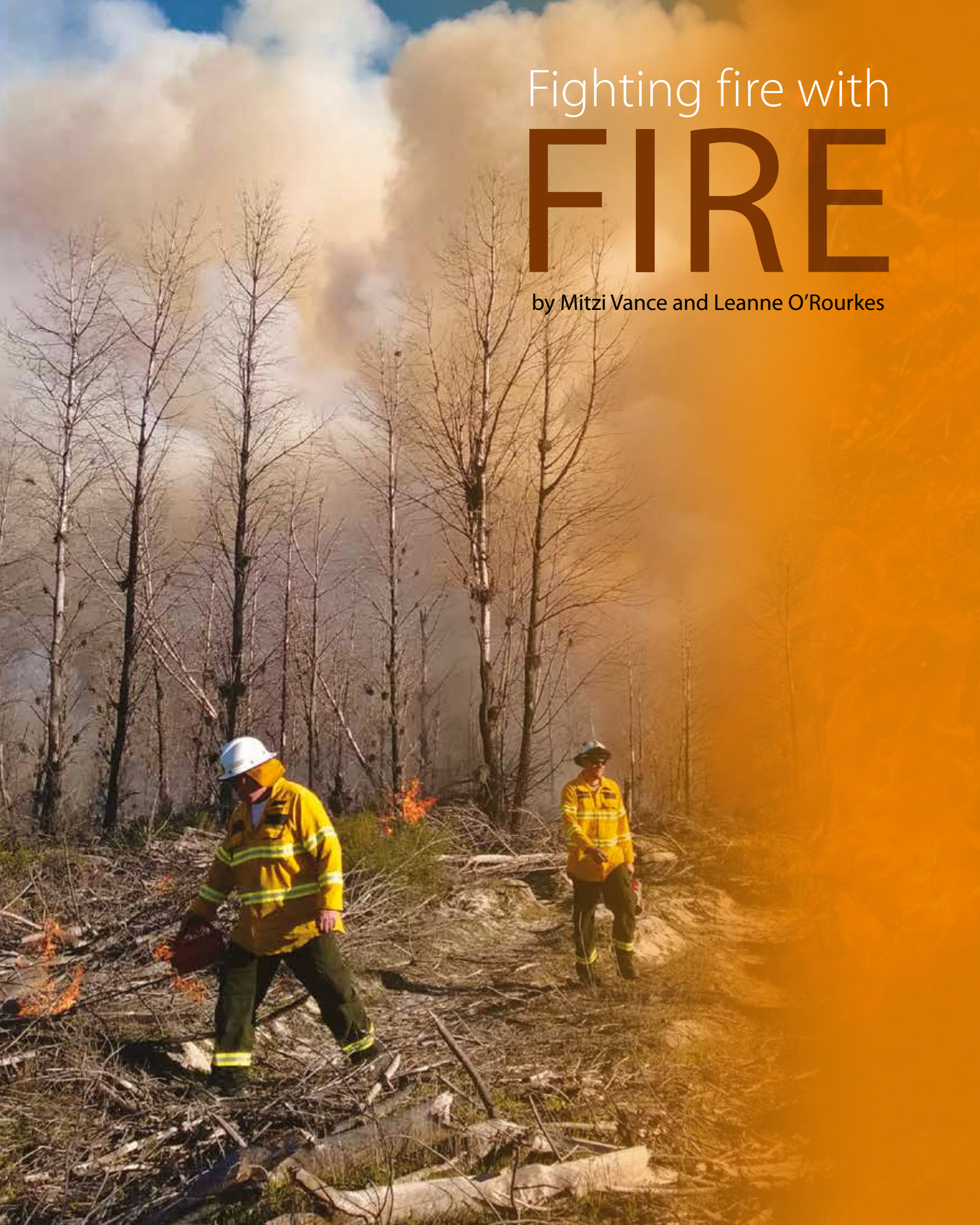


Fighting fire with

FIRE

by Mitzi Vance and Leanne O'Rourke



For up to 60,000 years, Aboriginal people used fire to their advantage in the Australian landscape. European settlers learnt much from these practices and have continued and refined the use of prescribed burning to mitigate the severity and impact of bushfires, maintain biodiversity and to rehabilitate vegetation. The 2015–16 prescribed burning season has been one of the most successful so far in recent years thanks to favourable weather conditions and an additional \$20 million over four years from Royalties for Regions, which has significantly enhanced the program.

Fire is a natural part of the Australian landscape. In fact, many plant species, and the communities they support, have evolved to not only survive fire, but rely on it to germinate seed and encourage new growth. Today, however, the effect of fire extends well beyond environmental impacts and has many social and economic implications. Raging bushfires can have catastrophic impacts on lives and infrastructure and as our towns and cities continue to grow and more people seek to live in regional areas, and our climate continues to change, fire preparedness is more important than ever.

A FIREY FRONT FOOT

The severity of a bushfire depends on a range of factors including weather conditions, the topography of the area and the type and condition of the vegetation or 'fuel' in the area. There's little that people can do about the first two factors but land managers can reduce fuel loads made up of forest litter, small shrubs and scrub, trees, bark and logs and other decomposing matter. And that's where prescribed burning comes in.

Aboriginal people have used fire in the landscape for thousands of years. It is understood they used fire throughout the year to create low-intensity burns that resulted in a fine-grained mosaic of different vegetation structure and fuel ages across the landscape. As a result, large intense bushfires were thought to be uncommon.

Prescribed burning was introduced as a key part of Western Australia's forest management in the mid 1950s and expanded significantly in scale following the 1961 Dwellingup and Karridale bushfires. This was assisted greatly by the development of reliable methods for aerial ignition. Nowadays, prescribed burning is tackled as a shared responsibility between Parks and Wildlife, the Department of Fire and Emergency Services (DFES), local governments, industries and other landholders including traditional owner groups. It is underpinned by lessons learnt from traditional burning as well as scientific research that has been carried out over many years and is implemented using a stringent process to ensure community safety. The program is also designed to provide benefits to Western Australia's plants and animals through a landscape-scale management approach.

WHEN AND WHERE

In south-west Western Australia, prescribed burning usually begins in spring, when forest fuel is still moist from winter rains. This means the fires are mild and slow-moving with low flame height and intensity. This approach achieves a mosaic effect, which provides unburnt refuges for plants and animals.

Some burning is also carried out during autumn when conditions are favourable, especially in areas where boggy ground conditions limit access in spring. When possible, autumn burns are carried out



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Main Crews use drip torches to ignite vegetation during a prescribed burn.
Photo – Leigh Sage/Parks and Wildlife

Top Aerial burning in Warren Region.
Photo – Parks and Wildlife

Above centre Fire is an important part of the Australian landscape and encourages regrowth.
Photo – Sally Bostwick/Parks and Wildlife

Above Planning and briefings are a key component to a prescribed burn.
Photo – Leigh Sage/Parks and Wildlife

3-year-old fuel

- Small flames and slow moving; low intensity at the head of the fire (less than 500 kilowatts per metre*)
- Quickly and safely suppressed
- Low environmental damage
- Most trees unscorched

6-year-old fuel

- High flames and fast moving; high intensity at the head of the fire (5000-10,000 kilowatts per metre*)
- Difficult and dangerous to suppress
- Moderate environmental damage
- Most trees scorched

20-year-old fuel

- Very high flames and very fast moving; very high intensity at the head of the fire (more than 20,000 kilowatts per metre*)
- Very dangerous and often impossible to suppress
- High environmental damage
- Most trees defoliated

Consequences when a bushfire strikes

* Calculations based on a typical jarrah forest, in peak summer/severe fire danger conditions.



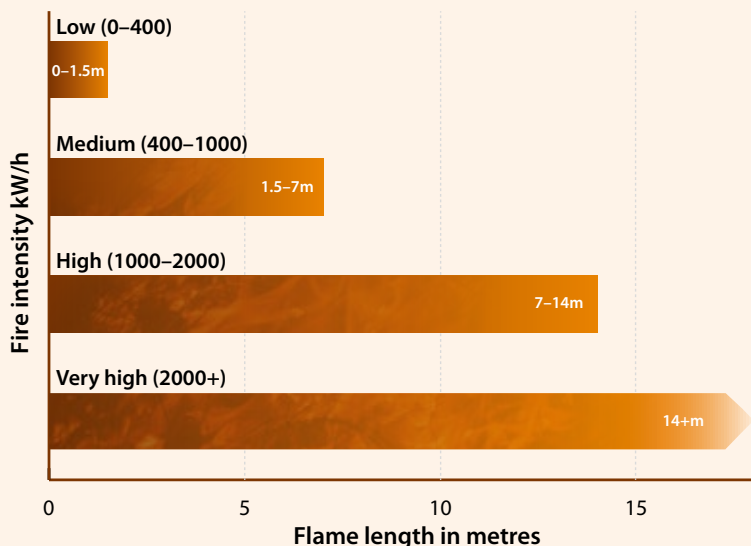
Fuel loads and fire intensity

Fuel is highly variable and can be characterised by amount, size, quantity, moisture content and how it's arranged. Fuel particles bigger than 6mm wide don't impact directly on the rate of spread or flame height, but do add substantially to the total amount of heat and intensity of the fire. However, the arrangement of the fuel can affect fire behavior – tightly packed fuel is less likely to burn and will smoulder, whereas loosely arranged fuel will burn more intensely due to more air flow. The moisture content of the fuel plays a major role in the ignition and intensity of the fire, and is determined by factors such as weather conditions, the type of vegetation and whether the material is living or dead.

Through natural processes, jarrah forests can accumulate 1–2 tonnes of litter and understorey fuel per hectare each year to a maximum of about 20 tonnes per hectare in 20 years. Fuel in karri forest accumulates at 3–4 tonnes per hectare each year, to a maximum of about 60 tonnes per hectare in 20 years. So what does this mean for firefighting? Fire intensity is measured by kilowatts per metre (kW/m). Fires that are less than 800kW/m can be tackled by hand tools and water support, while fires less than 2000kW/m can be fought using machines, tankers and water bombers. Fires with an intensity greater than 3000kW/m are significantly more challenging to suppress. In extreme fire cases, like the Victorian Black Saturday bushfire, fires can generate intensities in excess of 100,000kW/m.



Above Fuel is made up of forest litter, small shrubs and scrub, trees, bark and logs and other decomposing matter.
Photo – Peter Nicholas/Parks and Wildlife



after the first seasonal rains and the moisture content of the fuel increases. The outcomes of these burns are slightly different to those carried out in spring as larger fuels such as logs and limbs can smoulder for days and the burn may result in fewer unburnt patches. This type of burn tends to promote regeneration and resprouting of vegetation, the release of nutrients and reinvigoration of local habitats. In the successful season of 2014–15, favourable autumn conditions meant that burning could be carried out over around 147,000ha across Parks and Wildlife's south-west forest regions.



“While based on a simple concept, prescribed burning relies on a number of complex variables.”

Top A range of vehicles are used during a prescribed burn.

Photo – Leigh Sage/Parks and Wildlife

Above Bunuba rangers take part in prescribed burning along the Gibb River Road.

Above right An autumn prescribed burn being carried out in the Wheatbelt Region.

Photos – Parks and Wildlife

In the northern part of WA, where the seasons are ‘wet’ and ‘dry’, burning is carried out early in the dry season when winds are predictable and the fires tend to be lower in intensity, and more patchy and limited in extent.

PLANNING THE PRESCRIPTION

‘Prescribed burns’ are so-called because they follow a ‘prescription’ and have a number of conditions that must be met. The process of carrying out a

prescribed burn involves careful planning, consultation and monitoring.

Objectives are set for each burn. Consideration is given to assets and values in the area, what vegetation needs to be burnt and which should remain unburnt, the moisture content of the fuels, the history of fire activity in the area, the weather conditions and the best time of day and pattern for ignition. Deliberation is also given to the potential impact on vulnerable plants and animals, the potential impact of smoke on communities and land users in the burn proximity and the prescription may then be modified where necessary. Once the burn is completed, a review is undertaken to determine how successful it was and to glean lessons to improve future operations. The process followed by the department has been endorsed by the Office of Bushfire Risk Management, established in 2012 to facilitate bushfire risk management and coordinate the activities of the agencies responsible.

While based on a simple concept, prescribed burning relies on a number of complex variables. With each burn there is an element of risk that it will not go to plan, and implementing prescribed burning does not mean large bushfires will never occur. However, scientific research shows that prescribed burning is very effective in making large, damaging bushfires less

likely, and it plays an invaluable role in firefighting efforts by providing low-fuel ‘buffers’, making it easier to suppress many bushfires.

CHANGES IN THE AIR

In recognition of the key role prescribed burning plays in bushfire management, the State Government committed an extra \$20 million over four years through its Royalties for Regions program to boost Parks and Wildlife’s capacity to safely undertake planned burns when conditions allow. Since 1 July 2015, the department has prescribed burnt more than 131,000ha of land it manages in the south-west forest regions, significantly more than for the same period in recent years, with autumn burning yet to come.

These funds are in addition to the department’s annual prescribed burning budget of \$10 million and have provided for some extra positions and extended employment contracts for seasonal staff, additional contractor support and increased mobility of departmental staff. An added benefit will be the flow-on effect to regional communities through employment and the supply of goods and services while these operations are being carried out.

Another change to Parks and Wildlife’s prescribed burning program last year was adjustments to its performance and reporting measures. For the past



A close call

A Parks and Wildlife prescribed burn that was completed in 2011 saved homes in 2015, when a bushfire in Beeliar Regional Park in Perth's southern suburbs was stopped after running into the burnt area.

The fast-moving bushfire was running at 1km/h burning in a westerly direction and was out of control when it entered the previously burnt area, which drastically changed its behaviour.

Thanks to the prescribed burn, the fuel in the area was less than five years old and the head fire could be stopped before it reached the suburbs of Beeliar and Yangebup on the west side. Crews were then able to consolidate containment lines and more quickly extinguish it. This highlights the importance of carefully planned and controlled prescribed burning in suburban interface areas in the metropolitan area.

two decades, the department and its predecessors have reported against a notional prescribed burning target of 200,000ha across the Swan, South-West and Warren forest regions, which

include the majority of the south-west forests. However, on its own, this single reporting measure does not reflect the distribution of burns, indicate the amount of fuel across the landscape or represent bushfire risk to populated areas. To better reflect these, three additional measures have been introduced. The first measure separates the south-west prescribed burning area into three zones – A, B and C – and allocates an annual prescribed burning target for each. The second measure captures the proportion of the landscape with a fuel age less than six years, which currently sits at 35 per cent of department-managed lands with a target of 45 per cent. The third measure is the ratio of area affected by bushfire to area of prescribed burning.

whole-of-community effort that relies on the cooperation of many local and State government agencies, community groups and landholders. With each bushfire season, the distribution of people throughout the State changes somewhat and the climate fluctuates a little more, with drier conditions in the south-west inevitably increasing the risk and impact of bushfires. The way the land is used, and the resulting management responsibilities are changing – critical infrastructure such as pipelines and electricity transmission grids are being established on land managed by Parks and Wildlife and the area of forest rehabilitated after mining for bauxite, coal and other materials is increasing. However, land and emergency managers are better equipped than ever to deal with the eventuality of bushfires and are continually building on the knowledge base and resources necessary to prepare for them.

FORWARD MOTION

Fire preparedness and bushfire suppression is and will continue to be a

For more information about prescribed burns



Scan this QR code or visit www.dpaw.wa.gov.au.

Parks and Wildlife updates its website every morning with the prescribed burns planned for each day. The webpage dpaw.wa.gov.au/todaysburns provides details on where the burns will occur, the size and reasons for undertaking them. The webpage also provides health messages and links for people who may be affected by smoke.



Mitzi Vance and Leanne O'Rourke are Parks and Wildlife project coordinators. They can be contacted on (08) 9219 9999 or by email (mitzi.vance@dpaw.wa.gov.au or leanne.o'rourke@dpaw.wa.gov.au).