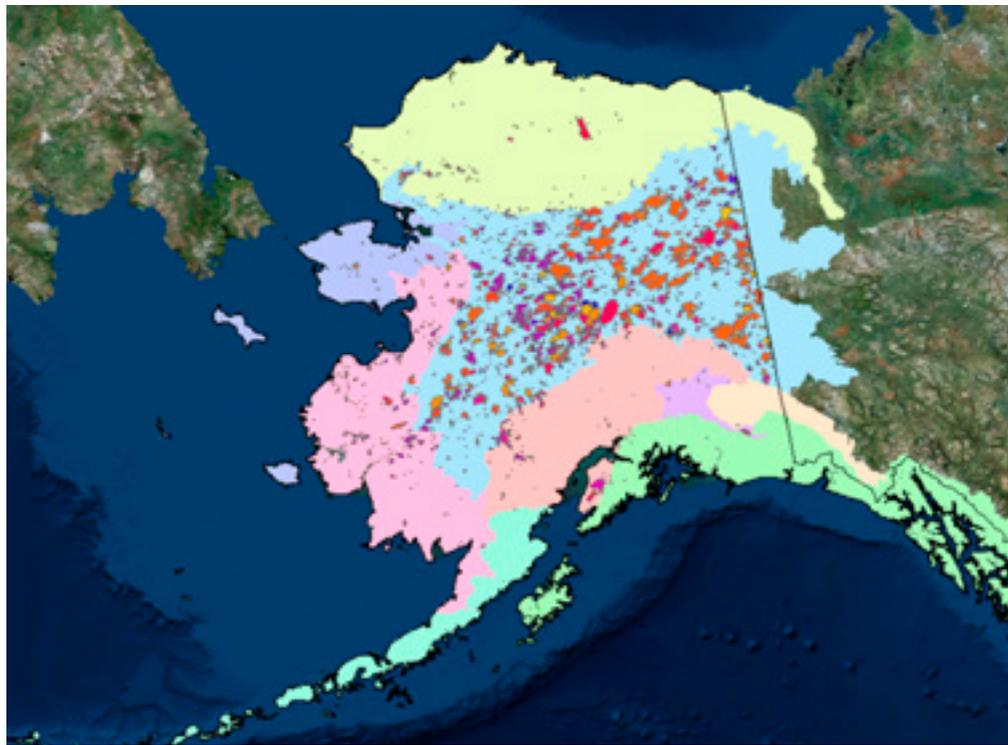
## ALASKA’S FIRE PROBLEM

### Few Fires, Many Acres, Some of the Time

The number of wildfires discovered in Alaska doesn’t vary greatly from year to year. The total each year isn’t very impressive, generally less than that faced by a single busy response area in other parts of the country.

But once started, many Alaskan fires burn in areas difficult to reach, unrestrained by overmatched and unsafe suppression efforts. During active seasons, they will grow significantly on only the hottest and sunniest days of the driest periods. But on the larger and longer scale, these brief periods of high fire activity account for many dramatic fire events. A recent analysis showed that over 50% of the total area burned from 2002- 2010 burned during only 36 days - just 6% of the fire season.

We’re beginning to question previous assumptions about fire management in Alaska as we conduct studies to evaluate the combined effects of changing climate, landscapes, and ignition patterns. We’re evaluating where and when we should consider a more aggressive response.

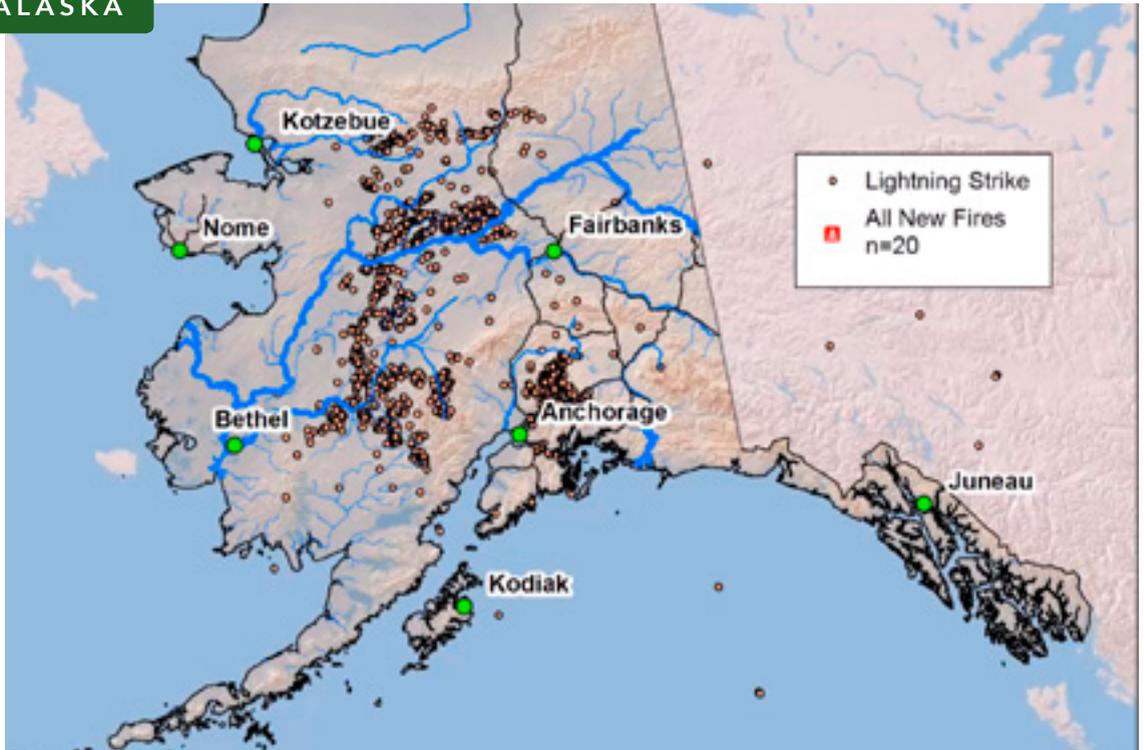


The boreal interior in blue carries the vast majority of large fires - nearly 90% of all burned area in the last 20 years. There’s also a contribution in the western tundra regions and from the Kenai Peninsula.

### Summer 2015: The Wake-Up Call

When fires get active during the peak season in Alaska, convective forces ignite blazes and reinforce the winds needed to produce major fire runs burning in heavy fuel loads. 2015 represents the surprise fire managers can face with the boom and bust pace found within seasons and between them.

That year fires burned the second largest area of any season on record dating back to 1940. After a low snow winter and a warm spring, two human-caused fires south of the Alaska Range started under hot, dry, windy conditions and threatened communities in the WUI just a week ahead of the summer solstice.



Stunning animation of over 230 lightning-caused wildfires in Alaska during 12 days in June of 2015 - IAWF Vimeo Channel

Though the weather moderated in the south after the major spread events, conditions remained very warm and dry in the interior. On June 19th, seasonal convective storms were again abundant and severe. Over 12 days, more than 230 fires were ignited by lightning. Seasonal preparations and fire day expectations were overwhelmed. And while typical July rains slowed and stopped most fires, it was only weeks later in August that concern for widespread late-season fire problems was allayed.

### What it means to be OCONUS

Our ability to assess Alaska's fire environment is impacted by lack of tools taken for granted in the lower 48 states and elsewhere. The next time you look at your favorite tool for fire assessment, see if there is a corresponding tool for Alaska. There are a few, but they suffer from lack of funding and support and are frustratingly unavailable when least expected.

Alaska is so separate from CONUS (Contiguous United States) in both the north/south and east/west directions that it requires a separate mapping domain for any reasonable resolution. Many projects don't have time, money or resources for the extra effort required to understand their applicability in the far north. As a result, many processes, much of the data, and timing issues make fire management in the far north seem very foreign.

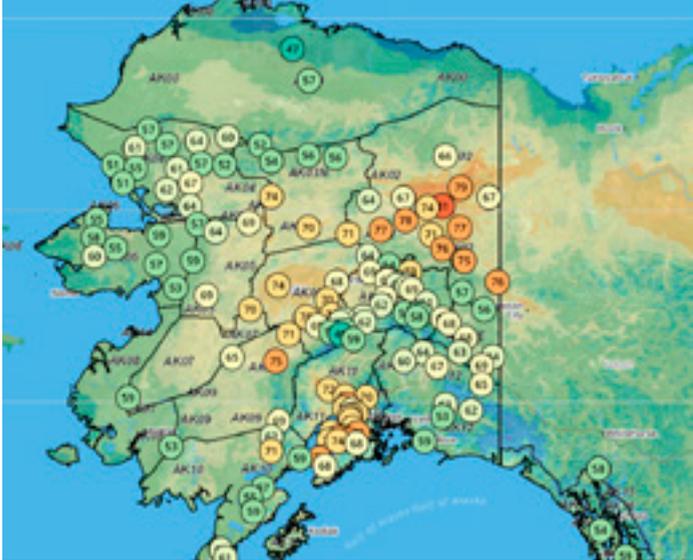
Unlike western CONUS, Alaska does not have access to traditional night-time IR mapping of fire situations. Day to day monitoring of significant fire activity in Alaska traditionally came from periodic intel flights to observe and map the most significant fires. We now have satellite tools, such as VIIRS RGB imagery, to detect fire intensity and fire movement of most of our fires on a daily basis.

Alaska has been using satellite fire detection data since the seemingly endless 2004 fire season when smoke rendered aerial observations nearly useless. Now with multiple polar-orbiting satellites passing over Alaska several times a day, results show that historic counts of MODIS detections very closely match trends in area burned, allowing a much more accurate picture of where and when fires have burned for sensitivity analysis. Instead of tracking where and when fires start, it is critical to track where and when relatively few fires grow throughout the fire season.

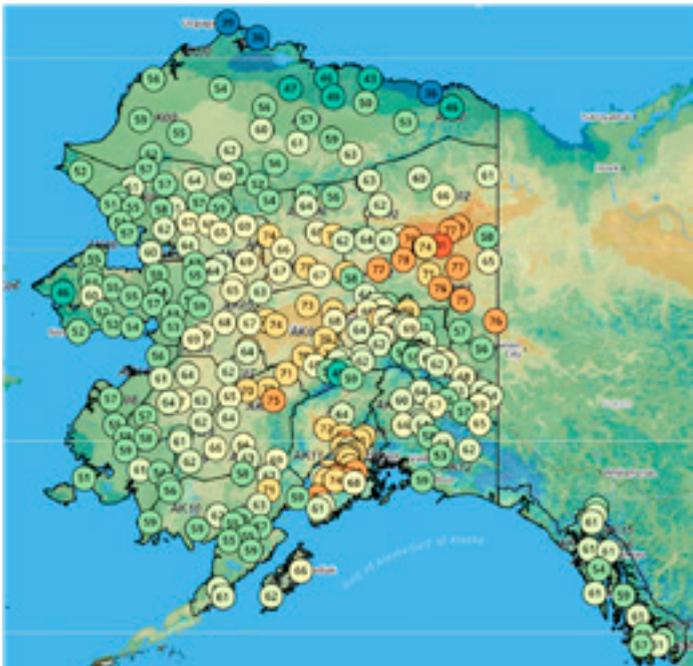
Distinguishing and mapping the locations of spruce, hardwoods, mixedwood forests and tundra seems like a straightforward task. And it is critical to understanding fire potential from any new start or growing fire. But the quality of our landscape maps is impacted by a lack of historic forest inventory and analysis data, resulting in a poor understanding of what is where.

### WIMS/RAWS network vs AKFF

While much of the western US can monitor, track, and validate the assessment of fuel flammability from a system of agency-managed, standard remote automated fire weather observation stations, Alaska's fire agencies cannot maintain a sufficient network on their own. On the next page, using the CONUS approach implemented in the Weather Information Management System (WIMS), there are only about 8 weather stations to cover the area of a typical state in the western US. The second map, Mesowest Alaska Fire & Fuels (AKFF) monitors at least 3 times as many stations from as many as 6 station networks. This has allowed us to manage a system adequately distributed



Weather Information Management System/RAWS stations (top) compared with Alaska Fire and Fuels (AKFF) stations (below).



across the state and fills important gaps in southwestern Alaska, the western interior, and the north slope.

While much of the fire-prone landscape in CONUS depend on fuels on the surface to ignite and support spread, Alaska’s landscape is characterized by deep duff layers under the boreal forest and tundra environments that dry more slowly, hold heat when dry, and resist extinguishment from all but season-ending weather events. This deep duff layer develops from very slow decomposition, holds a great deal of carbon, and provides a deep insulating blanket for the permafrost below. In an effort to understand our landscape flammability better, analysts use a range of tools and methods to evaluate the character and moisture levels in the duff under the boreal forest. Direct sensing of “soil” moisture with combinations of passive and active radar sensors from polar-orbiting satellites may eventually improve our current weather-based assessments of the current state of duff flammability.

Finding and supporting partners to help with far north assessments is pursued without much of the normal national support provided in the lower 48. One example, the Geographic Information Network of Alaska, has been providing remote sensing products to Alaska fire managers that are either not available elsewhere, timelier than provided nationally, or both (see <https://akff.mesowest.org/map/>).

Basic and applied research is also challenged by cross-applicability difficulties. One example, the NASA Arctic-Boreal Vulnerability Experiment (ABoVe) project was funded for 10 years in 2015 to learn about the boreal and Arctic environments. It supports interests in Alaska and our nearest neighbors in northwestern Canada. It is designed to learn about far north ecosystems, their disturbance regimes, permafrost, hydrologic systems, flora and fauna, and carbon pools to help manage our landscapes into the future.

Few CONUS fire managers and policymakers know about or will ever use any of its results.

Alaska adopted the Canadian Forest Fire Danger Rating System (CFFDRS) for the daily assessment of fire potential, as well as fireline fire behavior assessments on our home ground. It is simpler and easier to manage. And most important, it provides better insight to landscape flammability, fire spread, intensity, and control difficulty. But again, it seems foreign to those who arrive from elsewhere to help us manage our fires.

A depiction of Alaska’s size with the state boundary overlain on the 48 states of the CONUS domain, with the outlines of the three National Weather Service Forecast Office domains based in Anchorage, Fairbanks, and Juneau.

### Forecasting Fire Weather

Consider the fact that the three offices in the image above have responsibility for a land area equal to about 30 offices in the lower 48 (map, prior page). The radar is focused along the southern and western coasts, with only a single system established in the most burned interior. As a result, real-time information depends on surface observation and airport webcams to a much greater degree for much of the fire-prone landscape.

### Alaska Interagency Coordination Center and Predictive Services

With our unique imperatives for fire weather assessment, the ACC began posting fire danger information in tabular form on their own site nearly 20 years ago.

In 2015, Alaska Interagency Predictive Services and Mesowest began operating a comprehensive site for access to fire weather, fire danger, fire behavior, lightning, and active fire detection information. This provides both gridded and surface observation, and forecast data giving ready access to current conditions, detailed 3- day forecasts, general 7-day outlook data, and historic record dating back to 1994.

### Initiative – Alaskan Style

The state of Alaska has always had a population known for its character of confidence, fearlessness, vision, determination, and self-reliance. In that spirit, I present some examples of how we've taken the initiative to improve service to values at risk.

### Alaska Interagency Fire Management Plan

Created in 1980, its heart is the Fire Management Options map that identifies a predefined initial suppression response for each of 4 levels of protection. The map is evaluated each year and modified as needed as part of annual updates to the interagency plan. Approaching 40 years of existence, it's stood the test of time.

### Alaska Spatial Database

A key tool for delivering point protection to the 14 thousand native allotments, the Alaska Spatial Database tracks the locations and character of these allotments, small remote communities, scattered infrastructure, and other key resources so that they can be easily identified from the office for prioritization of point protection from oncoming fires as they start. It is also easy to add new "Known Sites" to the database as they are discovered, using a tablet in the field that can be synced to the system upon return.

### Climate Change-driven Collaboration

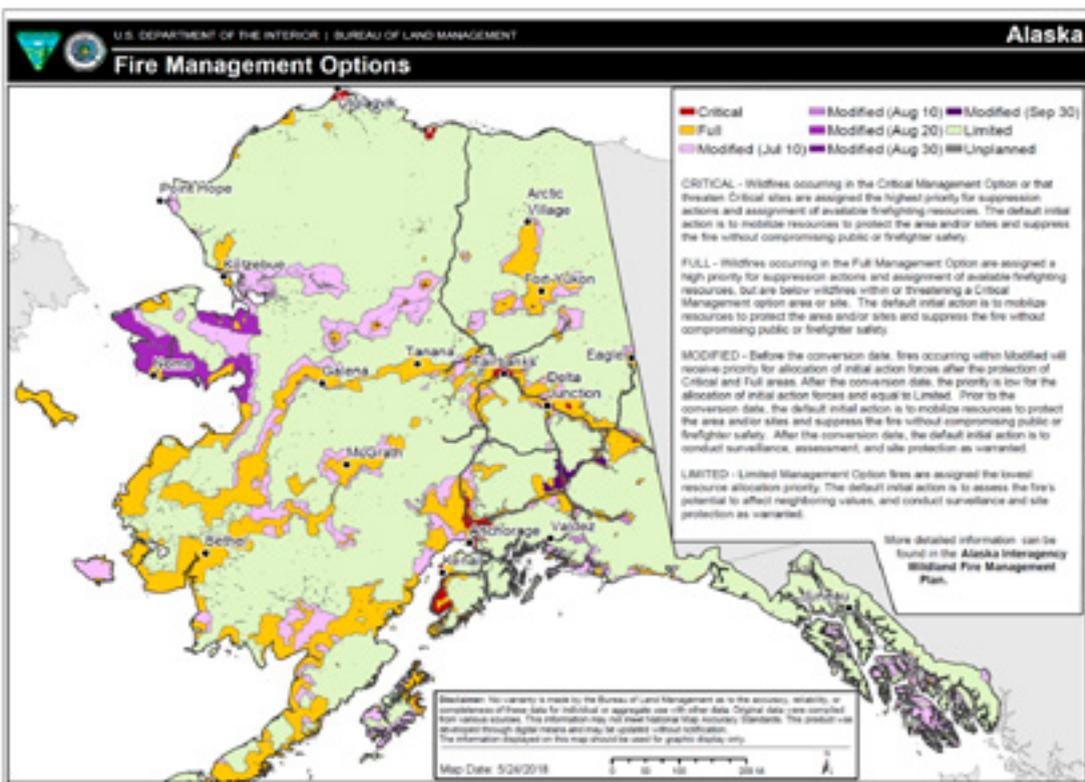
A recent study of climate change impacts on fire management decisions in Alaska identified protection of communities, enhancement of subsistence hunting opportunities, and protection of remote points on the landscape as the most pressing current challenges, with the protection of ecosystem carbon sinks as a looming concern. It was also discovered that our very small staffs limit individual agency effectiveness and that shared fire management responsibility require close interagency working practices.

Facilitation of these practices is a key element for success.

Bridging organizations like All Lands/All Hands and the Alaska Fire Science Consortium have critical roles in ensuring that research is targeted and applicable and that communication (both formal and informal) is maintained among relevant actors.

Beyond its impact on sea ice, glaciers, and permafrost, we're trying to understand how fire seasons are being impacted by the warming environment. As I struggle to grasp what will really happen as our climate changes and we continue to operate with the tools we have,

Alaska Interagency Management map



there are unmistakable impacts already growing at an alarmingly increasing pace.

Fire activity is more frequent, increasing along with with area burned and the number of significant fire years. Smoke impacts are a growing concern for a huge state stitched together by aviation lifelines.

What if the typical July rains hadn't come in 2015 and fires kept raging through September? Are 10 million acres burned possible? Will this scenario manifest, and is it even possible to prepare for?

What we do know is that those of us charged with fire management in Alaska have no choice but to keep up our determination and innovation in a landscape that's changing beneath our feet, before our eyes, and above our heads.

## Resources

- \* Recording of Presentation:  
<https://vimeo.com/334118398>
- \* 2015 lighting/fire animation -  
<https://vimeo.com/350208434>.
- \* Alaska Fire Science Consortium.  
<https://akfireconsortium.wordpress.com/>.
- \* All Lands/All Hands Action Plan:  
Reducing Wildland Fire Risk on  
Alaska's Kenai Peninsula.  
<https://www.frames.gov/catalog/6611>.

## ABOUT THE AUTHOR

Robert "Zeke" Ziel

Robert "Zeke" Ziel is Fire Analyst, Alaska Fire Science Consortium, University of Alaska Fairbanks.

Growing up in the eastern forests of the United States, first in the Appalachians of southeastern Kentucky and then on the lift plains of southern Michigan, Zeke has been fortunate for a career that allowed him to observe and analyze the physical, biological, and human processes that have molded wildland landscapes. He spent nearly 37 years working in Michigan for the Michigan DNR, as a consulting forester, and as the program manager for the Lake States Fire Science Consortium.

He learned and practiced fire assessment and analysis throughout the country as a Fire Behavior Analyst (FBAN) and Long Term Analyst (LTAN) for national incident management teams. These skills led Zeke to Fairbanks, Alaska in 2013, serving initially as the Fuels and Fire Analyst for Predictive Services at the Alaska Interagency Coordination Center for 4 years and now as the Fire Analyst for the Alaska Fire Science Consortium.

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U.S. Forest Service photo

# HOW TO SPEAK THE SAME LANGUAGE: DISPATCH FROM THE FORUM ON CATALAN WILDFIRE RESEARCH



An artist's interpretation of the Catalan fire challenge. Title: "Caravan from the darkness." Artist: Josep Serra.

**By Pau Costa Foundation and CERTEC-UPC teams, organizers of the Forum on Catalan Wildfire Research, including Nuria Prat-Guitart, Sebastien Lahaye, Oriol Vilalta, Mariona Borrás, Jordi Vendrell, Celia Conde, Helena Ballart, Guillem Canaleta (Pau Costa Foundation) and Mario M. Valero, Elsa Pastor (CERTEC-UPC)**

The wildfire forecast for 2019 projected a very challenging year in the Western Mediterranean of Europe for various reasons – from fuel to people to climate. First, fuel loads are greater than ever seen before, due to the rural abandonment and depopulation resulting from the decline of rural economies that in the past had effectively fixed people in the territory. Second, a densely populated Mediterranean region, with an increasing number of citizens living in the wildland-urban interface (WUI) who are unaware of the risk and without proper wildfire protection measures. And third, the increasing risk of wildfires resulting from climate change. During the first half of 2019, severe droughts and heat waves have affected the region, increasing stress on dense and volatile vegetation and expanding the fire season.

These factors led, in June 2019 alone, to five large wildfires that burned over 13,000 ha (32,000 acres) [1] in Spain. The first of them, the Ribera d'Ebre Wildfire (also known as La Torre de l'Espanyol Wildfire), which started on June 26, affected 6,500 ha (16,000 acres) in Catalonia, in the northeast region of Spain. This fire consumed the first 3,600 ha (8,900 acres) in only a few hours and burned for five days. Extreme winds caused the fire to spread rapidly through forest, abandoned agricultural lands and shrubs; 51 evacuations were required and rapid deployment of fire suppression operations that came from across the country to help. These efforts prevented the fire from spreading over a forest massif of 20,000 ha (50,000 acres), in part because the few healthy agricultural lands

modified the fire spread and facilitated fire suppression.

The 2019 fire season is not over, and fires such as the Ribera d'Ebre Wildfire highlight the need to coordinate efforts from all local and regional actors who can make a difference in the different stages of the emergency management cycle, with special emphasis on prevention, preparedness, response and mitigation.

With these challenges in mind, we share the guiding framework and outcomes of the Forum on Catalan Wildfire Research that took place in November 2018, at the Diagonal-Besòs Campus of the Universitat Politècnica de Catalunya, in Barcelona. This forum was conceived as a meeting point for researchers of all wildfire related disciplines, landscape managers, fire practitioners and companies at a regional scale – with the purpose of gathering a range of key actors who are motivated by the need to find solutions for a well-known gap in the collaboration framework between researchers and prevention and suppression professionals and the rest of the wildfire community. The links between wildland fire agencies and other entities have been strengthened to unprecedented levels in the last 20 years, yet still collaboration has been insufficient to achieve a unified voice and action to address the new wildfire challenges. This connection is essential if we're to understand wildfires and identify solutions that reach out jointly to policy makers and society.

Fifteen groups working in the Catalan region were represented in the Forum on Catalan Wildfire Research, sharing their work during the different sessions, including nine research groups, three administration bodies, three companies and two entities that work at the interface between the different actors. Additionally, four international research groups and one fire service from Australia, US, France and UK shared their work and provided context and other information on the wildfire challenges that the global fire community is facing. The Forum gathered over 80 participants to discuss the research conducted in Catalonia and how this



Ribera d'Ebre Wildfire, June 2009. Source: Catalan Fire and Rescue.

research can provide solutions at the regional and global scale. The Forum identified the current gaps in effective collaborations and identified regional and global opportunities to build the collaborative teams that master the collective fire challenge.

## Common challenges to overcome

Many practitioners and managers voiced concerns that current research is not providing the solutions required for effective responses to the threats they face, including dealing with large and intense wildfires that spread under extreme weather conditions with a high degree of simultaneity [2] and destructive potential. The 2017 and 2018 fire seasons have shown that there is a new trend of global fire behavior that is difficult to predict with current analysis tools. Established emergency response systems have collapsed under unprecedented wildfire behavior.

The consequences of this failure have been tragic. Participants agreed that integrated fire management (i.e. the mitigation of the effects from damaging fires while sustaining natural fire regimes) is fundamental. However, most of the regions are unable to effectively implement this synergistic approach. Current approaches make landscape structures and society very vulnerable to extreme wildfires. In fact, in many cases and countries, standing legislation prevents the measures needed to reduce vulnerability against extreme behavior. Extreme wildfires – those that escape our control and

Marc Castellnou (Catalan Fire and Rescue Service) presenting at the Forum.

threaten communities and lives — are increasingly inescapable and there is a dire need for joint efforts to act immediately.

In spite of efforts to develop innovative research and technology, these capabilities are lagging behind landscape and fire management threats. As such, fire management decisions on the ground are often relying more on experience than science. As valuable as on-the-ground experience is, it is limited when it comes to the “new normal.” The Forum was a call to collaborate and improve the current scientific knowledge to better inform decisions under uncertain and rapidly changing scenarios.

*“We see things that we cannot explain through current science. We firefighters need scientists to help explain the things we see. We are working with models that are failing to predict fire behaviors we are observing and dealing with. Therefore, we need new models to understand and deal with current and emerging fire behavior.”*

– M. Castellnou and M. Miralles,  
Catalan Fire and Rescue Service.

## Sharing responsibility

Allocating wildland fire management and related responsibilities among various entities is a challenging and well-known bottleneck. Fire responders are being burdened with the bulk of this. Management of large wildfire emergencies today is not only defining the present landscape, but it is also shaping the near- and long-term fuel structures and hence determining future fire risk. Response-phase actions are not only involving flame suppression in the immediate term, but also shaping the future in terms of wildfire risk and impact on society. This is an important message that should be better communicated within the entire wildfire community.

Forthcoming scientific and technological advances are key to support current challenges in wildfire management. We expect them to provide the precise data and other knowledge to facilitate better informed decision-making processes, not only in terms



of fire response, but also in prevention, mitigation and recovery measures. Moreover, they are the underpinning that will reduce uncertainty and help us move from experience-oriented to science-oriented decisions. The question arose if emergency managers would base their decisions more on science rather than experience, and if scientists and technology providers would be willing to take more responsibility for engaging managers? Opinions during the Forum were diverse. Some said research is ready to embrace responsibility in the short term, while some argued that science is not yet prepared to take responsibility for landscape and fire management actions, at least not with the current level of scientific understanding under rapidly shifting global changes.

It was agreed that better communication between managers, researchers and policy makers is needed to allow them to understand each other's viewpoints, have more productive debate, and find common ground in order to reach consensus and obtain political and social commitment for these shared responsibilities.

## Collaboration opportunities

To ensure fair, efficient and effective applicability of research and technology, the outcomes and products require better coordination and understanding between the different groups. Shared goals and strategies will encourage the development of novel, transdisciplinary research, integration of end-users with early stages of research development.

Of the strategic actions identified during the Forum, these five strategies are key:

- **Integrate social scientists in transdisciplinary team**

Teams that integrate social scientists, journalists and educators are needed to effectively transform technical results into communication outputs that connect with society. Transdisciplinary collaboration is needed to improve scientific and technical communication.



Thanks to technological evolution, there is a broad range of communication channels and digital technologies available to achieve our goals (web broadcasting, social media, augmented reality, etc.). However, using the right channels is not enough; appropriate and meaningful messages have to be composed and delivered to the entire community. The key to mitigating impacts of this new generation of wildfires is communication with society in laymen's terms.

*"Despite the consensus from the fire management and research communities that prevention is needed, prevention is not sexy. It never hits the news."*

– P. Navascués, Forest Fire Prevention Bureau, Diputació de Barcelona.

- **Strengthen global network to support regional challenges**

Business-as-usual prevention, preparedness and response are insufficient to deal with current and emerging wildfires. Efficient knowledge-sharing between regions with similar challenges will amplify the ground-truthing of lessons learned as unprecedented wildfires burn amid changing societies, climates, ecosystems and fire behavior.

Enhanced collaboration between experts around the world is key to improving the knowledge on fire and enhancing landscape resilience. In each wildfire, prescribed burn or regional fuel treatment initiative, there are unique and valuable experiences, best practices and lessons learned to be collected and shared. This knowledge can inform and guide us in dealing with future threats and solutions in other regions, and to understanding wildfires globally. Local and regional initiatives relying on the collaboration of scientists, managers and local actors are finding ways to successfully implement integrative fire management and create circular economies [3]. Finding ways to globally share local success stories is essential.

Participation on collaborative projects is one way to effectively foster this knowledge-sharing between research and management communities. It has happened so far in some projects even if this was not their direct purpose. However, initiatives that specifically aim at knowledge exchange are needed. Some initiatives and institutions identified in the Forum that serve this purpose include the International Association of Wildland Fire [4], the LANDFIRE program [5] in the US, the Bushfire and Natural Hazards CRC [6] in Australia and the Pau Costa Foundation [7] in Europe.

- **Create collaborative databases**

From a research perspective, data collection is often one of the most time- and resource-consuming tasks. Consequently, it may take years to validate some research outputs that practitioners currently need to prevent and manage current wildfires. Extreme wildfire behavior data is probably the best

Marta Aldea (Preventive Medicine and Epidemiology Unit, Hospital Clínic-Universitat de Barcelona-Barcelona Centre for International Health Research) presenting at the Forum.

example. In general, this makes research outputs of very limited utility in the short-term and weakens the relationship between management and science.

Collaboration in the wildland fire community would provide vital, high-quality, standardized data. Managers on the ground are willing to exchange empirical knowledge generated during their years of experience and also help collect data at wildfires or prescribed burns. These partnerships require tight connections between fire managers and researchers so that the former can better understand the scientific approaches to data collection that will later be analyzed to shape policy and approaches.

Having a common database of international fire data providing continuous records in time and space would greatly facilitate the work of researchers and developers around the world.

- **Enable industry alliances**

Industry can play a fundamental strategic and tactical role in improving management-science collaborations. Support from private sector technological partners is beneficial for the development of sound and applicable research. Subject matter experts can have an important intermediate role but often they are not part of the discussion. New technologies, such as artificial intelligence (AI) in the field of wildfire management, represent a great advancement in decision making. Yet incorporation of AI will not happen without strong collaboration between researchers, industry and practitioners.

FIRE-IN [8] is a five-year European-scaled initiative that is identifying issues and prioritizing linked research and industry opportunities with clear benefits for wildland fire management.

- **Define strategic agendas**

Ultimately, public administration must take decisive and specific action. Policy-makers are rarely present at conferences and other knowledge-sharing events where current and emerging matters are discussed; nor are they allocating funds and other resources to address knowledge exchange needs.

An Open Letter to the European Commission [9] after the 2017 wildland fire events in Europe called for action from various public administrations. We need much more involvement at all levels of government — local, regional, national and international. By working together, researchers, industry and managers can reach policy makers and society with the stronger voice urgently needed to face current and future wildfire threats.

## NOTES

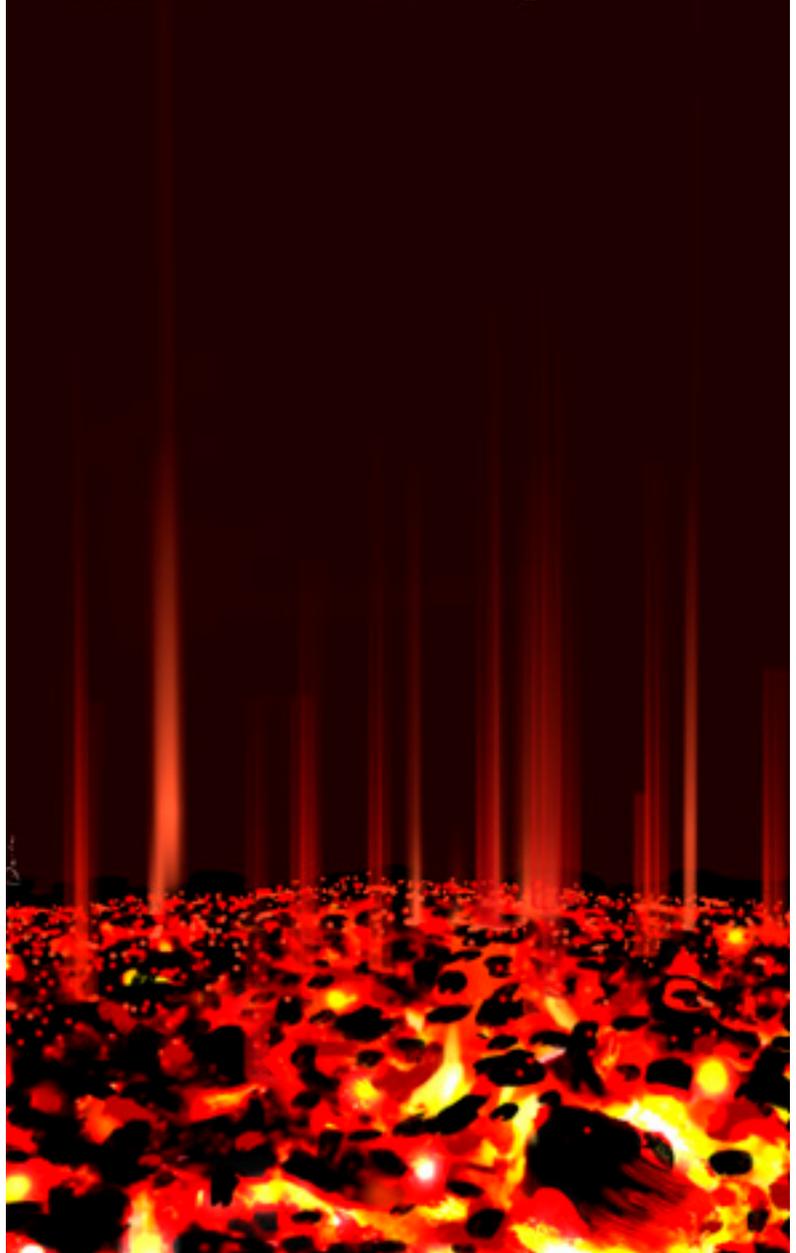
[1] Copernicus, EFFIS data: [http://effis.jrc.ec.europa.eu/static/effis\\_current\\_situation/public/index.html](http://effis.jrc.ec.europa.eu/static/effis_current_situation/public/index.html)

[2] M. Castellnou, Forum on Catalan Wildfire Research, video playlist: <https://lessonsonfire.eu/en/document/video-playlist-forum-catalan-wildfire-research>

[3] <https://www.ramatsdefoc.org/ca/>

[4] <https://www.iawfonline.org/>

## World Wide WF Cooperation



An artist's interpretation of collaboration. Title: "World Wide Wildfire Cooperation." Artist: Josep Serra.

[5] <https://www.landfire.gov/>

[6] <https://www.bnhcrc.com.au/>

[7] <https://paucostafoundation.org/>

[8] <https://fire-in.eu/>

[9] <http://www.paucostafoundation.org/ing/open-letter.php>

## RESOURCES

Archive of live tweets: #WildfireForumCAT.

All presentations, videos and information of participant research groups of the Forum are available in the Lessons on Fire Platform: <https://lessonsonfire.eu/en/community/forum-catalan-wildfire-research>.

## AFTER ACTION

An occasional column by fire practitioners and scientists who offer observations and reflections from the field.



# WITNESSING DROUGHT IN THE LAND OF LONGLEAF PINE

By Johnny Stowe

**Some longleaf pine trees are again shedding their needles early in parts of Southeastern North America. This and other shifts in phenology may offer a harbinger to climate change.**

Needle cast is an annual, natural occurrence usually taking place in autumn, but sudden, extreme drought has combined with high temperatures to cause this to take place early in certain areas.

Many folks become alarmed when they see brown needles on longleaf pines, since the trees are, after all, classified as evergreen. But the term evergreen can be misleading.

Although longleaf pines do retain some needles year-round, in years with normal rainfall individual bundles of needles generally remain on the tree for two growing seasons and are shed in the fall.

In several years with low rainfall over the last decade many longleaf pines dropped their needles in late July. But I have never seen healthy longleaf pines drop needles before the June solstice. This year I noticed needles on scattered trees in the Carolina and Georgia Sandhills browning up the last week in May.

Severe stress like this may cause some trees to die if other stress factors are in place or come along before the trees can recover from this episodic drought stress.

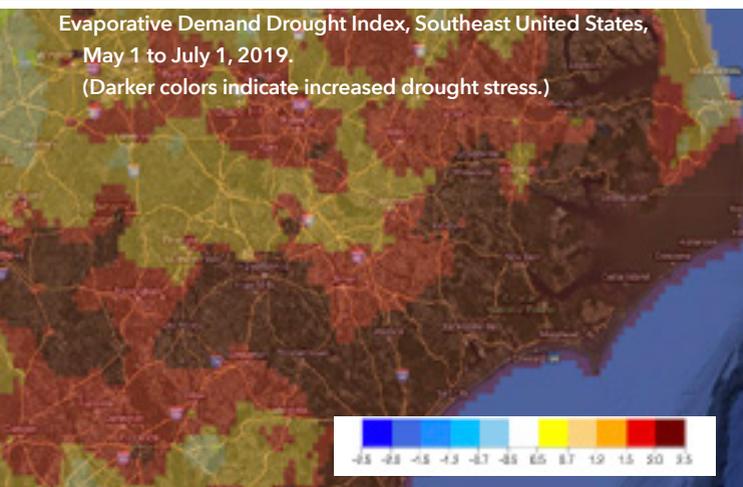
The two-year-old needles on longleaf pines are closer to the base of the branches than the younger needles, and so one easy way to tell if browning needles are a cause for concern or not is to note where they are found on the branch. If needles are browning at the base of branches but the needles toward the end of the branches are green, then the “brown-up” is either a result of annual fall shedding, or if it happens before fall, it is likely a natural response to drought. If the needles are browning at the extreme ends of numerous branches, especially if they are toward the top of the tree, then the problem might be something other than drought stress.

By dropping needles early, the tree reduces its need for water. Wilting of leaves in many other plants is a similar response to drought but differs in that the wilted leaves usually remain on the plant.

By wilting, leaves expose less surface to the sun and wind and so the plant requires less water. If the stress is not too severe or of not too long a duration, wilted leaves can recover when the plant receives additional water. Corn, which is a member of the grass family, curls its blades (leaves) to reduce water loss. This is often called “twisting,” and is easy to see. The blades of native warm season bunchgrasses, including Eastern gammagrass, also twist to reduce water loss, but they are much more resilient to drought stress because they have extensive root systems. If rainfall comes in time, grass blades will unfurl, otherwise they will die.

But browned needles are dead and do not reverse to green. The browned needles will adhere to the branches at first but eventually fall from the tree, usually dropping during high winds.

Evaporative Demand Drought Index, Southeast United States, May 1 to July 1, 2019.  
(Darker colors indicate increased drought stress.)



Trees are efficient at taking up, conserving and recycling nutrients. Before pine needles are shed in the fall, a high percentage of the nitrogen and phosphorus in the needles moves back into the tree before the needles turn brown and fall off. Nutrients such as calcium and magnesium do not translocate when needles shed. So these nutrients may be lost from the site in substantial quantities when straw is commercially raked on a regular basis. In those situations, it may be beneficial to fertilize occasionally to offset the loss of nutrients, especially on poor land where longleaf pine often grows. Soil tests or foliar analysis can reveal any nutrient loss.

Trees responding to unseasonal drought stress may not have time to extract nutrients before the needles brown up. Individual trees may drop needles a few weeks apart. Trees on dry sites tend to drop needles earlier than trees on wetter sites. Sometimes, trees growing on the same site next to each other drop needles at different times. Other species of pines, such as ponderosa pine, tend to react similarly to drought. Timing and degree of needle cast can impact fire behavior in nuanced ways that are dependent on age of trees, stand density, fire history and other site characteristics.

Longleaf pine ecosystems are fire-dependent forests, woodlands and savannas that once covered 25-35 million hectares from Virginia to Texas and down into Florida. The ecological integrity of these ecosystems, including high levels of biodiversity, is dependent on fire every one to five years. As it becomes increasingly impractical to allow lightning-ignited fires to burn, prescribed fire is serving a larger role. Prescribed fire lighters ignite about 500,000 acres per year in South Carolina, but more land needs to be burned in the state to enhance and sustain public safety, and for economic, ecological and cultural benefits.

Besides being more drought-resistant as compared to other Southern pines, longleaf is also less susceptible to damage from wind, fire, insects and diseases.

Repeated and relatively-sudden changes in established seasonal or annual phenomena such as needle cast may be a harbinger of long-term weather patterns, and have implications for climate change. Other phenological phenomena include time of first and last frost, snowfall, rainy and dry seasons, and spring "green-up" when leaves begin to grow. Timing of animal migrations and breeding, insect life stages, and the shedding of velvet and antler cast in deer are easy-to-observe phenological occurrences.

This is the news from our changing climate, circa 2019, from the land of the longleaf pine.

## RESOURCES

Evaporative Demand Drought Index, May 1 to July 1, 2019, focused on Longleaf Pine habitat. <https://climengine.page.link/3N7d>.

"Estimating canopy fuel characteristics for predicting crown fire potential in common forest types of the Atlantic Coastal Plain, USA." Anne G. Andreu, John I. Blake and Stanley J. Zarnoch. International Journal of Wildland Fire 27(11) 742-755 <https://doi.org/10.1071/WF18025>.

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## ABOUT THE AUTHOR

Johnny Stowe is a Heritage Preserve Manager in the Catawba district, South Carolina Department of Natural Resources, and a board member of the International Association of Wildland Fire. He joins *Wildfire* as a contributing editor.

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PREVIEW - 2018  
ANNUAL REPORT

INTERNATIONAL  
ASSOCIATION OF  
WILDLAND FIRE

2018

ANNUAL  
REPORT



# THE INTERNATIONAL ASSOCIATION OF WILDLAND FIRE

Wildland fire management encompasses a broad spectrum of planning, implementation, and monitoring and evaluation activities. These activities are designed to safely protect people, property, communities, societal infrastructure, and natural resources from detrimental effects of unwanted fires, to use fire where appropriate, and to accomplish stated goals and objectives. Wildland fire management involves the application of ecologic, social, and physical science, risk-based decision-making, risk management, human performance, and community engagement for discovery of new fire, use of wildland fire, and tactical application of the full range of ground and aerial implementation practices.

The International Association of Wildland Fire was established in 1990 as an independent, non-profit organization to facilitate global communication about wildland fire and provide leadership through a neutral forum that is important, and at times controversial.

## EXECUTIVE COMMITTEE:

The IAWF Executive Committee consists of the President, Vice-President, Treasurer, Secretary, and Executive Director. The Executive Director serves as an ex-officio (non-voting) member. All of these positions, except for the Executive Director are members of the Board of Directors. All role of the Executive Committee is to provide consultation and guidance to the Association's Board of Directors; approve any extraordinary expenditure of funds, subject to Board ratification, evaluate the performance of the Executive Director and carry out other duties established by the Board of Directors. Executive Committee members during 2018 were:



**ALEN SLUJEPČIĆ**  
PRESIDENT  
Deputy Chief Officer  
Capability and Infrastructure,  
Country Fire Authority  
Burnwood East, Victoria,  
Australia



**TODD STEELMAN**  
VICE PRESIDENT  
Stanback Dean,  
Nicholas School  
of the Environment  
Duke University  
Durham, North Carolina, USA

**STEVEN R. MILLER**  
SECRETARY  
Regional Director  
Fire and Aviation,  
USDA Forest Service, Region 9  
Milwaukee, Wisconsin, USA

**MIKEL ROBINSON**  
EXECUTIVE DIRECTOR  
Fortuna, USA

## STRATEGIC DIRECTION

The strategic direction of the IAWF is defined through our Goals and Strategies identified in our Strategic Plan and our ongoing efforts in collaboration, and partnerships.

### GOALS AND STRATEGIES:

The strategic direction of the IAWF is defined through our Goals and Strategies identified in our Strategic Plan and our ongoing efforts in collaboration, and partnerships.

- GOAL 1: IAWF RELEVANCE AND VALUE**  
Enhance and grow the capacity of IAWF to provide high-quality services to members and the profession.  
Strategy 1: Ensure that governance, financial, and operational capabilities are sufficient and sound so that the strategic plan can be implemented.  
Strategy 2: Build and strengthen relationships with other societies and organizations to increase partnerships, cooperation, and capacity for collective action around key issues of common interest and need.  
Strategy 3: Establish and leverage collaborative processes for members and interested individuals to contribute and exchange information, and evaluate ideas, and develop recommendations.
- GOAL 2: LEADERSHIP**  
Advocate for the wildland fire management program and profession.  
Strategy 1: Act in an independent role to provide leadership to global wildland fire management programs.  
Strategy 2: Actively promote the development, advancement and application of scientific and operational principles to safeguarding people, property, mission, heritage and the environment from the negative impacts of unwanted fire.  
Strategy 3: Act a global leader in presenting neutral forums for discussion of important and controversial wildland fire issues, developing recommendations in the form of position papers, testimonies, declarations, and affirmations for resolution, and setting standards to accelerate awareness by the public, scientists, and governments.
- GOAL 3: MEMBERSHIP**  
Ensure IAWF has a sustainable and active membership base supported by the association.  
Strategy 1: Encourage increased membership and involvement through active promotion across multiple platforms and activities.  
Strategy 2: Follow a broad philosophy of social inclusion realizing that our association will be strongest and achieve its full potential through optimization of global, gender, and age membership diversity.  
Strategy 3: Provide products, services, and capabilities to all individuals interested in the wildland fire profession.

### GOAL 4

**MEMBER PROFESSIONAL GROWTH**  
Provide the means to aid members' professional growth.  
Strategy 1: Utilize members' knowledge and experience for research and problem solving.  
Strategy 2: Recognize individuals for exemplary service to IAWF and to the wildland fire profession through scholarships, grants, and initiatives such as Students of Fire.  
Strategy 3: Recognize individuals for potential contributions to wildfire science and safety through education, training courses, and other opportunities to deliver educational, professional development, and networking opportunities.  
Strategy 4: Enhance engagement and involvement of students and early career scientists, and provide networking opportunities for all individuals interested in wildland fire.  
Strategy 5: In concert with other organizations, help develop and support core competencies (education, skills, knowledge, etc.) and roles and responsibilities for the profession.

### GOAL 5

**WILDLAND FIRE INFORMATION DISSEMINATION**  
Promote development, expansion and dissemination of wildland fire knowledge and information.  
Strategy 1: Individually and together with other partners around the world, plan, implement, and present significant technical conferences, symposia, workshops, meetings, webinars, special sessions, training courses, and other opportunities to deliver educational, professional development, and networking opportunities.  
Strategy 2: Promote and distribute strategic and tactical solutions that address and incorporate wildland fire safety concerns.  
Strategy 3: Support continued and accelerated multidisciplinary fire science research to advance this field.  
Strategy 4: Support the development, delivery, and proliferation of fire science transfer programs.

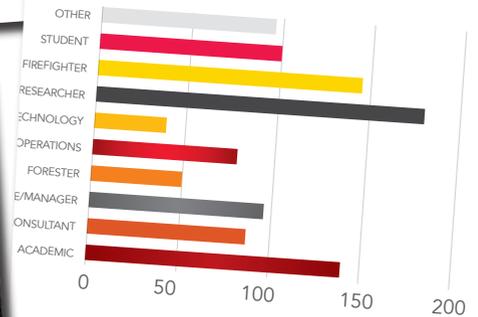
### GOAL 6

**IAWF COMMUNICATION**  
Through aggressive strategies, utilize all appropriate modes of communication to increase IAWF's role as an international leader for wildland fire, and wildfire.  
Strategy 1: Produce and distribute a high quality popular magazine for a broad audience - Wildfire.  
Strategy 2: Produce and distribute a high quality, peer-reviewed, professional journal of Wildland Fire.  
Strategy 3: Utilize all aspects of social media to rapidly disseminate information (limited to: Twitter, Facebook, LinkedIn, and others).  
Strategy 4: Utilize integrated communications planning. Webinars, platform, eNews - content and distribution.  
Strategy 5: Increase awareness of the importance of Wildland Fire and wildfire.

## STRATEGIC DIRECTION

## IAWF DEMOGRAPHICS

### IAWF MEMBER PROFESSION



## IAWF COMMUNICATION

### INTERNATIONAL JOURNAL OF WILDLAND FIRE (IJWF)

The IJWF has a contract with CSIRO to continue publishing IJWF. The journal is published 12 times per year. IJWF continues to publish new and significant articles that advance basic and applied research concerning wildland fire. Published papers aim to assist in understanding the landscape basic principles of fire as a process, its ecological impact at the local as well as the landscape level, modelling fire and its effects, and presenting information on how to effectively and efficiently manage fire. The journal has an international perspective, since wildland fire plays a major social, economic and ecological role around the globe.

IAWF Outstanding Associate Editor 2018

Mervyn P. CONNOR

Dr. Mervyn P. Connor, University of Queensland, Australia. He is a member of the International Association of Wildland Fire (IAWF) and the International Fire Ecology Society (IFES). He was the President of the International Association of Wildland Fire (IAWF) from 2015 to 2018. He is also a member of the International Fire Ecology Society (IFES) and the International Fire Ecology Society (IFES). He is also a member of the International Fire Ecology Society (IFES) and the International Fire Ecology Society (IFES).



### WILDFIRE MAGAZINE

Wildfire magazine is the only global magazine that connects fire researchers, government agencies, universities, non-governmental organizations, consultants, the fire business, fire-affected communities, and leaders in wildfire bushfire and all-risk management. We published four editions in 2018 that can be found at: [www.iawfonline.org/wildfire-magazine/](http://www.iawfonline.org/wildfire-magazine/)

The IAWF Wildfire Communications Committee provides guidance and direction on editorial content to an Executive Editor and a Managing Editor, who liaise directly with contributing writers, photographers, advertisers and other designers.

Wildfire aims to be a magazine that meets the vision of the IAWF - "Uniting our global wildfire community." Content includes fire science, operations, policy, people, health and safety, and news. Content strives to be diverse and inclusive of all wildland fire activities around the world.

### SOCIAL MEDIA

IAWF uses Facebook, Twitter and LinkedIn to disseminate information

FACEBOOK 2972 | TWITTER 3646 | LINKEDIN 1123

## WEBPAGE

The IAWF partnered with Design, based in Missoula, to launch a new webpage.



## CONFERENCES

**THE FIRE CONTINUUM CONFERENCE** was held in May 2018 at the University of Montana in Missoula, MT. The conference was jointly organized and sponsored by IAWF and the Association for Fire Ecology. It provided a great opportunity to expand collaborations, gain new knowledge, discuss the latest relevant research findings, learn about management treatments and engage in discussions on policy. We had more than 600 delegates and more than 450 presentations.

**THE 2ND NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY WORKSHOP** was held March 29-30, 2018 in Reno, Nevada. IAWF presented this workshop in partnership with the Wildland Fire Leadership Council (WFLC) and the Western, Southeast and Northeast Regional Strategy Committees. The theme was Making a Difference - Building Capacity, Improving Preparedness, and Learning from Experience, which addressed the role of science in supporting implementation and identified processes to ensure science integration in all planning and implementation activities. Over 180 people attended, with over 45 interactive sessions and panels.

**THE 15TH WILDLAND FIRE SAFETY SUMMIT & 5TH HUMAN DIMENSIONS OF WILDLAND FIRE CONFERENCE** was held December 10-14, 2018 in Asheville, North Carolina. The conference theme was Rethinking the Global Wildfire Problem: Are we Focusing on the Right Problems and Right Solutions? Over 165 people attended, from several countries.

**PLANNING FOR UPCOMING CONFERENCES**  
The IAWF will continue to partner and host conferences in the coming years.

**THE 6TH INTERNATIONAL WILDLAND FIRE BEHAVIOR AND FUELS CONFERENCE** will be April 29-May 3, 2019, held concurrently in Albuquerque, New Mexico; Marseille, France; and Sydney, Australia

**THE 3RD NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY WORKSHOP** will be held October 21-24, 2019 in Plymouth, Massachusetts.

**THE 3RD INTERNATIONAL SMOKE SYMPOSIUM** will be held April 20-24, 2020 in Raleigh, North Carolina.



Read the 2018 Annual Report at [www.iawfonline.org](http://www.iawfonline.org).

## TURNING GOALS INTO REALITIES

Soon after I became President in early 2018, and in my first Wildfire magazine column, I stated that I would like our focus to be on the following areas:

- Improve the value offering to the membership
- Increase our membership so we can truly represent the global wildfire community
- Increase the diversity of participation in the IAWF – gender, race and age
- Develop position papers for the issues that are the same or similar across the globe
- Build on our links with the Association for Fire Ecology in the US, Pau Costa in Europe, the International Fire Aviation Working Group, the Global Fire Monitoring Center, and so many other wildfire groups around the world
- Future-proof the financial sustainability of the IAWF.

As we move into 2019, it is time to assess the 2018 achievements and influences of the International Association of Wildland Fire (IAWF) against these goals. It has been a thought-provoking, very challenging and busy year.

Our membership committee has done considerable work related to the way we attract and retain new members. We have launched a new web site with a more contemporary look and feel, and it is also easier to navigate and find desired information. We are also continuing to improve our communications through Wildfire Magazine and social media. We will also move into publishing articles in two or more languages to make the magazine more attractive to the global wildfire community. This will not just help us increase our membership, but it will also improve benefits to existing members and help us to increase our diversity.

I am very proud of the Diversity and Inclusion Policy that we created in 2018 and have moved to implement more fully in 2019 with the establishment of a Diversity and Inclusion Committee. The policy promotes gender, racial, geographic and experiential diversity for our conference speakers and attendees. Importantly, it strives to be better at being inclusive of people from a variety of walks in life who are dealing with wildland fire issues and research. Our Diversity and Inclusion Committee will hold us to account given the ambitious goals that we have set for ourselves.

At the Board face-to-face meeting in Missoula, we initiated a series of discussion papers that are relevant to our work as wildland fire managers, practitioners and researchers. The first lot was finalised at the end of 2018 and will be published throughout 2019 in Wildfire magazine, with more to follow. These discussion papers are meant to invoke conversation among our community on what unites us and what we stand for, as well as how we can improve what we do. We are encouraging all members of the wildland fire community to provide feedback on these papers.

In May 2018, we held a very successful joint conference with the Association for Fire Ecology (AFE) in Missoula. It provided a great opportunity to expand collaborations, gain new knowledge, discuss the latest research findings, learn about management treatments and engage in discussions on policy. We had more than 600 attendees and more than 450 presentations. We also have a representative from each association attend each other's monthly board meetings in a liaison role. This is helping us better understanding each other so we can collaborate more productively.

We have also started working with the Pau Costa Association to develop a Memorandum of Understanding to formalize past and current collaboration. I expect that to be finalised in 2019.

Our financial situation is strong, and we are looking for further ways to improve it with well-planned and promoted conferences and with a more streamlined production process for Wildfire.

I am proud of what we have achieved last year and looking forward to a strong future.

Alen Slijepcevic,  
IAWF President and Chairman of the Board

MESSAGE FROM THE PRESIDENT





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