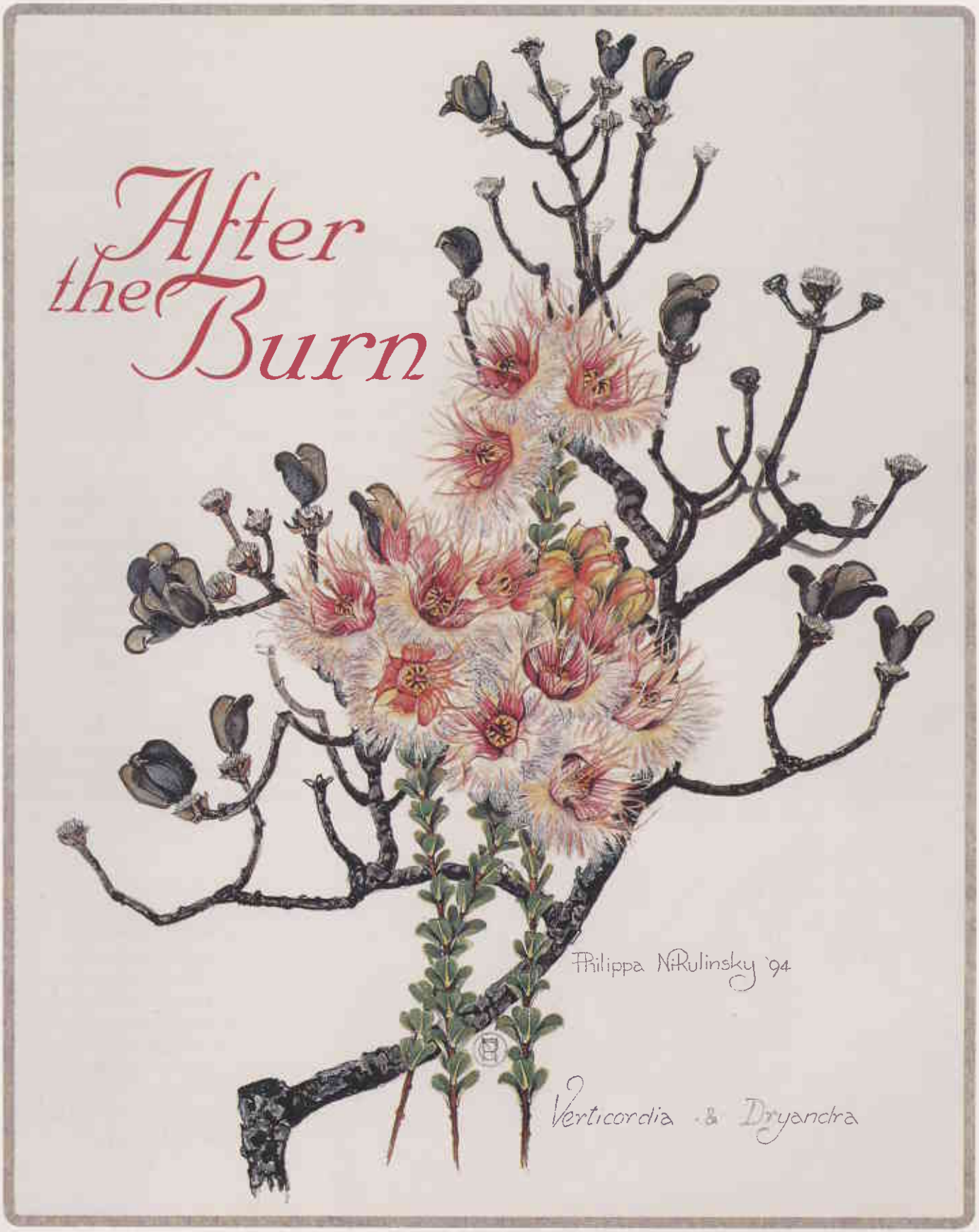
After the Burn



Fire is an ancient natural force. In partnership with climate, it has shaped the vegetation of forests, woodlands and shrublands of Western Australia for thousands of years. The endless process of fiery destruction and resurrection is a source of great fascination. This story explores the cycle of bushfire and regeneration as an artistic and a scientific experience. The Mt Adams area, in the heathland south of Geraldton, has been an inspiration to wildlife artist Philippa Nikulinsky, while farther south, the jarrah forest's response to fire has been the focus of the research of CALM scientist Neil Burrows. Common to both their accounts is an enduring sense of wonder.

by Mandy Glews and Neil Burrows ● *Illustrations by Philippa Nikulinsky*

The place is Mt Adams, south-east of Dongara. The time is late in the summer of 1991–92. It is not a hospitable place, particularly at this time of the year. It is shadeless and beset with scorching heat, flies and a relentless, furnace-like easterly wind. From the relative shelter of a car, the dusty grey heathland that stretches to the horizon in every direction looks unremarkable. Where a bushfire has recently swept through, the landscape appears even more desolate: charred and lifeless. And yet, on a closer look, this seemingly bleak and barren expanse of burnt scrub is bristling with life, and is an inspiration to wildlife artist Philippa Nikulinsky. In her words, it's 'a glorious display of life', a pageant of botanical splendour. The flames that raged across this heathland in December 1991 fuelled the crucible from which a unique artistic project was born.

It was a large, intense bushfire. Farmers in the area counted as many as 80 lightning strikes. It took three weeks for firefighters to bring the blaze under control. But what elsewhere seems such a destructive element is, in fact, the opposite here. For the hundreds of species of plants in these parts, fire is a midwife, a life-giving force that coaxes seed from plants and vigorous new growth from lignotubers. From the ashes and charcoal and soot, a triumphant display emerges, as species after species regenerates in a defiant parade of colour.

A few days after the fire, Philippa visited Mt Adams on a routine field trip and found a charred, ashen landscape with little sign of life. Then, within a few weeks, she returned to find the first green shoots reaching out from the blackened trunks and stems. Although the phenomenon of regeneration was well known to her, she still found herself suffused with a sense of awe. 'You just wonder how they can do it,' she says. 'There you are, in the hot, dry conditions, whipped by soot and sand in the scorching wind, no water in sight, no shelter, and there's all this life around you, all this new growth. It's like magic.'

The following spring, Philippa was acting as a consultant to a photographer, who was working on a feature on Western Australian wildflowers for *National Geographic* magazine. Knowing there would, by now, be interesting displays to be found, she brought him to Mt Adams and went for a walk with her notebook, while her client took photographs of the thousands of grasstree spikes that had emerged. 'I noticed that so much of the burnt matter seemed to form cages over the new growth,' Philippa recalls, 'and I wondered if it was a natural mechanism for protecting it.'

From there, ideas about the visual potential of capturing the depth and complexity of the theatre of regeneration began to take shape. Starting with a description of zamia fruit, her notebook reads, '...yellow-green, like lights inside the burnt leaves...amazing contrasts. Every tone of black, brown, mahogany, Indian red, even purple...how do I fit it on the page?' Reviewing her notes later, she added, 'Do I have to?' The seeds of *After the Burn* were sown.

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The contrasts between soft and harsh (or hard), bright and dark, colour and black make flower arrangements or paintings wherever one looks.

Left: Twisted, gnarled shapes of burnt seed cases make stark contraists with catspaws glowing bright orange—so many, they are called fire weeds.

ART FROM THE ASHES

Over the following year, Philippa returned to the location a dozen times, keeping a carefully selective record of the botanical talent show that was taking the stage in response to the fire. 'I feel that the burn makes a sort of a level playing-field,' Philippa explains. 'It gives every plant a fresh chance at its own glory. And each one more or less bounces out and says "Hey! Look at me!"'

Eventually, *After the Burn* developed into two five-metre-long scrolls of rice paper—story rolls—depicting the remarkable regeneration story through an artist's eye. One scroll represents the spring following the burn, the other twelve months later. 'The story rolls are meant to capture a sense of the rolling out of time,' Philippa says, 'the opening up of life, in endless sequence, a continuous story with no beginning, no end. 'And I wanted to convey the sustained sense of wonder, at life and all its forms, and the vitality and diversity of growth, death and regeneration in the natural world.'

Accompanying the scrolls are a series of individually framed pieces, which Philippa says represent frozen moments from the continuum.

'I wanted to show every plant in its individual space; not just a picked piece on a page, but *how* it grows, and what grows with it, its interaction with its surroundings,' she explains.

Philippa stresses that, although her botanical knowledge is thorough and her technical detail is correct, *After the Burn* is not in any way a scientific exercise. 'This is not a methodical inventory of species,' she says. 'It is a representation of what caught my eye as an artist.

'There is no exact measure of time here, either. For example, the elegant banksia (*B. elegans*) and yellow kangaroo paw (*Anigozanthos pulcherrimus*) do not flower at exactly the same time.

'But they grow together, and I know this. They are like partners. So they are pictured flowering together here.'

Likewise, artistic vision overrides scientific fact in the depiction of something that was not springing to life. Philippa was asked by a scientist looking at the work whether a particular zamia really had not produced any leaves, because it is the first species to do so after a fire. 'As it happened, there were other zamias around that had sprouted; this particular specimen, for some reason, had not,' Philippa says. 'But it was this one that caught my eye, because it was so dramatic. Whether it is scientifically representative of the region or not is of no consequence.

'I did not approach this as an objective observer. Sometimes, when I took to the field for this project, I was looking for things I wanted to see, because I knew they would be there.'

Top (to page 26): Story roll featuring plants from the first spring flowering after the burn.

Right (to page 26): Story roll featuring plants from the second spring flowering after the burn.

This selective vision is precisely what Philippa believes to be the key to the preference botanists are continuing to show for professional drawings over photographs to illustrate their work.

'A botanical artist can highlight features, leave out unnecessary detail and still make things absolutely correct without the distraction of background elements,' she says. 'A camera cannot do that. A camera cannot show how a plant grows, because a camera cannot *know* how a plant grows.'

Philippa continues to visit the Mt Adams area as part of her regular work. But she says the *After the Burn* site will soon lose its unique fascination.

'Five or six years after a fire, it's hard to walk through this bush,' Philippa says. 'It's thick and prickly, and it's difficult to find a lot of things, because they have retreated from their "moment". It's almost as though the bush is hibernating, waiting for the next event.

'Fire is not devastation. It's a new beginning; like a new canvas, where every plant has its moment of glory before everything else takes over. The regeneration is climactic. The colours of these plants will never again be so dramatic, or the flowers so profuse. This is life at its peak.'

A SCIENTIST'S VIEW

Measured against the human understanding of time, the tall forests appear eternal, quiescent, unchanging. But even over the four-hundred-year life-span of a jarrah tree, bushfires are paramount among events that initiate the cycle of regeneration, growth and senescence. The forest is ever-changing.

The dynamic cycle of plant life and growth in a jarrah forest is most apparent in the first few years after a bushfire. Adaptive traits, evolved over thousands of years to ensure the persistence of each species, are on display within weeks. About three quarters of the plants resprout from buds buried beneath the soil or beneath protective bark—these are called 'resprouters'. The remainder will regenerate from seed stored in woody capsules or in the soil—these are the 'seeders'.

Fire re-sets the time clock, and the variety and vigour of regenerating plants are staggering. The forest community demonstrates that, in the face of fire, it is not delicate and fragile, but robust and resilient.

CALM scientists and field officers have recorded the fire response of about 500 plant species in South West forests, including a number that are declared rare. The time it takes for plants to reach flowering age varies with each species

and with rainfall. At two study sites on high rainfall, upland jarrah forests (average annual rainfall 1 000 to 1 200 mm), 92 per cent of all understorey plants had flowered within two years of fire, and all understorey species had flowered within three years. Pineapple bush (*Dasypogon hookeri*) and grasstree or pulonok (*Kingia australis*) flowered within three months of the fire, and another ten shrub species had flowered within eight months. Orchids and other geophytes, herbs and fire ephemerals had flowered within 12 months. Wattles and grevilleas flowered within one to two years, depending on the species. At another site, in low rainfall jarrah forest (average annual rainfall about 750 mm), plants took some 12 to 18 months longer to reach flowering age after fire, but all understorey plants had flowered within four years.

Mature trees such as jarrah (*Eucalyptus marginata*), marri (*E. calophylla*) and bullich (*E. megacarpa*) can take as long as four or five years to reach flowering age after having their crowns scorched or burnt by an intense wildfire. Small trees, such as bull banksia (*B. grandis*), take two to three years to flower.

TIMING IS EVERYTHING

Plants do not always set viable seed in the first flowering period after fire. Some plants take many years before seed production is sufficient to re-establish the population after fire. Plants most vulnerable to frequent fire are the seeders, especially those that depend on seed stored in capsules on the bush. If these plants are not able to flower and produce adequate stores of seed before the next fire, they will not survive.

Some seeders growing on sites such as creek lines and around granite outcrops, which are usually too damp to burn in spring and are normally only dry enough to burn in summer or autumn, require longer fire-free periods. For example, a mohan (*Melaleuca viminea*), which grows along valleys in the eastern part of the jarrah forest, can take up to six years before flowering after fire, and river banksia (*B. seminuda*), which in the jarrah forest is confined to rivers and creeks, can take up to seven years to flower after regenerating from seed. The swamp banksia or pungura (*B. littoralis*), is similar in appearance to the river banksia and is also found along creeks, rivers and swampy areas in the forest. But unlike the river banksia, it is able to resprout after fire and usually flowers within three to four years.

To ensure the survival of the seeder species, it is essential that the interval between fires is sufficient to enable an adequate build-up of seed, either in the soil or on the plant. The time it takes for this to occur is not known for every species in the jarrah forest, but based on a number of species that have been studied around Australia, adequate seed can be expected to exist for a particular species when more than 50 per cent of the plants have flowered, or when the time elapsed is twice the time taken for the plant to first flower after fire.

For high rainfall and low rainfall jarrah forests, fire interval of six to seven years and eight to nine years respectively are likely to maintain plant diversity. For moist sites, such as around granite

outcrops, valley floors and creek lines, fire interval of less than about 10 to 12 years could cause a gradual decline in some seed species. Frequent summer bushfires or regular autumn prescribed burns (at six- to eight-year intervals), which burn creeks and valley floors, could threaten those species that take a relatively long time to reach flowering age. On the other hand, infrequent summer or autumn fires (every 20 to 30 years) stimulate regeneration and pose no threat to these species.

Prescribed burning is an important management technique for reducing the threat posed by forest wildfires. The rate of accumulation of dead leaves and twigs (fuel) on the jarrah forest floor, is such that these forests are normally burnt to reduce fuel loads on a six- to eight-year cycle, depending on fuel build-up. When fuel-reduction burns are implemented under cool, moist, spring conditions, it is mainly the drier mid-slopes and ridges that burn. Damp sites (such as creek lines and valley floors) normally do not burn in spring, so those plants that take longer to reach flowering age are protected. The interval between fuel-reduction burns in jarrah forests is determined by the fuel accumulation and is sufficient to allow all understorey species to regenerate and build up seed stores.

Above: The startling blue splashes of the leschenaultia with the amazing colours of new leaves appearing from a hakea lignotuber, have to be seen to be believed.

Above: Sundews (*Drosera* spp.) appear in vast numbers. As the sun glints on the sticky leaves, they appear to light up, especially during early morning and late evening.

Below: Spilling seeds and leaves from the charred remains of eucalypts and banksias.

CALM scientists and field officers are compiling an extensive computer database of the response of plants to fire. This information, together with the findings from other fire ecology research, is being used to refine and further develop fire management in South West forests, where the aim is to minimise the threat of wildfire, while conserving the forest ecosystem. In this way, our use of fire will ensure it fulfils its natural ecological function.

POSTSCRIPT

Fire is the ultimate leveller to artists and scientists alike. While it can be a tool wielded under our control, it will always remain an outside, primal and overpowering force, and its breathtaking aftermath of regeneration is a constant reminder of how far beyond us the natural world extends. Recognition of this super-human scale and power is where, in nature, science and art meet and find a common purpose.

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The threatened Wyalkatchem foxglove is being given a helping hand by scientists from CALM and Kings Park and Botanic Garden (see page 17).

This nesting pair of splendid fairy-wrens is one of the many 'Birds of the Stirling Range' (see page 36).

WA Goldfields timbers are fast becoming recognised as prime materials for producing world-class musical instruments. See 'Musical Timbers' on page 48.

A new CALM book, Dive & Snorkel Sites in Western Australia, *will encourage novice divers and snorkellers to explore the rich and diverse coastline of WA. See 'Secrets of the Sea' on page 10.*

The common rock-rat, photographed here in the Kimberley, has recently been recorded in the Kennedy Range National Park. See page 28 for a profile of this wonderful wilderness area.

FEATURES

REGULARS

COVER

The brilliant purple flowers of the twining fringed lily (*Thysanotus patersonii*) entwined around the burnt stem of a slender banksia (*B. attenuata*). See 'After the Burn' on page 21.

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