

FIRE AUSTRALIA

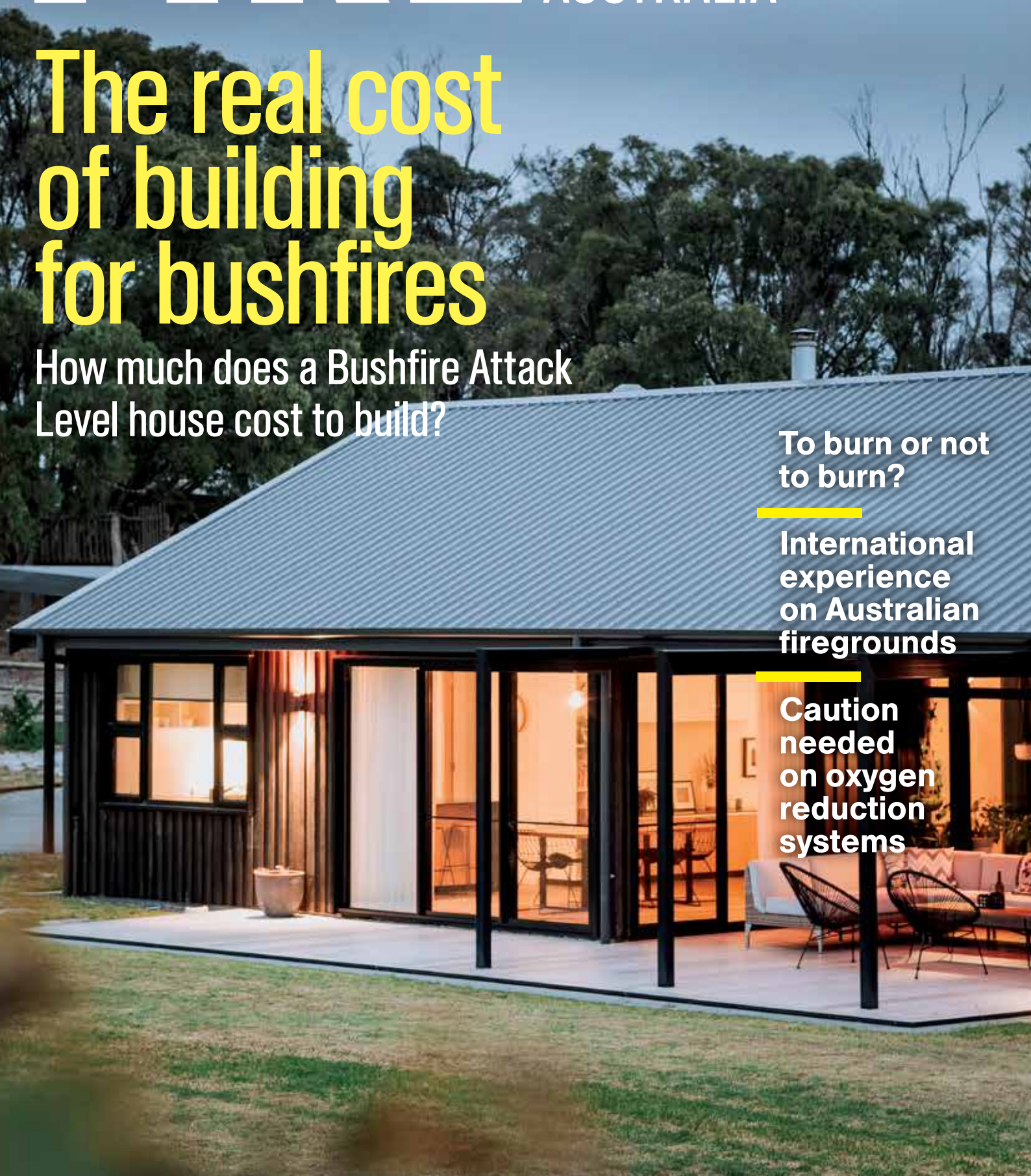
The real cost of building for bushfires

How much does a Bushfire Attack Level house cost to build?

To burn or not to burn?

International experience on Australian firegrounds

Caution needed on oxygen reduction systems



Pertronic F220 Protects Sydney's Transport Tunnel System



The fire system in Sydney's newly-opened M4 East motorway tunnel is based on a Pertronic® F220/Net2 network with 93 F220 fire indicator panels.

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Pertronic Industries congratulate WestConnex on the successful completion of the M4 East motorway.



One of the Pertronic 28U weatherproof F220 fire indicator panels supplied for Sydney's M4 East motorway tunnels.

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TAKING HOLD OF FIRE PROTECTION'S FUTURE

SCOTT WILLIAMS

Chief Executive
Officer, Fire Protection
Association Australia



On 6 April 2020 fire safety assessment changed. From this date, any practitioner who assesses and endorses measures on an annual fire safety statement in New South Wales must hold accreditation as a Fire Protection Accreditation Scheme (FPAS) Fire Safety Assessor (FSA).

Likewise, those who endorse plans and specifications for sprinklers, hydrants and hose reels, and fire detection and alarm systems, must be FPAS Fire Systems Design (FSD) accredited, unless they hold other accreditation recognised by the Building Professionals Board.

Practitioners accredited under these

classifications will be recognised by the NSW Government as competent fire safety practitioners (CFSP). Anyone without an accreditation number will henceforth be unable to submit designs or carry out annual assessments.

For building owners, this change means a significant reduction in the time and risk involved in finding a CFSP, as required under NSW legislation. While the requirement for building owners to find a 'competent' fire safety practitioner has not been affected, the method of determining that competency has changed.

Building owners will no longer need to undertake time-consuming research into their service providers; they will simply need to verify an accreditation number on a national online register. They can be confident that FPAS-accredited practitioners are competent, hold appropriate insurance, and are held to FPA Australia's Code of Professional Conduct.

For fire protection practitioners the change is, of course, far more significant. With an accreditation scheme developed by industry now recognised by the NSW Government, the fire protection industry is, in many ways, taking hold of its own future by increasing professionalism and delivering higher standards.

The change will allow us to weed out the 'cowboys' who are reducing the professionalism and quality of service provided by the industry.

The move towards accreditation is matched by a commitment by FPA Australia to investigate complaints and audit at least ten percent of practitioners per year—leaving the 'cowboys' with nowhere to hide.

This supports practitioners who are doing the right thing and stops the race to the bottom, as accredited individuals will no longer have to compete with unscrupulous operators. For owners, managers and occupants of buildings, and for the broader NSW community, accreditation means that everyone can have greater confidence that the buildings in which they live and work are safe.

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FIRE AUSTRALIA



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OUR COVER

Building a BAL-rated house, like this BAL 19 home, is not as expensive as often thought.

PHOTO: LEE GRIFFITH

ABOUT FIRE AUSTRALIA

Fire Australia is a joint publication of Fire Protection Association Australia, AFAC and the Bushfire and Natural Hazards CRC. We aim to bring the latest news, developments and technical information to the fire protection industry, emergency services and natural hazards research organisations. *Fire Australia* is produced quarterly and distributed throughout Australia and New Zealand. Editorial submissions are welcome and can be sent to: tom.bicknell@fpaa.com.au. For more details on submitting a contribution, please contact the editors.

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STUDENT RESEARCH SUPPORTING EMERGENCY MANAGEMENT

Another five Bushfire and Natural Hazards CRC students have successfully had their theses accepted to complete their PhDs, with their research offering vital knowledge to support the emergency management sector.

Dr Rahul Wadhvani's PhD focuses on refining two submodels, pyrolysis and firebrand transport, in the Wildland-Urban Interface Fire Dynamics Simulator. His findings have improved the understanding of how firebrands spread, which will aid fire-spread modelling and future research. Dr Wadhvani completed his PhD with Victoria University.

To reduce the impacts of future hazards, Dr Graeme Riddell's research provides three key contributions through the use of foresight, primarily in scenarios within disaster risk assessment processes, to support effective policy and investment decision-making. Dr Riddell completed his PhD with the University of Adelaide.

Dr Christopher Thomas's thesis

revolves around the numerical models that allow for two-way interaction between a bushfire and the surrounding atmosphere; an essential tool in understanding the dynamic behaviour of fire. His thesis has important implications for the stochastic modelling of spotfire redevelopment and was completed with the University of New South Wales.

PhD research by Dr Thomas Kloetzke investigated near-surface wind fields during tropical cyclones that make landfall through the analysis of near-surface wind observations and numerical simulation of idealised tropical cyclones. His research has helped develop improved methods for estimating the risk these cyclones pose to buildings and communities. Dr Kloetzke completed his PhD with the University of Queensland.

Associate student Dr James Ricketts' PhD explores the nature of abrupt decadal shifts in a changing climate. His research identifies and relates episodes of apparent abrupt shifts in regional climates in Australia and extends this



PHOTO: BUSHFIRE AND NATURAL HAZARDS CRC

Dr Rahul Wadhvani with the fire dynamics simulator.

methodology to global datasets and modelled futures to better inform risk assessments. Dr Ricketts completed his PhD with Victoria University.

Congratulations to Dr Wadhvani, Dr Riddell, Dr Thomas, Dr Kloetzke and Dr Ricketts. ■

BLACK SATURDAY AND BLACK SUMMER: COMPARISON OF FIRE IMPACTS



The anniversary of the Black Saturday bushfires on 7 February provided a sombre reminder and comparison between the 2009 fire event and the 2019-20 Black Summer.

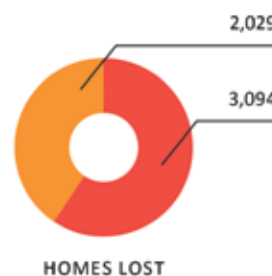
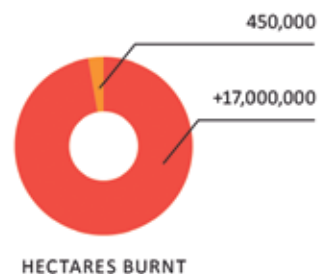
AFAC data shows the differences between the single tragic, devastating event in 2009, which impacted Victoria so heavily on one afternoon, and the concurrent, compounding bushfire events over many months during 2019-20.

The consecutive bushfires burnt over 17 million hectares during the 2019-20

season, while less than half a million hectares burnt in 2009.

Noting where many of the fires occurred this summer, it is not surprising that more houses were lost this season compared to Black Saturday, but many more were saved around fire-ravaged communities.

While there was a tragic loss of life this summer, the number is far smaller than the loss of life on one afternoon in 2009. This has been attributed to significant developments in advice and warnings, and more aware and responsive communities. ■



● 2019-20 ● Black Saturday 2009

AFAC data illustrates the impacts and comparison between the 2019-20 Black Summer and the 2009 Black Saturday bushfires.

SOURCE: AFAC



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IMPORTANT UPDATE TO AFAC EVENTS CALENDAR

A FAC has made the decision to postpone its professional development and events programs until further notice to minimise the spread of the coronavirus (COVID-19) outbreak.

AFAC is monitoring advice from government authorities in relation to the pandemic. With many organisations implementing staff travel bans, the primary consideration for AFAC is the health and safety of staff, delegates, speakers and others who help to bring these events to life.

Attendance at Australian Institute for Police Management (AIPM) courses by

AFAC member agencies will also cease until further notice.

AFAC will provide updates on its professional development and events programs through its website, social media channels and the AFAC newsletter—AFAC News. ■

To view postponed events, please visit afac.com.au/events.

In light of the COVID-19 outbreak, AFAC has postponed its professional development and events programs.



PHOTO: AFAC

MATTHEW WRIGHT DEPARTS FPA AUSTRALIA

It was with a mix of sadness and gratitude that Fire Protection Association Australia (FPA Australia) announced Matthew Wright's departure as General Manager—Technical Services/ Deputy CEO on 7 February 2020.

Mr Wright served with FPA Australia from October 2010, and during that time he was a critical part of the Association's growth. He played a central role in most of the Association's major achievements over the past decade, including the expansion of the Fire Protection Accreditation Scheme, the inclusion of residential sprinklers in the National Construction Code, and advocacy resulting in improved standards and legislation too numerous to mention.

Mr Wright's advocacy raised the profile and influence of FPA Australia, and improved engagement with the industry. He is highly respected by his peers, evidenced by his frequent appearances on conference programs, industry forums and in the media on behalf of FPA Australia. His ability to build strong relationships with key stakeholders in government and industry has opened many doors for the fire protection sector.

"For the past decade, Matthew has championed the drive for effective regulations and improved professional competence and practice in the fire protection industry. He has made a great contribution to the industry during his time with FPA Australia," Scott Williams,



PHOTO: TOM BICKNELL, FPA AUSTRALIA

FPA Australia's CEO, said on behalf of the Association.

"His passion for the industry and for life safety outcomes is clear to all who work with him, and his belief in the value and responsibility of the Association's work has been an inspiration to his colleagues.

"While we will miss him, we are sure Matthew will continue to contribute to the safety of the community with the same passion in his new role. We thank

him for his contribution and wish him all the best."

The FPA Australia Board also thanks Mr Wright for his many years of service to the Association and his commitment to the professionalisation and improvement of the fire protection industry.

Mr Wright has moved to a new senior position in the growing Australian and New Zealand division of global safety science company UL. ■

Matthew Wright played a major role in FPA Australia's growth.

PM ACKNOWLEDGES CRC ROLE IN BUSHFIRE RESPONSE

Australian bushfire researchers are working together to attack the causes and consequences arising from the extraordinary run of bushfires across much of Australia in 2019–2020. The Bushfire Science Roundtable met in January and March in Canberra under the Minister for Industry, Science and Technology, the Hon Karen Andrews, with scientists from a wide range of organisations involved in bushfire-related science. The Bushfire and Natural Hazards CRC was represented by Chair Dr Katherine Woodthorpe, Research Director Dr John Bates and researchers Professor Vivienne Tippet from the Queensland University of Technology, Dr Katharine Haynes from the University of Wollongong and Dr Geoff Cary from the Australian National University.

Minister Andrews highlighted that disaster response, recovery and resilience activities should be informed by multidisciplinary research. Bushfire research, as well as broader natural hazards research, demands drawing on a wide range of disciplines, including the natural and physical sciences, engineering, humanities and social sciences.

Following the Roundtable, The Hon.



CRC Chair Dr Katherine Woodthorpe, Prime Minister Scott Morrison, CRC Research Director Dr John Bates and Minister for Industry, Science and Technology Karen Andrews.

Scott Morrison MP, Prime Minister of Australia invited the CRC to Parliament House to discuss current and future contributions of research to the bushfire response and recovery.

Dr Woodthorpe and Dr Bates met with Prime Minister Morrison and Minister Andrews in early February to talk about building a bushfire-resilient Australia.

The CRC was invited to discuss how it could support the then proposed

Royal Commission into National Natural Disaster Arrangements, using its research knowledge and expertise and through the Inquiries and Reviews database.

The database catalogues over 300 inquiries and reviews of emergencies and disasters caused by natural hazards across all Australian jurisdictions between 1886 and 2017. It captures the findings of previous royal commissions and other bushfire inquiries. ■

NEW LEVELS OF FSD ACCREDITATION NOW AVAILABLE

Two new levels are now available for the Fire Protection Accreditation Scheme (FPAS) Fire Systems Design (FSD) class of accreditation, enabling practitioners to gain accreditation better tailored to the complexity of the fire systems design they work on.

FSD accredits practitioners to undertake the design of three categories of fire safety systems:

- ◆ Fire Sprinkler Systems
- ◆ Fire Hydrant and Fire Hose Reel Systems or
- ◆ Fire Detection and Alarm Systems.

Practitioners can now select from three levels of accreditation in each of the three FSD categories to best suit the complexity of work they want to perform. The two new levels complement the existing unrestricted level of FSD accreditation.

Level 1 (Basic), Level 2

PHOTO: FPA AUSTRALIA



Practitioners can now choose from three levels of FSD accreditation.

(Intermediate) and Level 3 (Advanced) each specify the system types, configurations and the nature of work a practitioner at that level is accredited to undertake, as well as any conditions that relate to the defined level. ■

To learn more about the new levels of FSD accreditation and what they cover, read our new Fire Systems Design Accreditation Levels and Restrictions practice note on the FPA Australia website: ow.ly/czQp50yX9vs.

FSA ACCREDITATION REGISTER NOW AVAILABLE

A register is now available to the public of competent fire safety practitioners holding the Fire Protection Accreditation Scheme (FPAS) Fire Safety Assessment (FSA) class of accreditation. The FSA Accreditation Register lists practitioners holding FSA accreditation, which as of 6 April 2020 recognises them as competent fire safety practitioners (CFSPs).

Following 6 April 2020, individuals holding FSA or Fire Systems Design (FSD) accreditation are officially

recognised as CFSPs under NSW legislation.

After this point, by law only CFSPs are able to conduct the work covered by these two classes of accreditation, and individuals will only be able to become a CFSP by holding FPAS FSA or FSD accreditation, or accreditation under other future schemes recognised by the NSW Government.

The FSA Accreditation Register allows building owners and managers to verify the accreditation details of CFSPs

who are performing work for them, as well as allowing them to find suitably accredited practitioners near them. ■

The Register is available at connect.fpaa.com.au/FireSafetyAssessor.



EXTENSIONS TO THE TRANSITION PERIOD FOR SECTOR QUALIFICATIONS

Commissioners at the Australian Skills Quality Authority (ASQA) have approved an extension to the 12-month transition period for the fire and emergency services qualifications and SES skill sets in the PUA12 Public Safety Training Package.

The superseded fire and emergency services qualifications and SES skill sets will remain on the national register until 17 July 2021.

AFAC submitted a request in December 2019 to the ASQA seeking an extension to the normal 12-month transition period that applies to superseded qualifications.

The qualifications and skill sets involved are:

- ◆ PUA21312 Certificate II in Public Safety (SES)
- ◆ PUA20613 Certificate II in Public Safety (Firefighting and Emergency Operations)
- ◆ PUA20713 Certificate II in Public Safety (Firefighting Operations)
- ◆ PUA30412 Certificate III in Public Safety (SES Rescue)
- ◆ PUA30512 Certificate III in Public Safety (SES Operations)
- ◆ PUA30613 Certificate III in Public Safety (Firefighting and Emergency Operations)
- ◆ PUA30713 Certificate III in Public Safety (Firefighting Operations)
- ◆ PUA33012 Certificate III in Public Safety (Emergency Communications Centre Operations)

- ◆ PUA42712 Certificate IV in Public Safety (Emergency Communications Centre Operations)
- ◆ PUA40212 Certificate IV in Public Safety (SES Leadership)
- ◆ PUA40313 Certificate IV in Public Safety (Firefighting Supervision)
- ◆ PUA50513 Diploma of Public Safety (Firefighting Management)
- ◆ PUA50412 Diploma of Public Safety (SES Operations Management)
- ◆ PUA60513 Advanced Diploma of Public Safety (Firefighting Management)
- ◆ PUA60913 Advanced Diploma of Public Safety (Fire Investigation)

Further, the 14 associated skill sets have also been extended.

- ◆ PUASS00028 Basic Rescue
- ◆ PUASS00029 Basic Tree Operations
- ◆ PUASS00032 Beach Team Management
- ◆ PUASS00033 Community Engagement
- ◆ PUASS00034 Flood Response Operations
- ◆ PUASS00035 Floodboat Response Operations
- ◆ PUASS00036 Incident Response Team Leader
- ◆ PUASS00037 Intermediate Tree Operations
- ◆ PUASS00038 Land Search Team
- ◆ PUASS00045 Road Accident Rescue
- ◆ PUASS00046 SES First Aid and Safety
- ◆ PUASS00047 SES Induction
- ◆ PUASS00048 Storm and Water Damage Response

- ◆ PUASS00049 Storm and Water Damage Response at Height.

This extension is granted to all registered training organisations (RTOs) delivering the qualifications and/or skill sets to current learners. The decision extends the transition period for these RTOs to complete training, assessment and Australian Qualifications Framework (AQF) certification issuance for the learners currently enrolled.

ASQA will publish this decision on its website and notify all affected RTOs.

The qualification(s) and skill sets will remain on the relevant RTOs' scope of registration until the end of the extended transition period.

This extension will provide all AFAC Member RTOs with an additional 12 months to prepare to transition to the new fire and emergency service qualifications and to ensure they can meet their RTO requirements. This will ensure:

- ◆ existing training and assessment material aligned to these superseded qualifications and skill sets within the PUA12 Public Safety Training Package can be used in preparation for the 2020–2021 fire season
- ◆ learners currently enrolled and learners yet to enrol can access training and assessment that will enable them to fulfil important emergency management duties beyond 17 July 2020. ■



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RESILIENT AUSTRALIA AWARDS SEEKING SUBMISSIONS

Submissions are open for the 2020 Resilient Australia Awards, which promote shared responsibility for resilience and celebrate initiatives that make communities better prepared for disasters and emergencies.

Now in their 21st year, the awards are taking submissions across six categories: community, business, school, government, local government and photography.

Previous entries have focused on a wide range of collaborative projects, risk assessment and mitigation activities, training and research programs and community engagement.

In 2019, Sarah Hamilton won the Resilient Australia National Award for her SES Awareness Badge, which draws on the common linkages between Scouts and emergency services.

Over 500 scouts have received the badge, which empowers young members to carry out challenging tasks and build their confidence in new learning areas.



Sarah Hamilton took out the 2019 Resilient Australia National Award.

The photography category draws a high level of submissions each year; images that focus on all phases of resilience and disasters including preparedness, response and recovery.

This year the Resilient Australia Awards are seeking images that capture different perspectives from the sector and answer the question: 'What does disaster resilience in Australia mean to you?'

Submissions are open until 18 May

in every state and territory. Jurisdictional winners are considered for national awards to be presented at a national ceremony later in the year.

The program is proudly sponsored by the Australian Government, in partnership with the Australian Institute for Disaster Resilience and the states and territories. ■

Submit your entry at aidr.org.au/raa

NEW AND UPDATED GOOD PRACTICE GUIDES

Fire Protection Association Australia (FPA Australia) has recently published an updated version of its Good Practice Guide (GPG-04) on fire safety statements to reflect the updated requirements as a result of the NSW building reforms, and the upcoming NSW Government recognition of the FPAS Fire Safety Assessment (FSA) and Fire Systems Design (FSD) classes of accreditation.

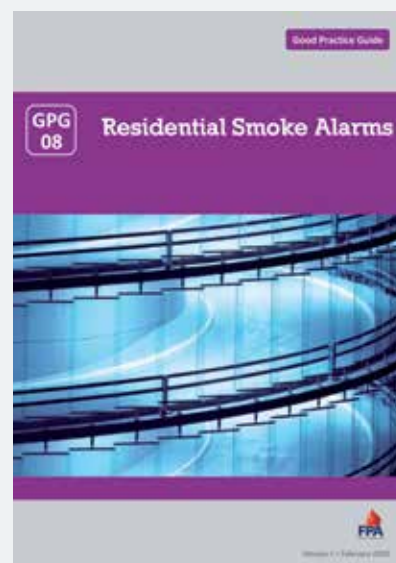
The updated guide is based on the NSW reforms FAQs on the FPA Australia website, as well as the presentations and learnings from the Association's seminars and other work on delivery of the FPAS FSA and FSD accreditation.

A new Good Practice Guide (GPG-08) on residential smoke alarms has also been published. This Good Practice Guide (GPG) is intended to provide practical guidance on smoke alarm performance, regulatory requirements and the development of escape plans.



This GPG represents the first output of ongoing work by the Association in this area.

Preview versions are available on the



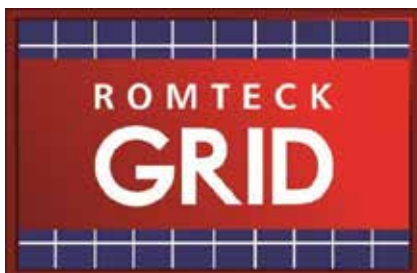
FPA Australia website. Full versions are available to Association members on the CONNECT platform, or to non-members on request. ■



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BREAKING DOWN AUSTRALIA'S BUSHFIRES

An expert panel was assembled in Brisbane in January to dissect the devastating bushfire season, with Bushfire and Natural Hazards CRC researchers providing their insight.

Hosted by the Queensland University of Technology on 31 January, the Grand Challenge Future Forum featured CRC researchers from QUT Professor Vivienne Tippet, Associate Professor Amisha Mehta and Associate Professor Dominique Greer, alongside CRC CEO Dr Richard Thornton. They were joined by Major-General Richard Wilson, former Chair of the Queensland Reconstruction Authority, Firesticks Alliance Cultural Practitioner Leeton Lee, and QUT's Dr Ian Weir, Dr Timothy Graham and Associate Professor Wendy Scaife.

Dr Thornton opened the forum and said that forest management, building construction and human behaviours must be considered to increase Australia's bushfire resilience.

The importance of community response and action was a hot topic on the day, with in-depth discussions on the role of the community in dealing with natural hazards. Associate Professor



PHOTO: INSTITUTE FOR FUTURE ENVIRONMENTS, QUT

Panel at QUT forum—back row, L to R: Dr Timothy Graham—Dr Richard Thornton—Major-General Richard Wilson—Leeton Lee—Prof Vivienne Tippet; front row, L to R: A/Prof Wendy Scaife—A/Prof Amisha Mehta—A/Prof Dominique Greer.

Greer and Associate Professor Mehta discussed the research for the CRC project *Effective risk and warning communication during natural hazards*, saying the power of the community can be leveraged further in future crises.

Dr Thornton described the role of the CRC in making sure strong science is picked up in meaningful ways when

asked how we can merge science and community together into real action.

"This disaster and the unfolding disaster that will happen is a critical point which we can leverage science into getting policy change and practical solutions," he said. "That's certainly what we're trying to do and what a number of our scientists are doing." ■

AFAC RECOGNITION OF PRIOR LEARNING GUIDE

AFAC has commenced the development of a recognition of prior learning (RPL) guide for the fire and emergency services, which addresses the recommendations gathered through interviews with more than 20 registered training organisations and personnel involved in RPL policy and practice.

The guide will be supported by case studies and support resources and tools used within AFAC member agencies and beyond.

The vocational education and training (VET) system recognises that an individual acquires skills and expertise through formal, non-formal and informal learning. Recognising an individual's expertise requires an assessment process and the gathering

of evidence. This process can be undertaken on an individual basis or for a larger cohort. Evidence can take many forms and be gathered from multiple sources.

While AFAC members implement RPL within their organisations, its application remains challenging. From October to December 2019 AFAC collected research reports on RPL, samples of effective RPL practice and interviewed 28 representatives from 20 organisations.

The findings from these interviews provided the starting point for developing a nationally agreed guide, building on industry best practice and lessons learned.

The RPL guide will complement the AFAC *Assessment Strategies Guide* prepared for the 2019 Public Safety Training Package. It will help to provide practical approaches on how to conduct RPL while being compliant with the *Standards for Registered Training Organisations (RTOs) 2015*. ■

SA FLUORINATED FOAM BAN ENFORCED

The two-year grace period for the South Australian Government's ban on fluorinated firefighting foams ended on 30 January, after which penalties apply.

The Environmental Protection Authority SA (EPA SA) reminded the fire protection industry that after this date a person must not fill, or permit the filling, of a fire extinguisher with fluorinated firefighting foam, and a person must not supply fluorinated firefighting foam.

All fluorinated firefighting foams (per- and poly-fluoroalkyl substances), including more modern ≤C6 type fluorotelomers, are covered by the ban.

The ban came into effect on 30 January 2018 with an amendment to the *Environment Protection (Water Quality) Policy 2015* under the *Environment Protection Act 1993*. The two-year grace period allowed industry time to transition away from fluorinated foams. ■

For more information about the ban, fire protection service providers' responsibilities and disposal pathways, visit the EPA SA website: ow.ly/JvDn50yX9Yx.

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FIRE AND CULTURE MANAGEMENT AT SAVANNA FIRE FORUM 2020

BY **DEB SPARKES**

AFAC

In the midst and aftermath of the summer fires in southern Australia, it can be easy to forget that northern Australia faces large fires across the tropical savannas every year.

The Savanna Fire Forum, held in Darwin on 18 and 19 February, provided a place for fire managers, Indigenous land managers, carbon industry practitioners, scientists, policymakers and other interested parties from across Australia to reflect, connect and share knowledge about savanna fire management.

Tropical savanna covers one quarter of Australia and the annual amount of savanna burnt is mapped and measured using hotspots monitoring provided by North Australia and Rangelands Fire Information (NAFI).

In 2004 the total area burnt was 12,608,400 hectares. Most of these fires occurred in the late dry season, giving rise to more intense and widespread fires.

In 2007, the West Arnhem Land Fire Abatement program (WALFA) began. The project aimed to establish earlier dry season fires to break up the landscape and prevent the run of late dry season fires.

As savannas have a short and predictable fire return interval of one to two years, a methodology was formulated that allowed the reduction in emissions between early and late dry season fires to be calculated and these carbon credits to be sold through the carbon farming incentives.

The success of the WALFA project in gaining economic, cultural, social and environmental benefits for Traditional Owners has led to more than 70 carbon farming savanna fire management initiatives across northern Australia.

These projects have delivered more than \$80 M back into the economies of participating groups. Beyond the economic benefits, the increased application of early dry season fires has seen the annual area burnt across northern Australia drop to 8,124,900 hectares in 2019. This brings the added environmental benefit of allowing some patched and long-unburnt areas to flourish, which are essential to small mammal populations.

With so many groups now participating in the projects, the Indigenous Carbon Industry Network organised the first Savanna Fire Forum in 2018 for 100 participants. In its third year, the forum reached capacity with

320 people in attendance at the 2020 event.

The two-day forum allowed Traditional Owner ranger groups to share how the projects have increased connection to Country and reinvigorated management of the land with 'two-eyed learning'. This approach to learning captures both Indigenous and Western knowledge by combining ancient practices with modern technology such as leaf blowers, helicopters and iPad mapping.

The forum also offers a platform to introduce new trends, training opportunities and ecological research findings. For example, this year's forum discussed the emissions reduction accounting that has now been extended to include sequestration accounting, where standing trees are saved from destructive fires through applying earlier fires. This will serve to increase the economic benefits for existing and emerging projects.

Many northern Australia ranger groups at the forum expressed their desire to help out southern Australia with their firefighting effort. They also set up networks with southern Traditional Owner groups to share their experiences of how increased collaboration between agencies and ranger groups has improved their social and cultural outlook.

This year there was also a women-only talking circle where women from local ranger groups searched for ways to strengthen their training and pathways to become leaders in fire management on Country.

While ranger groups are tracking at around 30% women, there are cultural traditions that can be barriers to their participation. Several great initiatives were put forward to build capability, including women-only training camps.

With its wide range of speakers and topics, the Savanna Fire Forum is now recognised as a great opportunity in northern Australia to gather a network and share stories from Country. ■

A women-only talking circle took place at the forum, where participants strengthened their skills to become leaders in fire management.



PHOTO: VERONICA TORAL-GRANDA, CHARLES DARWIN UNIVERSITY

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AUSTRALIAN FIRES THROUGH THE EYES OF THE UNITED STATES

The unprecedented scale of the recent bushfire season was met with an extraordinary number of international deployments. A group of US firefighters reflect on their time on the Australian fireground.

BY **ALANA BEITZ**

AFAC

This bushfire season has seen by far the largest nationally coordinated interstate and international deployment of fire and emergency personnel across Australia in firefighter, incident management and aviation roles.

Drawing upon established resource sharing agreements, US and Canadian personnel deployed into NSW, SA, ACT and Victoria. New Zealand also deployed hundreds of firefighting personnel across Australia this season.

Coordinated by the AFAC National Resource Sharing Centre (NRSC), 239 Canadian, 360 US and 320 New Zealand personnel

were deployed to Australia to assist. An additional 6,386 Australian personnel were deployed across state borders to help their interstate colleagues.

Beyond facilitating the sharing of resources to locations that need assistance, the NRSC fosters knowledge and information sharing between agencies, on the fire ground and in the control room.

On the completion of their 31-day deployment, nine US firefighters reflected on their experience during their deployment to the Ovens region in Victoria before they returned home on 5 February. They shared their perspectives of working alongside foreign crews in a foreign environment, including the new hazards, terminology, rostering and social connections.



US Task Force members clearing felled trees from a road.

PHOTO: NEAL HERBERT/US DEPARTMENT OF INTERIOR

"My first impression of when we landed in Australia was the haze of all the smoke from the bushfires that were going on. But once we went from the plane to the bus the view was really beautiful—the country was really beautiful—and we couldn't wait to actually get into the mountainous areas and see what was out there."

Victor Almanza — Fire Engine Operator, US Forest Service

"The integration was really interesting, just trying to pick up on the dialogue in terms of the verbiage. Ultimately, they mean the same thing that we do, it was just a matter of picking up the vocabulary. For example, a snag for us is a stag in Australia. And line location, what you call a running edge, for us it would probably be a hot line or a hot edge, but all in all it meant the same thing."

Jackie Ortega — Engineer, US Forest Service

"The tactics are solid here in Australia with the overhead aerial hazards they have and when you're dealing with spotting distances they have down here, direct attack is pretty risky. I learnt that the aerial hazards are real, so grabbing an edge and having one foot in the black like we do in the States is not going to be successful, you need to pick a ridge and get that ridge prepped correctly to be successful."

Frank Keeler—Fire Management Officer, US Bureau of Land Management

"They fight fire differently here to how we do. But the fire community adapts to an ever-changing situation—just like what fire is. And everything feels like it's upside down, so whatever I think is north is usually south, or west is east, so adjusting to that was the biggest difference."

Johnny Summers—Engineer, US Forest Service

"Bonding here, being on our days off, just going around some of the local towns, the people were really amazing, really hospitable, really kind. I just found it really calming here, even though it was 30 days it didn't feel like 30 days just because of the way people take care of you out here."

Jorge Perez—Engineer, US Forest Service

"We've done line cutting, we've done tagging, making sure hazard trees are clear so they don't block roadways and helping out the district with whatever they need ... It's been awesome because I spent about eight years on a hotshot crew before I got injured, so being back with everybody and doing that line of work again was fun for me."

Danielle Cardenas—Dispatch Centre Assistant Manager, US Forest Service

"For folks here, the added stress of having an international assignment, gone for a long period of time, gone from your family, the roster—five days on, one day off, five days on, two days off—was needed and well received. The crew definitely had a great attitude the whole time and I think it was a result of that schedule."

Ben Covolt—Smokejumper, US Forest Service

"If I were given another opportunity to come back, I feel like I would be five days ahead

when I get here. And I think that is the same for the Australian firefighters that have been to the United States and have seen how we operate and manage crews. So those opportunities—for both us to come to Australia and Australians to come to the States to see that—will help our relationship in the future."

Rance Neighbours—Assistant Fire Manager Officer, US Bureau of Land Management

"The best thing that happened was just being selected to come out and help with the Australian bushfires and finding that when we came over there were individuals that were just like us, hardworking, and away from their families for long periods of time and there is an awesome support system—our brothers and sisters in fire all the way across the world."

Leonard Dimaculangan—Hotshot Captain, US Forest Service

The experiences of the international fire specialists deployed to Australia in 2019–20 will help build the collective knowledge of the global firefighting community and support a more streamlined integration of international resources during future deployments.

The duration and severity of this bushfire season is a reminder that it is essential to have a sustainable approach to maintaining disaster preparedness and response efforts, and international reinforcements are a critical component of our disaster response surge capacity.

A coordinated approach to maximising national and international emergency management capability enables us to be well prepared, reduce disaster risk and keep communities, critical infrastructure and our environment as safe as possible. ■

360 US personnel deployed to Australia to assist in the 2019-20 bushfire season.



PHOTO: NEAL HERBERT/US DEPARTMENT OF INTERIOR



Above: Peter Kambouris (right) on deployment in Alberta, Canada in 2015.



PHOTO: AFAC



PHOTO: CFFC

Top: Peter Kambouris (right) and Jason Cottingham reconnect at a deployment debrief at the Victorian Emergency Management Institute.

Above: Jason Cottingham (left) with Canadian Incident Management Team in Victoria.

FRIENDSHIP FORGED IN FIRE

The recent deployment of international fire specialists to Australia has rekindled a connection made five years earlier in Alberta, Canada.

BY **ALANA BEITZ**

AFAC

The 2019–20 fire season challenged multiple regions across Australia and activated the most significant international resourcing request for assistance.

Alberta Agriculture and Forestry Wildfire Management Specialist Jason Cottingham was one of 239 Canadian fire specialists deployed to Australia. He undertook a month-long deployment as a fire behaviour analyst assisting in Victoria.

During his deployment, Mr Cottingham was surprised to reconnect with Grampians Regional Manager of Forests and Fire Operations Peter Kambouris, who he first met in Alberta in 2015 when Australia deployed a contingent of 47 fire specialists to the Canadian province.

"Australia has been in our country a number of times, so it is reciprocal in terms of them providing assistance to us,

and us providing assistance to them," Mr Cottingham said.

When Mr Kambouris deployed to Alberta with Forest Fire Management Victoria, the province experienced 1,850 fires that burnt 492,530 hectares, a significant increase from the previous ten-year average of 1,496 fires and 177,842 hectares burnt. He said these intense events highlighted the importance of resource sharing arrangements.

"I think with large landscape fires more prevalent than perhaps they were historically, the more knowledge and information we share the better we are going to be at it in the future. Not just to prepare for it, but also to adapt our fire strategies," he said.

"Seeing different techniques that were applied on the fire ground that we don't adopt here because of the different landscapes, and being able to bring some of those aspects back to share with respective managers, is a really important part of what we do and what we can gain out of deploying internationally."

Mr Cottingham agreed that these arrangements strengthened firefighting capabilities and supported knowledge sharing on an international scale.

"As a global organisation, we're always trying to evolve, do better and be more efficient with the resources we have. It is important that we make these exchanges of knowledge and information back and forth because we get better as organisations and we are more successful in the long term," he said.

Mr Kambouris said that the international partnerships introduced the fire specialists to each other, but the personal connections ensured a culture of mutual learning.

"It's not just about the relationship and bumping into someone you haven't seen in a while and worked with once upon a time, it's about us fostering that relationship and learning from Alberta and other jurisdictions as well. It's how we continue to do what we do better." ■

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TO BURN OR NOT TO BURN IS NOT THE QUESTION

The debate around prescribed burning is ongoing and as heated as ever. Daniel May suggests that the practice is an effective tool rather than a cure-all.

BY **DANIEL MAY**

Australian National University and Bushfire and Natural Hazards CRC

During five years of researching the history and politics of Indigenous burning, I have often found myself being pulled back towards debates about prescribed burning. This practice—also known as hazard reduction burning, control burning or planned burning—uses deliberately lit fire, under favourable conditions, most commonly to reduce the fuel

available for future bushfires. Because Indigenous burning is often conflated with prescribed burning, I'm frequently asked an ostensibly simple question: does it work?

To say that experts, researchers and practitioners disagree about the answer is to put it mildly. Academic mentors have warned me to stay away, lest I be caught up in interminable debates and distracted from my main research. Among experts, suspicions about motives and trench mentalities abound, tied up with cross-disciplinary rivalries, political ideologies and implicit knowledge hierarchies. Your model versus my anecdote; your beliefs versus my facts. The debate can seem like a black hole, sucking in and grinding up.

Fire management, and especially prescribed burning, has dominated public discussion in recent months. In this highly charged political context, I must admit to some scepticism about

the Royal Commission into National Natural Disaster Arrangements and other inquiries. As the US fire historian Stephen Pyne has observed, fire is almost never considered on its own terms. Three bushfire royal commissions over the past century demonstrate how prescribed burning can become a proxy for other political issues.

1939

One of Australia's most infamous disasters was Black Friday, which took the lives of 71 Victorians in 1939. The subsequent royal commission is well known for the eloquence of commissioner Leonard Stretton's lamenting of the environmental ignorance of settlers: "They had not lived long enough. The experience of the past could not guide them to an understanding of what might, and did, happen."

The Stretton commission attracted a great deal of public interest and deeply

Kinglake, Victoria after the 2009 fires.

Prescribed burning resists easy, grand, continent-wide narratives. It is a tool, not a panacea, and one that must be thought of and used subtly on a local basis. We also need broader recognition that it is *hazard reduction* and not *hazard removal*.

The state's Forests Commission tried to exclude fire—controlled or otherwise—wherever possible, believing it damaged the mountain ash (*Eucalyptus regnans*) forests. But it reluctantly accepted the need for strategically important areas, such as ridge lines, to undergo some prescribed burning.

Stretton ultimately found that excluding fire altogether was impractical in Australia, and that the amount of prescribed burning performed before 1939 had been "ridiculously inadequate". Stretton's phrase has been quoted ever since as a foundational legitimisation of prescribed burning. Less well known is his later qualification: "It is not suggested that the practice be followed in mountain ash country ... [except] where necessity demands that it should be done." In 1939, Stretton recognised that prescribed burning could not be thought of as a blanket solution.

1961

Stretton's recommendations for fire management were extended by the royal commission following the 1961 Dwellingup fires in Western Australia. Organised forestry in that state had followed a fire suppression paradigm since it had been established in the early twentieth century. Also inspired by US ideas about fire, early WA foresters believed that bushfire was harmful to timber and that it was possible to banish it entirely from the forests of jarrah (*Eucalyptus marginata*) in the state's south-west. In recognition of the increasing failures of this policy, and after discovering that jarrah forests were less sensitive to fire than mountain ash, conservator Allan Harris overturned the policy in 1954. Broad-based, rotational prescribed burning became the norm in jarrah forests, and ten percent or so of the forest was burnt annually.

This policy came under close scrutiny following the 1961 fires, which caused significant forest damage but no loss of life. Royal Commissioner

Geoffrey Rodger found that prescribed burning had worked reasonably well in Dwellingup and the WA Forests Department should "make every endeavour to improve and extend" the practice in jarrah. But he also noted that it would not stop a fire under extreme conditions; instead, the aim was to "reduce the fire intensity and rate of spread and so allow fire suppression forces to attack the fire more easily and with greater safety". This formed the philosophical basis of the 'Australian Strategy' of prescribed burning that was exported across the continent and even overseas.

At the commission, many farmers argued for extended prescribed burning, some calling for the state's south-west to be burnt "whenever possible" or "as often as it will burn". Much of their testimony was coloured by resentment at the department's existing policies, "high-handed" official attitudes or even individual prosecutions for illegal ignition—a "natural antipathy to government departments and civil servants", in the words of forester Angelo Milesi. As the commission progressed, Rodger increasingly suggested to witnesses that perhaps they were not up to date with department practice, and he ultimately found that many critics had "little real knowledge" of either the forests or department policy. Prescribed burning levels functioned, he believed, as a proxy for other complaints and long-held grudges.

2009

The royal commission set up following Victoria's devastating Black Saturday fires in 2009, which killed 173 people, chose to be guided in its assessment of prescribed burning by a panel of experts. The panel emphasised that the practice was the "most effective mechanism" to reduce fuel; but it also found that under the catastrophic conditions on that day "the probability of effective suppression was negligible", regardless of just how

influenced land management policy across Victoria. It also served as a public stage for bureaucratic infighting and blame shifting, especially over the role, if any, that prescribed burning should play in managing the state's forests.

A E Kelso, an engineer with the Melbourne Metropolitan Board of Works, sought forests with closed canopies and 'clean' floors in order to safeguard Melbourne's water supply from erosion. Drawing on ideas of forestry from the US, he argued for the complete exclusion and suppression of any fire within the forest. By contrast, rural Victorians generally called for much greater 'broadcast' burning, sometimes every three to four years, in order to keep the forest safe. But forester C E Lane-Poole derided such proposals as a self-interested desire for the fresh stock feed that grew in the fires' wake, claiming that graziers saw "a box of matches as the best grass seed".



PHOTO: BUSHFIRE AND NATURAL HAZARDS CRC

Aftermath of the 2009 Kinglake, Victoria fires.

much fuel-reduction burning was conducted, and that the level of burning “did not mitigate the immediate impacts of fire”. Yet, reduced fuel levels from prior burns did help contain and suppress the fires, according to the panel, once conditions moderated following the wrenching wind change on the evening of the conflagration.

The panel agreed that a hectare-based target for prescribed burning should be a guide rather than the sole policy aim, because not all hectares are of equal value. But the commission chose to recommend that five percent of all public lands be burnt on an annual basis. After heavy criticism that this burning was being disproportionately conducted in remote areas where escaped burns were less liable to damage property, and after a review found the target not to be “achievable, affordable or sustainable”, the policy was replaced in 2016. Prescribed burning in Victoria is now guided by the evidence of where it will best reduce bushfire risk.

As in 1939 and 1961, the submissions and media response to the Black Saturday Commission reveal that prescribed burning functioned as a proxy for other issues. Climate change, a defence of public lands, cattle grazing on the Victorian High

Country, the decline of the native timber industry—factors like these were hopelessly entangled with discussions ostensibly about fuel levels. Very few participants considered the complexities of catastrophic conditions, or whether a strategy developed in jarrah was applicable to mountain ash. Aside from the familiar confusion between prescribed burning and ‘back burning’, there was no real consensus on how to refer to different types of burning, from strips around settlements or on the edge of wet forests to the broad-area burns developed in WA.

As those three commissions demonstrate, Australia has always had a ready supply of ‘armchair fire generals’. But the reaction to the recent southern fires seems, like the fires themselves, to be more extensive. The opinion industry has been churning out hot takes, rural and interface communities are genuinely outraged, and we are even confronted by the horrifying prospect of a coordinated online campaign of bots and sock puppets encouraging quick fixes and undermining nuanced discussion.

The recent fires have also boosted interest in Indigenous cultural burning. Movements like the Firesticks Alliance, which seeks to reignite cultural burning

in the southern states, hold great promise both for hazard reduction and, especially, as way for Indigenous Australians to assert and fulfil their responsibilities to Country. But while cultural burning and prescribed burning might seem like the same thing, they are not identical, and they often differ in method, effect and intent. Appropriation is a danger, as is exploitation or rushed failures. Cultural burning is not the answer; it is part of a multitude of answers and needs to be considered patiently, respectfully and locally.

Prescribed burning resists easy, grand, continent-wide narratives. It is a tool, not a panacea, and one that must be thought of and used subtly on a local basis. We also need broader recognition that it is *hazard reduction* and not *hazard removal*. A vigorous contest of ideas, policies and practice is obviously desirable, but it will be challenging to create a space where this can happen without being overshadowed by the broader politics of fire and land management. We have too many armchair fire generals and not enough fire stewards.

How we manage this discussion may well have significance beyond our shores. The response to the 1910 ‘Big Burn’ in the US locked the US Forest



PHOTO: ALEX DEURA, NSW DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT

Service into a fire-suppression paradigm, culminating in the unsustainable maxim that all wildfires must be extinguished by 10 am the following day. Fires were suppressed on the ground and fires were suppressed in the mind—research showing their vital ecological role was shamefully buried or ridiculed.

This fire suppression paradigm was

exported around the globe, including, as we have seen, to Australia. It took decades for Australians to abandon it, and we played a small but significant part in convincing the US to do the same. In recent years, disastrous wildfires have struck (among other places) California, Greece and Portugal. Climate change is challenging

established fire management policies and strategies. It is also challenging established fire politics. With these fires, we have an opportunity to lead the world again. ■

This article originally appeared in Inside Story on 17 January 2020

Hazard-reduction burning in Bomaderry Creek Park, NSW.

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HOW MUCH DOES IT REALLY COST TO BUILD HOMES THAT WILL SURVIVE BUSHFIRE?

A new West Australian study, Project BAL Build, has sought to address the misinformation and confusion about the cost of building bushfire-resistant houses.

BY **KATHRYN KINNEAR**

Bio Diverse Solutions

AND **JULIE DE JONG**

H+H Architects

In regional Western Australia, questions continually arise about the cost of building to Australian Standard AS 3959 *Construction of buildings in bushfire-prone areas* and the Bushfire Attack Levels (BAL) it prescribes. Project BAL Build was a study developed by this article's authors to provide information on the cost of building to AS 3959 in regional WA. The study examined costs using a building design that is common in the region (rather than hypothetical house plans), as well as examining the cost of constructing the seven levels of BAL and comparing these ratings with a base design.

Background to AS 3959

The practice of building to AS 3959 is not new in Australia. AS 3959 was originally released in 1991, with the current fourth edition published in 2018. Construction to AS 3959 was legislated in December 2015 by the WA Government, making the practice relatively new in the WA building industry.

Poor information availability

There is little public information about how much building to BAL requirements adds to the cost of a house. What information is available puts broad ranges on that cost. It was reported in the *Daily Telegraph* in 2018 that a

leading insurance company estimated the cost of meeting BAL 12.5 to BAL 40 was between \$16,000 and \$56,000, and between \$65,000 and \$277,000 for meeting BAL Flame Zone (FZ) requirements.

WA landowners described additional charges of \$50,000 to \$120,000 for construction to BAL FZ and \$45,000 to \$65,000 for construction to BAL 40, demonstrating that there are clearly financial impacts attributed to BAL compliance—but the nature and extent of these costs is extremely variable.

Regulatory Impact Statement

In 2009 the Australian Building Codes Board (ABCB) published a Regulatory

Impact Statement (RIS) that assessed the cost benefits of the revised AS 3959. The RIS assessed three house types as the basis for comparison and calculated the generic cost impacts for compliance across the six different BAL ratings. The three house types were:

- ◆ a base house: a single-storey, three-bedroom house, timber weatherboard construction, slab on ground
- ◆ a large two-storey, four-bedroom house, brick veneer construction, slab on ground
- ◆ an elevated lightweight construction (ELC), single-storey, four-bedroom house, timber weatherboard construction, elevated subfloor.

The cost implications the ABCB found are presented in Figure 2.

Some key findings of the RIS:

- ◆ It accepts that some individuals will pay more for their house to comply with AS 3959, offering them some benefits (inherent in the higher construction standard, such as reduced damage costs, wellbeing, etc.) but primarily offering a cost benefit to the broader community, particularly by reducing the economic impacts of property loss from bushfires.
- ◆ Costs can be seen to favour different building types (i.e. brick veneer), potentially reducing consumer choice and design innovation for alternative construction types.
- ◆ The RIS tends to minimise the broad scale impacts of these cost implications. When used out of context, this could lead to ill-considered or restricted choices regarding site selection, building type, materials and construction



PHOTO: LEE GRIFFITH

Australian Standard AS 3959 divides bushfire prone areas into six Bushfire Attack Levels (BALs), based on their potential exposure to ember attack, radiant heat and direct flame contact.

- BAL-LOW—very low risk
- BAL-12.5—low risk
- BAL-19—moderate risk
- BAL-29—high risk
- BAL-40—very high risk
- BAL-FZ—extreme risk (Flame Zone)

Building a BAL-rated house, like this BAL-19 home, is not as expensive as often thought.



FIGURE 1. The reference house.

SOURCE: K. KINNEAR, J. DE JONG

FIGURE 2. Costs of constructing houses to various BAL ratings.

Category of bushfire attack	Base house	Large two-storey	ELC house
Current standard			
LOW	\$0	\$0	\$0
MEDIUM	\$9,196	\$12,586	\$19,174
HIGH	\$24,469	\$36,529	\$42,573
EXTREME	\$29,483	\$43,810	\$53,489
Proposed standard			
BAL-LOW	\$0	\$0	\$0
BAL-12.5	\$11,535	\$14,981	\$21,428
BAL-19	\$11,535	\$14,981	\$21,428
BAL-29	\$15,471	\$17,095	\$35,024
BAL-40	\$17,107	\$19,751	\$62,357
BAL-FZ	\$20,885	\$28,905	\$76,679

SOURCE: ABCB 2009

methodology. The reality is that some home owners may not be able to afford to build in a bushfire-prone area.

◆ Consumers may be misled about the real cost of bushfire compliance, with generic figures being applied by 'shonky builders' under the guise of variations.

◆ It is difficult to calculate the cost of applying a higher standard of construction to an industry standard that has much higher tolerances for error (e.g. maximum gaps of 2mm).

Are all these costs attributable to bushfire compliance?

We must recognise that bushfire compliance needs to be considered in conjunction with other construction standards that already require higher levels of performance, including Section J of the National Construction Code (NCC) on energy efficiency. In particular, many bushfire-prone areas are cold in winter and hot in summer, already requiring a passive-solar design response, thermally efficient glazing and thermal mass.

Site-responsive design should already

take into consideration all aspects of the site including topography, sunlight and solar orientation, prevailing winds, shading and sun protection, thermal insulation and thermal mass, retention of environmental features, functioning of local ecosystems and habitats, site access and egress, proximity to neighbours, provision of site services, etc. Good design and construction should already consider the suitability of materials and their performance in a range of environmental conditions, including summer heat, winter storms, seasonal flooding, insect and vermin infestations and bushfire events.

Good design and construction

From an architect's perspective, one positive outcome of the construction standards and BAL planning principles of AS 3959 is the importance placed on site-responsive design. It also reinforces higher standards of construction in residential building—an industry that doesn't necessarily prioritise the importance of 'building to last', and where we are constantly seeing more consumers being convinced to upgrade

their kitchen benchtops instead of their insulation levels.

Some key building requirements in AS 3959 are just good practice in building a durable house.

◆ **Durable products:** Use of durable and resilient cladding/construction materials will increase the life of the building and reduce maintenance costs long-term.

◆ **Minimal gaps, seals and weather strips:** Minimal gaps in buildings means better weather-proofing, improved insect and vermin control, and better thermal insulation properties of the internal conditioned spaces.

◆ **Glazing:** Higher-spec glazing improves thermal performance and energy efficiency of buildings.

◆ **Cladding:** Eaves and subfloors reduce maintenance and allow concealment of structure and services.

◆ **Metal screens:** Mesh screens made of corrosion-resistant steel, bronze or aluminium have superior performance and improve security.

◆ **Sarking:** Sarking improves the thermal performance of all roofs and assists with controlling condensation in buildings, which is a significant issue resulting from the higher insulation requirements of Section J.

◆ **Setbacks between buildings:** The NCC already requires consideration of setbacks and separation distances between buildings and boundaries that are considered 'fire-source features' to prevent the spread of fire and property damage, and the BAL standards reinforce this approach.

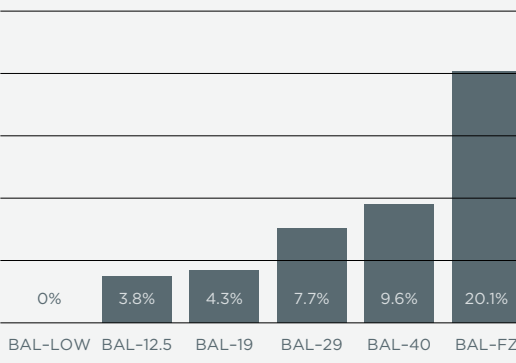
Project BAL Build: a case study

In developing the cost comparison, the Project BAL Build authors wanted to be sure an actual design used in regional WA was the reference house. The design had to reflect the current building market's expectations and had to take into account materials that can be sourced in regional WA (noting some materials, especially timber species for

PHOTO: J. DE JONG



FIGURE 3. Project BAL Build increase in construction costs to reference house.



SOURCE: K. KINNEAR, J. DE JONG

BAL construction can struggle with industry tolerance of lower standards, such as this BAL 12.5 build with gaps greater than 3mm.

BAL 40, often cannot be sourced in WA).

The reference building used was a house built in Tambellup, WA, approximately 200 kilometres from Perth. The reference house was a single-storey, four-bedroom house, brick veneer and with weatherboard cladding and a Colorbond roof (see Figure 1). The reference house had no special construction requirements, aligned to the NCC, and was a typical size and type of construction seen throughout regional WA.

The study found that it was feasible to build to all BAL levels, and major cost impacts are likely to be experienced only for BAL-40 and BAL-FZ. A summary of the findings for the building construction requirements and the cost increase through the seven levels of AS 3959/BAL construction is shown in Figure 2.

Full details of the construction requirements of the reference house

from BAL-Low to BAL FZ can found at www.biodiversesolutions.com.au and www.hharchitects.com.au.

Findings of study

The biggest cost impacts revolved around the gap and join sealing (applicable to all levels), upgrading glazing (but starting from a very low standard in the reference house), screens (applicable to all levels), bushfire shutters or BAL 40/BAL FZ-rated window systems, and lining the eaves, verandas and subfloors.

It is in the interest of the consumer to minimise their BAL, both to limit their upfront construction costs as well as long-term maintenance costs (for the building and the site, to manage the Asset Protection Zones). Some building types are more readily compliant to the AS 3959 bushfire standard, and this is already the dominant type of housing

construction in WA (i.e. masonry or fibre-cement weatherboard with slab-on-ground and profiled steel roof). It was noted that many of the upgrades required to comply with AS 3959 are already required in order to comply with Section J-Energy Efficiency provisions of the NCC and good practice generally.

Recommendations and conclusions from this study include:

- ◆ Consumers should request quotes from their builder that clearly demonstrate the extra-over provisions related to AS 3959 compliance, which aren't already required for their six-star energy rating.
- ◆ Builders should clearly articulate in plans the BAL provisions addressing compliance with AS 3959. Many building surveyors require this to be submitted as a separate drawing at the time of building permit application.
- ◆ Bushfire consultants should not give advice about construction cost implications unless they are a construction cost consultant.
- ◆ Designers and builders should consider bushfire compliance as part of their consideration of all site conditions that affect the building and its site planning, and mitigate impacts where possible.
- ◆ Building to BAL-12.5 to BAL-29 is not as significant a cost as previously thought.
- ◆ The cost of building to BAL-40, surprisingly, added less than 10% cost to the reference house.
- ◆ Significant cost increases occur in the BAL-FZ building standard.
- ◆ Building to AS 3959 and BAL is good building practice; it prioritises resilience, durability, building performance and site-responsive design. ■

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DATA CAPTURES DIVERSITY JOURNEY

Women's representation in fire and emergency services remains low—at 24.2%. New approaches to recruitment and workplace policies are addressing the barriers and unconscious bias that exist across the sector.

BY **ALANA BEITZ**

AFAC

Frontline roles in the fire and emergency services are a critical pathway to leadership positions across the sector. The Male Champions of Change (MCC) Fire and Emergency Group is prioritising women's representation in these positions to foster a more gender-inclusive sector.

Established in April 2017, the MCC Fire and Emergency Group comprises 29 sector leaders representing an estimated 288,000 employees and volunteers across Australia and New Zealand. In early 2020, the group released its second progress report, documenting the steps forward in diversity and inclusion made since their initial report in December 2018.

Group convenor and Victorian Human Rights and Equal Opportunity Commissioner Kristen Hilton said the report captured the collective and conscious efforts of the sector.

"This year's results, particularly in the area of recruitment, show that real progress is being made to ensure our emergency services are more representative of the communities they serve," she said.

AFAC CEO Stuart Ellis said a more diverse workforce would strengthen the sector.

"We firmly believe that attracting more women and tapping into new and

different skills will be fundamental to meeting Australia's fire and emergency prevention, preparedness, incident response and recovery needs into the future."

The second report provides a point of comparison to measure workplace gender representation over the last 12 months in leadership, recruitment, graduates and promotions. Highlights from the *Male Champions of Change Fire and Emergency Impact Report 2018–19* include:

- ◆ Gender balance or an increase in women's representation was achieved across 77.6% of employment categories in 2019.
- ◆ Overall representation of women increased to 24.2% in 2019 from 22% in 2018.
- ◆ 40.1% of overall hires across the group were women
- ◆ 79.3% of members have mainstreamed flexible working strategies.
- ◆ 92.9% of members have flexible parental leave policies.
- ◆ 79.3% of members have a formal policy or strategy in place for preventing and addressing sexual harassment.

The report also provides updates on seven priority areas for the fire and emergency services sector, with examples of changes in action from member agencies detailed in the report:

Inclusive leadership—85.2% of group members have committed to the 'panel

pledge' to ensure gender balance at key sector events.

Flexible workplaces—79.3% of members have implemented flexible work policies, with further work to be completed in 2020.

Talent development—the group prepared a 'sponsorship of talent' program to help identify and accelerate the skills development of women.

Communication—72% of member organisations underwent an audit of their public presence to ensure they present a respectful and inclusive environment.

Community—the group supported gender and diversity research and increased community engagement on social issues, such as domestic violence.

Systems—various members commenced development of sexual harassment policies, reviewed workplace culture and adopted mentoring programs.

Reporting—all members shared gender representation data to develop the most consistent and comprehensive reporting on gender equality ever undertaken in the fire and emergency sector. ■

Changes to recruitment and workplace policies are helping fire and emergency service agencies better reflect the communities they serve.

Read the full report online:
malechampionsofchange.com/wp-content/uploads/2020/03/Fire-Emergency-Impact-Report-2019.pdf.

WHY CAUTION IS NEEDED ON OXYGEN REDUCTION SYSTEMS

As interest in oxygen reduction systems grows, caution must be taken to ensure it is the right system for the job.

BY **MICHAEL STUCKINGS**

Operations Chief Engineer, FM Global

The fire triangle explains that there are three ingredients for most fires—heat, fuel and an oxidising agent. If you want to control a fire, you reduce the fuel, oxygen or heat. Sprinklers, which are the most commonly used fire protection system, address the heat and fuel legs. But now there's a new kid on the block, which aims to solve the problem differently: oxygen reduction systems (ORS).

It's not surprising that there is significant interest in this new technology. You need a fire to activate a sprinkler system, and while the damage from a fire can be limited using sprinklers, damage is inevitable—from the fire itself, the smoke and/or the water used to put it out.

ORS are designed to avoid fires starting or spreading by maintaining a permanently low oxygen concentration in an enclosed protection space. They do this by streaming nitrogen (N_2) into these spaces. ORS are sometimes positioned as a more cost-effective way to reduce fire risk, with claims that they can eliminate the need for more costly fire sprinkler installations.

FM Global is seeing an increase in the number of businesses considering ORS as a way of preventing the start or controlling spread of fire. We expect interest in ORS to grow as warehouses get bigger and automated storage retrieval becomes more popular. Combined with increases in robotic technology, rising salaries and land

costs, organisations are increasingly building warehouses that are more than 30 metres tall. Sprinkler systems in these environments become elaborate and costly, making alternatives more appealing.

We recently did some testing to advance ORS understanding and reduce risk. Our research centred on the oxygen concentration limits required to prevent fire propagation, testing various ignition source intensities and different fuel sources.

What we've discovered should serve as a note of caution for anyone managing fire risk. Our research reveals that the oxygen concentration needed for an ORS to function effectively must be lower than that specified in a commonly referenced standard—the existing German VDS3527.

As a result, we feel that these systems are a potentially viable fire protection method for certain well-sealed, unoccupied spaces, but will require significant consideration to replace sprinkler protection.

Research in more detail

To provide more context, I'll outline how we conducted our lab research into ORS.

- ◆ Testing commodities included five standard commodities commonly found in today's warehouses: Class 3, as well as both cartoned and uncartoned expanded and unexpanded plastics (Cartoned Unexpanded Plastic [CUP], Cartoned Expanded Plastic [CEP], Uncartoned Unexpanded Plastic [UUP] and Uncartoned Expanded

Plastic [UEP]). Two-tier fuel arrays of standard commodities were set up in rack storage configuration in an enclosure. To represent a large space at uniform concentration, a constant N_2 /air mixture flow was supplied into the enclosure at a desired oxygen concentration.

- ◆ The target oxygen concentration was varied from 9% up to 17%. A premixed propane ignitor with a constant heat release rate (HRR) was used as the ignition source.
- ◆ The impact of the test conditions on fire propagation was examined in detail for Class 3 commodities at different oxygen levels. The results showed that oxygen concentration is the dominant parameter controlling fire propagation.

The limiting oxygen concentrations (LOC) that support flame propagation were determined with and without a sustained ignition source using statistical analysis of the large-scale data. The LOC was defined as the oxygen concentration for a 5% probability of flame spread.

Findings on the appropriate LOC for different commodity and ignition types were as follows:

- ◆ cartoned (Class 3, CUP and CEP) with a sustained ignitor—11.1%
- ◆ uncartoned (UUP and UEP) with a sustained ignitor—13.0%
- ◆ cartoned (Class 3, CUP and CEP) with ignitor shut-off after ignition—13.8%
- ◆ uncartoned (UUP and UEP) with ignitor shut off after ignition—14.7%.

Beyond LOC

Given the criticality of maintaining the LOC and the potential complexity of ORS, the design of the specific system should be evaluated to ensure that the fire protection provides the appropriate level of reliability through redundancy, alarming, ready availability of sparring and appropriately trained service personnel.

In temperature control systems, people may not realise that the temperature has spiked until it's too late. A similar risk exists with ORS. The effectiveness of the system in minimising the spread of fire relies on maintaining the LOC. Failure of electrical power or a system component, or loss of enclosure integrity could cause the oxygen concentration to rise to a level where a fire is possible before the problem can be identified and rectified—leaving the facility unprotected against fire if there is no sprinkler system provided.

There are also personal safety issues to be thoroughly considered. The LOC our research recommends as effective for reducing fire propagation risk will create confined space hazards for any people working in warehouses where ORS are deployed. Any organisation using these systems needs very clear procedures on how a person may enter the space.

Clear cooperation and communication with the local fire department is also critical. Firefighters called out to a fire would need to understand that they're responding to an event in an area with significantly lower oxygen concentration. There's also a possibility that, by compromising the enclosure integrity, fire crews could make matters worse by allowing more oxygen into the building, fuelling the fire.

These words of caution are not to say that ORS are not appropriate for some situations. For those considering

how best to reduce fire and fire propagation risk, we recommend thoroughly assessing claims made by providers and consulting with independent partners.

We caution that while ORS offer potential benefits, they must be implemented with caution, all necessary safeguards in place and a back-up plan. At this time, they should be considered an additional fire prevention method, but not a substitute for traditional fire protection measures. In the future there is the potential for ORS to be implemented as an alternative to traditional fire protection measures. ■

To explore the research in greater technical depth see the full report, *Evaluation of Oxygen Reduction System (ORS) in Large-Scale Fire Tests*, at ow.ly/bimY50yEIRt.

Interest in oxygen reduction systems will grow as automated warehouses become more popular.

PHOTO: FM GLOBAL



AFAC20 KEYNOTES SHINE A LIGHT ON PAST EXPERIENCES

A survivor of the London bombings, an anaesthetist from the Thai cave rescue, a former special assistant to a US president and Australia's Chief Scientist will all take to the stage at the AFAC20 powered by INTERSCHUTZ Conference and Trade Exhibition.

BY **COSTA HARITOS**

AFAC

An exciting range of keynote speakers with unique past experiences have been secured for the AFAC20 powered by INTERSCHUTZ Conference and Trade Exhibition.

The conference is scheduled to take place at the Adelaide Convention and Exhibition Centre from 25 to 28 August, with presentations exploring the central theme: 'Connecting communities. Creating resilience.'

Dr Gill Hicks AM MBE

Dr Gill Hicks AM MBE lost both legs after being the last victim to be rescued from the 2005 London bombings.

Now, she is one of Australia's most thought-provoking speakers and strongest advocates for global peace.

Dr Hicks launched M.A.D. (Making A Difference) For Peace, a not-for-profit that

educates people about taking individual responsibility in creating a world without extreme conflict. She is also the author of a book, *One unknown*, named after the label given to her when she was admitted to hospital as an unidentified body.

Her AFAC20 powered by INTERSCHUTZ keynote presentation will explore the idea of doing more than just surviving.

"There is a knowing that comes from facing the unimaginable, insights that make life and our purpose very clear, what really matters is what we do and how we contribute to ensure we leave a lasting footprint—our legacy," Dr Hicks said.

She says her story is about more than resilience.

"For me, as a double amputee, having the confidence to fall means I have the ability to keep getting back up—it's more than resilience, it's about the determination to continue and honour the gift of my life."

Dr Hicks, among her many prestigious recognitions, also recently received the highest honorary doctorate from the University of South Australia for her positive impacts on society.

Dr Richard Harris SC OAM

As 2019 Australian of the Year, Dr Richard Harris SC OAM was celebrated for his work in the 2018 Tham Luang cave rescue in Thailand, where he saved the lives of 13 people from a flooded cave.

Dr Harris works in anaesthesia and aeromedical retrieval medicine, where he has developed an interest in search and rescue operations. He established the first sump rescue training course in Australasia, which focuses on deep caves.

He will present his story of resilience and complex decision-making in Adelaide this August, where he will tailor the presentation to focus on how to achieve goals and resilience when under pressure.



PHOTO: SPECIALIST ANAESTHETIST SERVICES

Dr Richard Harris SC OAM.

Dr Harris published his experiences from inside the cave in a book titled *Against all odds*, and received the Star of Courage for his bravery and the Order of Australia for this service to the international community.

Alice Hill (US)

As a former special assistant to US President Barack Obama and Senior Director for resilience policy on the National Security Council, Alice Hill has focused her career on connecting communities and creating resilience.

Ms Hill's presentation will focus on the risks, consequences and responses associated with climate change as she draws on her experiences as Senior Fellow for Climate Change Policy at the

Council of Foreign Relations. She will also draw from her past experiences serving as Research Fellow at Stanford University's Hoover Institution.

She is the co-author of *Building a resilient tomorrow*, which focuses on preparedness and resilience for the coming of climate disruption.

Dr Alan Finkel AO

Australia's Chief Scientist, Dr Alan Finkel AO, will present the Dr Laurie Hammond Oration as part of the Bushfire and Natural Hazards CRC's Research Forum on Day 1 of the conference. Dr Finkel has an extensive science background as a neuroscientist, an educator, entrepreneur and engineer.

He previously served as the President of the Australian Academy of Technology and Engineering and the Chancellor of Monash University.

Dr Finkel is committed to science

The AFAC Conference Board is monitoring information from government authorities regarding the spread of COVID-19, and will determine any changes to the AFAC20 powered by INTERSCHUTZ Conference based on this advice.



PHOTO: AUSTRALIA'S CHIEF SCIENTIST

Dr Alan Finkel AO.

education and is the cofounder of *Cosmos* magazine, which also operates a secondary schools' science education program.

AFAC20 powered by INTERSCHUTZ will take place on the back of the highly successful AFAC19 Conference, which attracted over 4,000 delegates in Melbourne. The 2020 three-day event will begin with the Bushfire and Natural Hazards CRC's Research Forum, and will run concurrently alongside the Australian Disaster Resilience Conference and the Women and Firefighting Australasia Conference ■

For updated information on AFAC20 powered by INTERSCHUTZ, please visit: www.afacconference.com.au.



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SAVANNA FIRE

PHOTO: NATHAN MADDOCK, BUSHFIRE AND NATURAL HAZARDS CRC

New tools have been developed to assess and improve fire management, providing metrics that allow land managers to better measure the effect of fire.

Large areas of northern Australia burn each year, affecting the environment and carbon emissions.

BY **AMY MULDER**

Bushfire and Natural Hazards CRC

A savanna-wide fire-mapping program has been developed to assist fire managers across northern Australia in assessing the effectiveness of planned burns. In the vast landscape of Australia's fire-prone north, fuel reduction is the main tool for reducing bushfire risk.

The Bushfire and Natural Hazards CRC project *Tools supporting fire management in northern Australia* has created sophisticated mapping and modelling tools to assist fire managers. An outcome of the work, the Savanna Monitoring and Evaluation Reporting Framework (SMERF), provides web-based, savanna-wide fire mapping to assist land managers with fire planning across large areas of land.

The online program evaluates the effects of fire where burnt-area mapping

is available across the Northern Territory, and large parts of Western Australia and northern Queensland. It assesses nearly 20 years of data to show where bushfires have burnt, at what time of year (early or late dry season) and when an area was last burnt.

CRC researcher Dr Andrew Edwards from Charles Darwin University explained that SMERF provides a meaningful suite of metrics to support fire and land managers.

"The data out of SMERF are really useful means—and probably the only means we have at the moment—of evaluating the effects of fire and improved or not-improved fire regimes, from an ecological perspective," said Dr Edwards.

"The information from the reports will be able to be used to apply local, ecological and traditional knowledge to improve biodiversity and landscape management."

While web-based tools that cover Australia's tropical savannas and rangelands have provided satellite-derived burnt-area mapping for more than 20 years, SMERF distills existing monitoring and evaluation reports and incorporates information gathered from workshops and interviews with land and fire managers, as well as the scientific literature and case studies.

"SMERF has standardised monitoring and evaluation, making it readily accessible for all levels of land management for nearly 70% of continental Australia. SMERF can also be applied wherever fire history mapping is available, at any scale," Dr Edwards said.

Reports on all national parks are available, with plans to be expanded into all properties in northern Australia.

SMERF's easy-to-use, flexible reports are available at www.ntinfonet.org.au/smerf-crc.



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CALCULATING THE LOSSES THIS FIRE SEASON

The impact of natural hazards on the economy is complex and often overwhelming. The 2019–20 fires are no different, and the true costs won't be known for years.

BY **RADHIYA FANHAM**

Bushfire and Natural Hazards CRC

Estimating the total economic cost of Australia's natural hazards is not easy. The physical destruction of the recent bushfires that have torn through millions of hectares of the Australian landscape, as well as the impact on human lives, the economy and the environment, is complex. Adding to this complexity is that, as the full effects become known, it is highly likely that the costs of this season will continue to rise for years to come.

Professor of Economics at Deakin University and researcher for the Bushfire and Natural Hazards CRC Mehmet Ulubasoglu described three types of costs related to natural disasters.

"The first type is tangible direct damages, which are basically the market value of the properties or infrastructure damaged, such as houses, cars and crops," he said.

"The second type of cost is tangible indirect losses. These are not direct damages, but they are incurred as a consequence of disasters, such as relief and recovery expenditures that have to be made.

Bushfires have complex impacts on the economy, including effects on forestry.

PHOTO: SOUTH AUSTRALIA SES

"The third cost type is intangible indirect losses. These effects are not directly measurable but we know that they are there—such as mental health effects, social effects and the value of the forests burnt," Prof Ulubasoglu explained.

Taking into account all three types of costs in the wake of the 2019–20 bushfire season, current estimates stand at tens of billions of dollars in losses. Professor John Quiggin, Australian Laureate Fellow in Economics at the University of Queensland, estimates a loss of over \$100 bn.

The effects of bushfires last for years and they hit some sectors much harder than others. It is this very area that Prof Ulubasoglu has been exploring in his research, undertaken as part of the CRC project *Optimising post-disaster recovery interventions in Australia*. With a focus on the 2009 Black Saturday bushfires, the analysis undertaken by Prof Ulubasoglu and his team shows that the economic impacts of these fires hit the agricultural sector the hardest.

"Agricultural sector employees received the hardest hit. They lost an average of \$11,000 of annual income per individual as a result of the disaster," Prof Ulubasoglu explained.



Professor Mehmet Ulubasoglu presenting at AFAC18 powered by INTERSCHUTZ.

"Our research shows that 'smallness' in economic terms is a point of vulnerability in the sense that sectors find it difficult to come back to their pre-disaster income trajectory because they face a big loss compared to their size."

This means that, in general, low-income earners can lose out, while middle-income or high-income earners are not affected to the same degree—or may even increase their annual income. When it comes to how often a person works, typically the incomes of part-time workers decrease while full-time workers are not affected.

When natural hazards occur, people place negative weight on production, investment and business activities, hence consumer confidence falls, resulting in a broader negative outlook for the economy.

Prof Ulubasoglu says we need to recognise that these different sectors represent different levels of vulnerability and so there is significant room to reconsider the system to make the most out of taxpayers' money and build a sustainable disaster recovery model.

It has been an incredibly long and difficult fire season all around the country. When asked how Australia can cope with future disasters and the inevitable negative impact on the economy, Prof Ulubasoglu said we need to recognise the scale of the threat.

"Climate change is a real and significant threat," he said. "There are new dimensions and risks waiting to be identified, documented and quantified so we need to increase our research into these emerging risks."

Find out more about this research at www.bnhcrc.com.au/research/postdisastereconomics.

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Large airtankers like the Avro RJ85 firebomber provide infrastructure protection and lay retardant lines to limit the spread of the bushfires.

FULL THROTTLE FOR PILOTS THROUGH BUSHFIRE CRISIS

Aerial firefighting pilots have a bird's-eye view of the severity of a bushfire as they assist ground crews from above. The 2019–20 bushfire season saw the largest ever procurement of aircraft taking to the skies to protect people, infrastructure and wildlife.

BY **COSTA HARITOS**

AFAC

Ray Horton spends most mornings running along the calm Geelong waterfront, in Victoria's south-west. By the afternoon, he is soaring above raging bushfires and laying retardant at 200 feet.

Mr Horton lives in Abbotsford, just outside of Vancouver, Canada, but for the past six years he has been swapping the Canadian winter for the Australian summer to work as a large air tanker pilot. He said his previous experiences of fire seasons in Australia "look very benign" when compared to the 2019–20 season.

"I've never seen fire develop from

basically its conception to monster size as quickly as I have witnessed here in Australia this year," he said.

Mr Horton has operated in Victoria, NSW and on Kangaroo Island during Australia's unprecedented bushfire season, which burnt over 16 million hectares between September 2019 and February 2020.

Hundreds of international pilots, firefighters and specialists were deployed to Australia at the request of the states and territories through the AFAC National Resource Sharing Centre (NRSC) during the bushfire season.

"We've certainly had big fires in Canada that have threatened and gone through communities, none to the extent

and not with the speed of what we saw here.

"The terrain around Australia can make it pretty challenging," Mr Horton said.

Mr Horton is one of two crew members who make up the cockpit on the Avro RJ85 firebomber aircraft, which is part of a fleet of over 160 aircraft procured by the AFAC National Aerial Firefighting Centre (NAFC).

NAFC facilitates the coordination and procurement of these highly specialised firefighting aircraft. NAFC General Manager Richard Alder said an additional 20 aircraft were procured for the 2019–20 season, which saw existing aircraft used in unprecedented numbers.

"The speed and versatility of the aircraft mean they can play a wide range of really valuable roles in supporting firefighters," Mr Alder said.

Firefighting aircraft across Australia are supported through ARENA, an innovative NAFC software system that tracks the national fleet, their capability and the availability of resources in real time.

"ARENA was developed in collaboration with all states and territories. The real-time visibility of resources across the nation that it provides has really revolutionised the way we manage aircraft," Mr Alder said.

The RJ85 aircraft boasts an 11,350-litre retardant capacity tank and can cruise at speeds of up to 680 kilometres per hour. It was initially designed as a short-haul airliner with the capacity to take off from short runways and navigate steep approaches, making it perfect for dealing with fast-moving bushfires across the Australian terrain.

Doing data differently in the sky

Data is crucial to aerial firefighting, which is made easier through intelligence-gathering systems and smaller aircraft that monitor the fire behaviour to inform where aerial resources are deployed.

Petri Miniotas was operating the Airbus AS350 helicopter or Firebird 100 across the eastern fireground from the Queensland border down to the Victorian border, where he was gathering geospatial data to help his large air tanker counterparts protect

infrastructure and lay retardant lines to limit the spread of the fires.

"Intelligence gathering is helpful across all aspects of an operation," he said.

The specialist intelligence-gathering camera can help incident management teams provide accurate information to communities affected by bushfires, as well as prioritise and distribute aerial resources through real-time footage.

"We can stand off from the fire and assist the Air Attack Supervisor.

"For us it's about data management—so I can be flat out or quietly working away in the helicopter depending on what the fire is doing and the level of data and mapping required," Mr Miniotas said.

During the 2019–20 season, additional large air tankers were flown in from the United States, including two DC-10s—the largest-sized aircraft procured by NAFC—and two Erickson Aero MD87-103s.

These large air tankers provide a weight of attack and speed of deployment that are not matched by other smaller firefighting aircraft.

Mr Miniotas said the national aerial and resource-sharing capabilities provided through AFAC have been of great assistance.

"Many people I've worked with over the past months have all said this is the biggest [bushfire season] they've ever seen," Mr Miniotas said.

The helicopter pilot says intelligence gathering is a "major part" of aerial firefighting, which will be challenged by

longer fire seasons in both Australia and the Northern Hemisphere.

"The more eyes in the sky out there, the greater level of preparedness we can have when an incident is present and for overall awareness on the conditions.

"Fire activity is a lot easier to see from the sky. Decisions about containment, direct attack and placement of resources are all greatly aided through aviation," Mr Miniotas said.

He says his technical knowledge and experiences with camera operation and flying helicopters have sparked a passion for the multifaceted job.

"There is a lot our little helicopters can do—this is just the beginning," he said.

As aircrews were reunited with their families back home, Mr Horton said the crash of a Coulson large air tanker in the Snowy Monaro region in January was a day for reflection.

"There's no possible way to compartmentalise that immediately and pretend it didn't happen and keep flying safely.

"We learn from it and we try to correct anything that we're doing and make it better and safer," he said.

While the software and terrain may differ between Australia and the Northern Hemisphere, the aerial firefighting community are "all brothers in arms".

"We're generally with the same crews for long periods of time so we become a little bit of a family," said Mr Horton. ■



PHOTO: WAYNE RIGG, CFA

AFAC's National Aerial Firefighting Centre procured its largest fleet of aircraft during the 2019–20 bushfire season, including two Erickson Aero MD87-103s from the United States.

PERSPECTIVES ON THE SECTOR

WITH MICHAEL MORGAN

**STUART
ELLIS AM**

Chief Executive Officer,
AFAC



In this regular series, AFAC CEO Stuart Ellis interviews a senior AFAC leader for each issue of *Fire Australia*. This issue he caught up with Michael Morgan, Chief Officer of the South Australian Metropolitan Fire Service.

You have served with the SA Metropolitan Fire Service (SAMFS) throughout your fire service career. Now as CEO and Chief Officer, you are clearly proud of the service. What has changed since you joined as a recruit in 1986?

I joined the SAMFS in February 1986 and have just celebrated 34 years of service at a recruit course reunion. I was fortunate enough to progress to the role of SAMFS Chief Officer in 2018.

During my career, I've noticed that it has become a more modern, progressive workplace with improved equipment and training. Community expectations have also increased, where there's now more of a focus on what firefighters do. Also, as a fire service, we have greater interaction with the community than when I first joined, which is a very positive thing.

You have maintained a particular interest and have been recognised for supporting women and diversity. Why have you done this?

I've been passionate about diversity and inclusion for a number of years and at the rank of Assistant Chief Fire Officer I had worked actively to increase the diversity across the workforce. I really do want to see the role of the firefighter become more open to people from diverse backgrounds. Everyone deserves the same opportunities that I've had in my career.

I believe that the workforce flourishes with more diversity. It creates a healthier, more communicative and supportive environment for all.

SAMFS, SA Country Fire Service and SA State Emergency Service work with the South Australian Fire and Emergency Commission (SAFECOM) in a unique arrangement. You are on the SAFECOM Board. What does that bring to SAMFS and your coordination with the other services?

There is a unique arrangement in SA that requires the agencies to work collaboratively and to be more interactive. It brings about stronger relationships between chiefs and emergency services agencies.

We find there is more of a reliance on each agency to support one another. There is great interoperability between our agencies and we work collaboratively to achieve the best outcomes possible for the community.

SAMFS has had particular challenges with per- and poly-fluoroalkyl substances (PFAS) at some of your stations. Can you tell us a little about what is being done to respond to this?

When we first became aware of PFAS issues as an agency, we responded quickly by testing sites and fire appliances and remediating if a risk was identified. Our organisation also

implemented voluntary blood testing for all current and former firefighters and staff, which was taken up by about 800 people.

The issue has been particularly challenging for the SAMFS in one area with a fire station that had historical use. The station was vacated while remediation of the site occurred. We have worked with other agencies from around Australia to identify the risks associated with PFAS and to share learnings about reducing those risks, including site cleaning, appliance cleaning and attempting to find safe methods to reduce elevated PFAS levels in human blood.

All SAMFS appliances have been cleaned and are below any level of risk and we continue to work with key stakeholders to return the crew to the station in the near future.

Currently, we are seeking to conduct further studies regarding PFAS reduction for firefighters, staff and their families.

Are you pleased with the calibre of recruits SAMFS is attracting and how would you compare them to recruits in your day?

I think it's exciting to see a new generation of firefighters entering the service and the skills and experience that they bring. Fortunately, the fire services face no challenge in attracting a large volume of people to applying for firefighter positions. However, one of

SAMFS
Chief Officer
Michael
Morgan.



SAMFS Chief
Officer Morgan
cradles the
daughters of
two serving
firefighters at a
meeting.

SAMFS Chief
Officer Morgan
attending a briefing
at the Kangaroo
Island bushfires,
January 2020.

PHOTO: SAMFS

the key areas we do have to focus on is attracting a more diverse workforce.

We actively engage with diverse groups to show people that firefighting can be a path for them. We aim to give them a better understanding of the role, to break down historical stereotypes and to encourage people to consider becoming a firefighter.

The recruits of old and current times are similar in that they all have a passion for the job. Today, our recruit courses continue to be full of graduates who feel incredibly privileged to step into the role.

With today's recruitment, organisations expect some differences, including a more modern thinking, agile and diverse workforce of people who are seeking greater opportunities for improvement, growth and promotion.

Finally, where do you see SAMFS in five years? Are there particular goals you are keen to achieve?

I'd like to see greater diversity across the board at the fire service and for our fire service to continue to be held in high regard and respect by the community. I'd also like to see our organisation enhance its community engagement through initiatives such as open days and station days.

One of the things I love about fire service open days is that we attract so many different people from different backgrounds. I think that continuing to engage with the community is vital



PHOTO: SAMFS

for enhancing community safety and providing a greater understanding of the role of a firefighter.

I'm keen for the SAMFS to continue to support multicultural events, as well as diversity events such as the Pride March. Fire services often come across disadvantaged groups through our work, so I'd like to see the SAMFS continue to support vulnerable people in our communities by engaging with initiatives such as Vinnies CEO Sleepout.

We continue to focus on the mental and physical health of firefighters and staff, from when they sign up to the job and into their retirement. Our staff give so much during their careers, we owe it to them to create a smoother transition into retirement that considers their mental, physical and financial wellbeing. ■

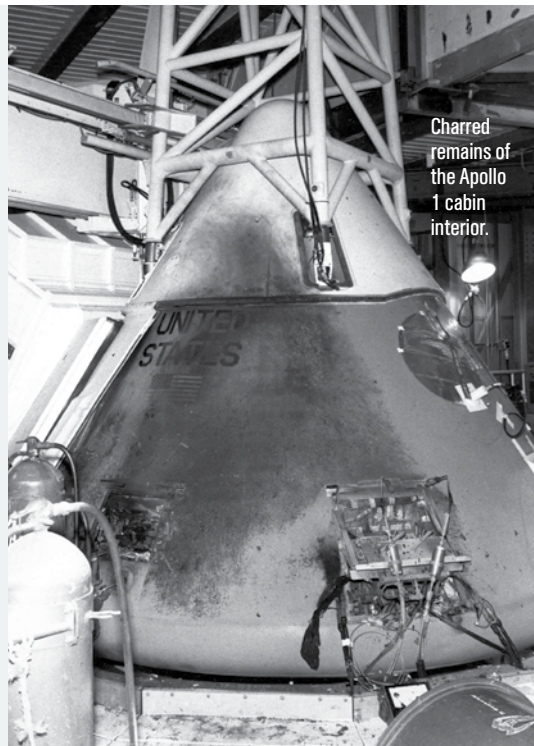
PHOTO: SAMFS

"I believe that the workforce flourishes with more diversity. It creates a healthier, more communicative and supportive environment for all."

—Michael Morgan, Chief Officer
SA Metropolitan Fire Service

The Apollo 1 crew, L to R—Virgil I 'Gus' Grissom—Edward H White II—Roger B Chaffee.

PHOTO: NASA



Charred remains of the Apollo 1 cabin interior.

PHOTO: NASA



The blackened exterior of the command module after the Apollo 1 fire.

PHOTO: NASA

THE APOLLO 1 TRAGEDY—1967

BY **BARRY LEE OAM**

On 27 January 1967, three US astronauts died when a flash fire swept through the Apollo 1 command module on the Saturn rocket launch pad at Cape Kennedy, Florida. The space crew—Virgil I 'Gus' Grissom, Edward White and Roger B. Chaffee—were taking part in a rehearsal for the launch of the first Apollo mission. It is probable that an electrical spark caused the fire, which spread quickly in the oxygen-filled atmosphere, killing the crew within seconds.

It was the first fatal fire in the US space program. The May 1968 issue of the US National Fire Protection Association's *NFPA Journal* reported that it was one of the largest fire losses by value in 1967, estimated at US\$75 M. It took more than 18 months and extensive redesigns before NASA sent more men into space.

At the time, fire protection provisions were minimal. In the relatively simple configurations of Mercury, Gemini and Apollo, crew members could observe the complete interior of the pressurised

modules and could recognise potential fire situations immediately. A food rehydration gun was designated for use as an emergency fire extinguisher, and was supplemented by cellulose gel fire extinguishers, which formed a foam when sprayed.

The atmosphere in the Apollo spacecraft was 100% oxygen at approximately 110 kiloPascals (absolute pressure of 16 pounds per square inch). Fire propagated through the cabin via materials that were not considered significantly flammable in a normal air atmosphere, but which were very flammable in 100% oxygen. These included kilometres of wiring snaking throughout the cabin, oxygen and water/glycol lines, foam pads and nylon netting. Seconds after ignition, the fire burnt hotter than 600 degrees Celsius.

As materials inside the cabin were incinerated, they gave off toxic fumes characterised by carbon monoxide and heavy smoke. The hatch door, intended to keep the astronauts and the atmosphere securely inside the spacecraft, proved impossible to open at time of fire—it was cabin pressure-sealed.

The astronauts had one option only: depressurise the cabin and attempt to snuff out the fire. However, despite their efforts, they did not succeed and could not open the inner hatch. Physicians later concluded that they died from asphyxia due to inhalation of toxic gases and were almost certainly unconscious before succumbing.

Follow-on investigations resulted in several design changes to improve Apollo crew safety. The oxygen environment used for ground tests was replaced with a nitrogen-oxygen mix. Flammable items were removed and, most notably, the hatch door was redesigned to that it would open in seconds to permit immediate crew to exit. ■

The risks taken by Gus Grissom, Ed White and Roger B. Chaffee materially contributed to the greatest burst of technological advancement known to humans in the twentieth century. More than fifty years later, no one interested in space flight has forgotten.

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BY **JESSICA TEMPLE**

Technical Administrator—Projects and Standards,
FPA Australia

AND **IAN FINDLAY**

Technical Officer—Projects and Standards, FPA Australia

STANDARDS

CE-030 Maritime structures

AS 3962-2020 *Marina design* was published on 6 March.

FP-002 Fire detection and alarm systems

FP-002 is in the process of reviewing the public comment for the AS 1603.17, AS 4428.3 and AS 4428.16 revisions. Work on the revision of AS 1670.6 continues.

FP-004 Automatic fire sprinkler installations

Amendment 2 to AS 2118.1-2017 is at committee ballot. Progress continues on revisions of AS 2118.2 and AS 2118.6.

FP-009 Fire hydrant installations

Progress continues on the AS 2419.4 draft (new standard for STORZ connections).

FP-011 Special hazard fire protection systems

Progress continues on the revisions of AS 3772-2008 and AS 4587-1999.

FP-022 Fire protection of mobile and transportable equipment

Progress continues on the revision of AS 5062 *Fire protection for mobile and transportable equipment*.

TS-001 Building commissioning

Progress continues on the new technical specification for building commissioning.

TECHNICAL ADVISORY COMMITTEES

The most recent round of TAC meetings was held in March, with the next round proposed to be held in July.

TAC/1 Maintenance of fire protection systems and equipment

The TAC continues to review comments received for inclusion in the draft project proposal for the revision of AS 1851-2012, and will also be meeting outside regularly scheduled meetings to get through the large volume of comments.

TAC/2 Fire detection and alarm systems

The Good Practice Guide GPG-08 *Residential smoke alarms* was published on 7 February 2020.

Progress continues on the draft Good Practice Guide (GPG) on speaker layout.

TAC/3/7 Portable and mobile equipment

The ACCC is reviewing the mandatory safety standards for portable fire extinguishers. TAC/3/7 has provided input to this review and is monitoring its progress.

TAC/4/8/9 Fire sprinkler and hydrant systems, tanks and fixed

The TAC continues to monitor and provide input to current Standards Australia projects.

Work continues on the GPG on hydrant commissioning and the pumpset checklists.

TAC/11/22 Special hazards fire protection systems

The TAC continues to monitor global developments in firefighting foams and associated policies and continues to work on an update to IB-06 *Selection and use of firefighting foams* to reflect these ongoing developments.

The TAC continues to monitor and provide input to current Standards Australia projects.

TAC/17 Emergency planning

TAC/17 did not meet this round; however, progress continues on the revision of IB-11 *Evacuation diagrams*.

TAC/18/19 Passive fire protection

Work continues on the update of PS-05 *Product compliance and evidence of suitability* and development of a GPG on intumescent dampers.

This TAC is undertaking discussions with TAC/1 on critical defects for fire doors.

TAC/20 Bushfire safety

The TAC continues to monitor and provide input to future AS 3959 work, as well as other bushfire documents and requirements.





AFAC20 POWERED BY INTERSCHUTZ

25–28 August 2020,

Adelaide Convention and Exhibition Centre

AFAC20 powered by INTERSCHUTZ will draw together international experts and leading thinkers from the emergency management sector in Adelaide this August. Delegates will explore the central theme 'Connecting communities. Creating resilience', with the latest technology on show as part of the trade exhibition and a live demonstrations area. The conference will feature the Bushfire and Natural Hazards CRC Research Forum and will run concurrently with the Institution of Fire Engineers Conference, Australian Disaster Resilience Conference and the Women in Firefighting Australasia Conference.

The AFAC Conference Board is monitoring information from government authorities regarding the spread of COVID-19, and will determine any changes to the AFAC20 powered by INTERSCHUTZ Conference based on this advice.

For more information, visit
www.afacconference.com.au.

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Shane Fitzsimmons

After 12 years serving as Commissioner NSW Rural Fire Service (RFS), Shane Fitzsimmons will take up a new role as Commissioner Resilience NSW. Mr Fitzsimmons has been with NSW RFS for more than 35 years, where he has also served on the AFAC Board as Deputy President and as a council member for an extended period.



Rob Rogers

Rob Rogers will take up the role of Commissioner at NSW Rural Fire Service. Mr Rogers has served as Deputy Commissioner of NSW Rural Fire Service for nine years, and he also served as Executive Director of Operations during the 2019–20 Black Summer bushfires.



Stephanie Rotarangi

Dr Stephanie Rotarangi has joined the AFAC Board. Dr Rotarangi oversees operational capability at the Country Fire Authority. She also works on the development of growth programs outside the Melbourne metropolitan area and in Victoria's regional cities. She has a PhD in geography and a Master of Environmental Science.



Carlene York

NSW State Emergency Service Commissioner Carlene York has joined the AFAC Board. Commissioner York joined NSW SES in October 2019 and has previously worked at senior levels with the NSW Police Force. She is a recipient of the Audrey Fagan Memorial Award—the highest honour of the Australasian Council of Women and Policing.



Sandra Whight

Sandra Whight, General Manager of Decision Support Services at the Bureau of Meteorology, has been appointed to the Board of the Bushfire and Natural Hazards CRC. Ms Whight is 25 years into her career in fire, was previously the Director of Community Fire Safety, Tasmania Fire Service, and is currently the Co-chair of the AFAC Climate Change Group, where she works with the whole emergency management sector to adapt and respond to the challenges of climate change.



Pat Jones

Superintendent Pat Jones has retired from ACT Fire and Rescue following 32 years of service. He is a recipient of the ACT Fire and Rescue Long Service and Good Conduct Medal with clasp for 30 years of service, the National Medal with clasp for 25 years' service, the Humanitarian Overseas Service Medal, and Canterbury Citation for his service after the Canterbury earthquake in 2010.

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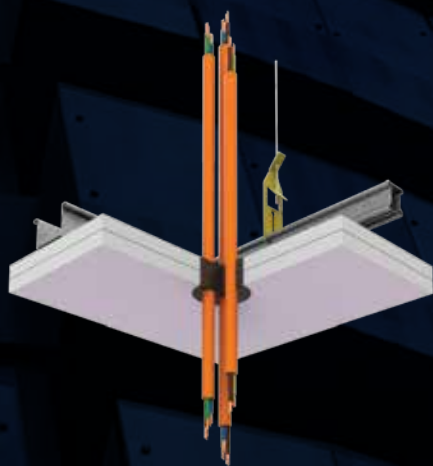
LEADERS IN PASSIVE FIRE



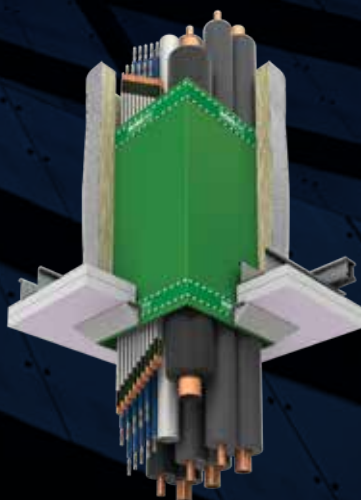
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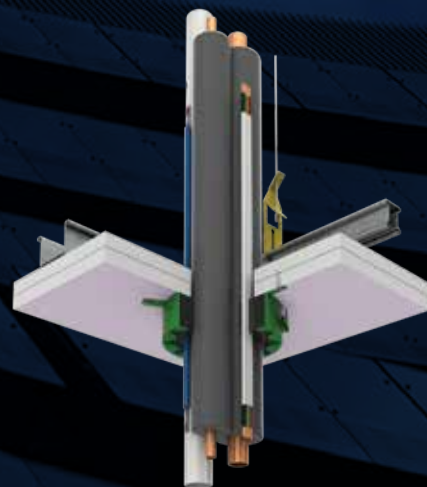
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