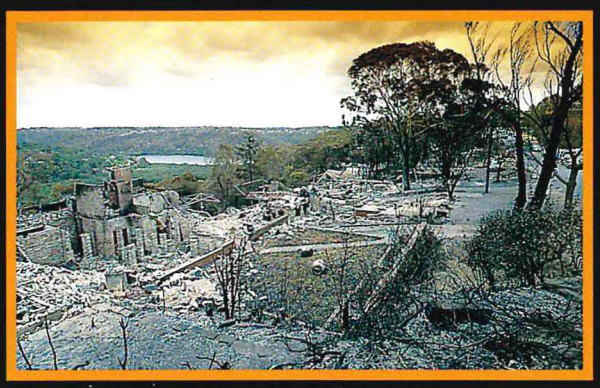
FIGHTING FIRE WITH FIRE



by Rick Sneeuwjagt

The images on this page show part of the inferno and aftermath of the fearful January 1994 wildfires in New South Wales. Commentators blamed the tragedy partly on the lack of precautionary planned fires - of which many are lighted every year in Western Australia. What are planned burns? What do they do to the environment? What would happen without them?

Every year in the south-west of Western Australia, about 300 wildfires are started by lightning, arsonists or mischance on lands managed by the Department of Conservation and Land Management (CALM). These wildfires threaten human life, property, and the environment. Some of them are uncontrollable, even by well-equipped and highly trained firefighters. In the south-west forests since 1988 alone, there have been more than 200 lightning-caused fires - any of which, without the benefit of prior planned burning, might have erupted into wildfires of the scale that devastated New South Wales.

Fighting bushfires is a science based on weather, sources of ignition, and fuel. WA is the only part of the world which combines a hot, dry Mediterranean climate with tall forests, producing large quantities of combustibles. Our summers turn the forests into a vast arena ready for conflagration. If fuels have not been reduced, the bush explodes into inferno.

Fuel is the only factor which can be managed. It consists of ground 'litter' - fallen leaves, twigs, bark and sticks - and live and dead vegetation. Also, many trees have stringy or fibrous bark, which can be blown aloft as burning brands and embers, setting spot fires ahead of the main fire. 'Spotting' and 'hopovers' are common in forest fires, and nearly always occur with heavy, dry fuels. They can leap kilometres from the main fire edge, crossing firebreaks. Jarrah trees can accumulate thick and fluffy bark in long-unburnt areas, allowing a big blaze, the feared 'crown fire', to soar into the treetops. Incredibly, such fires release the same energy as a medium-sized nuclear bomb - every 10 minutes.

That is why planned burns are WA's first method of defeating wildfire. The other is a fast response by well-trained firefighters. The first method - reducing the fire's energy source - makes the second effective.

Fuel can burn in three different ways: as a mild creeping fire, confined to litter on the forest floor; a more intense fire, with flames up to eight metres high, consuming litter and shrubs and mildly scorching the treetops; and a high-intensity fire, which rages through the treetops. Most planned burns are of the first type, occasionally the second; most wildfires are of the third. A crown fire consumes litter, shrub layers, and all the leaves in the tree, leaving only the trunks standing; it can rage at heights of more than 100 m. Under some conditions, a creeping fire becomes a crown fire; but if forest fuels are reduced, a crown fire will not develop - even under extreme weather conditions. This was shown in the horrendous Dwellingup fires of 1961, and is a chief reason why the subsequent Royal Commission endorsed planned burns in WA forests.

MISCONCEPTIONS

A few people think that regular planned burns encourage additional forest fuels. Decades of research refute this view. Fuels are always light after a fire, then accumulate until a 'plateau' is reached. In dense forest it builds more rapidly to critical levels; in drier forests it may take 10 years. Fire or not, fuels become very heavy after a few years, and do not decrease in the long absence of fire.

A common myth is that bushfire is unnatural. This attitude comes from the northern hemisphere, where fire is rare and abhorrent. In WA, fire is as natural as rain and sun. Our forests have evolved in its regular presence, and need it to survive.

A belief arising from this myth is that fire destroys plants and animals. But any species unable to live with fire went extinct long before European settlement. No species are known in WA forests which do not survive or recover from periodic fire, either by regeneration or recolonisation. Some plants and animals are favoured by long periods without fire, but can still recover after it, and other species actually flourish in the presence of frequent fire. Some species are unaffected by low-intensity fire but are killed by high-intensity fire; some species will not regenerate except after a high-intensity fire. Despite 30 years of research, there is no evidence that planned burning permanently disturbs the environment. In fact a burnt area will usually recover quickly. (See 'Seasoned with Fire' in *LANDSCOPE*, Autumn 1990.)

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New South Wales firefighter dampening down fuels along the flank of one of the hundreds of January fires.
Photo - Grenville Turner/Wildlight
Inset: A home once surrounded by heavy bush. Sprinkler protection is limited in the absence of prior burning.
Photo - Peter Solness

Left: A large fuel-reduction burn ignited in a spot-pattern by aircraft. Incendiaries are placed and timed so that fires join up in the cool of the evening; they create a mosaic of burnt and unburnt patches. This burn was designed to protect the forest and the farm in the foreground. The fuel-reduced areas starve wildfires, enabling firefighters to control them even during extreme conditions.
Photo - Cliff Winfield

One objection to planned burns is their supposed visual impact. Compared with wildfire, the impact is small. A severe wildfire's visual effects are dramatic: tree trunks are blackened and their leaves scorched. Severe wildfires can also kill trees and leave them standing, giant tombstones, for decades. After a low-intensity planned burn, however, only the understorey is blackened and many areas are left unburnt. Also, the recovery of our forests after either sort of fire is remarkable. Within days green shoots appear, and the first animals and birds return. In tough, resilient ecosystems like the jarrah forest, the visual effects of low-intensity planned burns, unlike those of severe wildfire, disappear within a year.

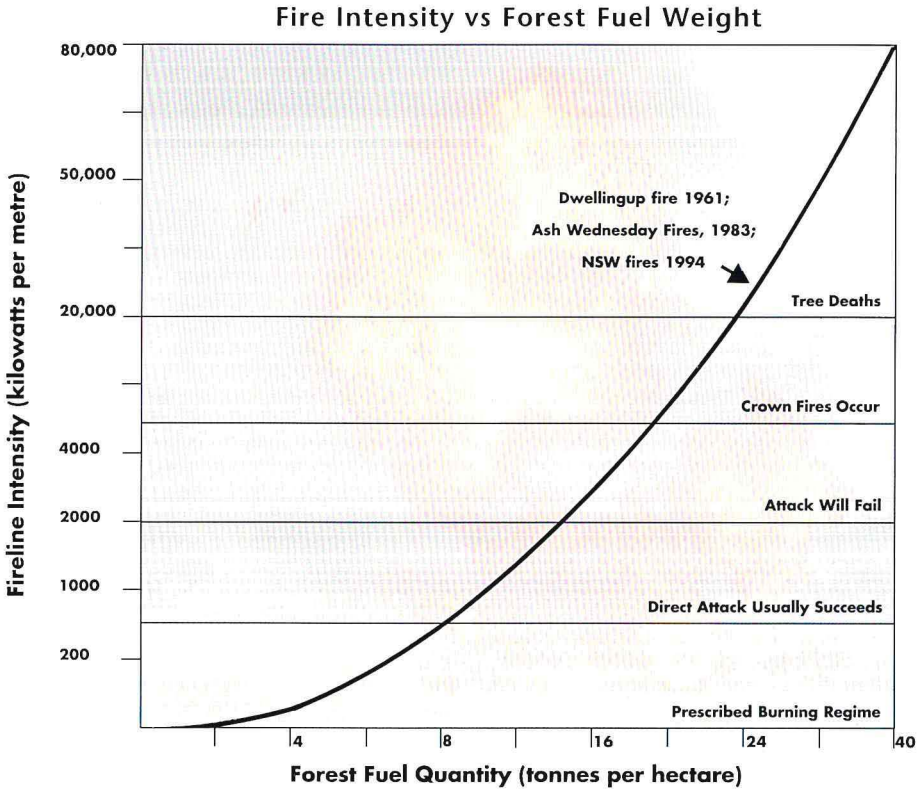
CALM seeks to minimise the visual effects of planned burns and wildfires. Planned burns are lit under the coolest conditions that will provide effective fuel reduction; the height to the treetops is used to decide the maximum fire intensity, reducing the risk of scorch; burns are confined to one side of a tourist road in the one season, or are set back from the road edge, minimising visibly burnt bush.

Some people worry that planned burns cause the wildfires they seek to prevent. Despite the efforts of well-trained staff, a few burns do escape from their boundaries, often because of an unpredictable wind change. The percentage of wildfires caused by these escapes is small: in 1989-90 it was 7.5 per

Top: A typical low-intensity planned burn. Lit in mild weather and low wind, small flames spread slowly. Wildlife can easily move out of the way and find refuge (burns are designed to leave about a quarter of the land unburnt).
Photo - Rick Sneeuwjagt

Right: A moderate-intensity burn with flames reaching two or three metres high. This is the maximum intensity of a fuel-reduction burn.
Photo - Tom Leftwich

Below: A high-intensity wildfire seen from the relative safety of the flank. Even here, the flames roar up to 20 metres high. Such a fire cannot be attacked safely; spot-fires from the tree crowns can ignite the vegetation kilometres ahead, and the fire's course and speed are difficult to predict.
Photo - Tom Leftwich



Fire intensity is directly related to the weight of fuel consumed.
Background: Intense wildfire about to assault a home from an area of heavy vegetation, unburnt for many years.
Photo - West Australian Newspapers

cent, in 1990-91 six per cent, in 1991-92 five per cent, and in 1992-93 three per cent.

STARTING A BURN

Scientists have long researched fuel accumulation and the effects of different wind speeds, temperatures, relative humidity, fuel dryness and slope on fires in the jarrah and karri forests. Their work forms the basis of a fire behaviour prediction system and a planned burning guide, used by field staff carrying out planned burns.

The proposed burn is planned up to eight years ahead, a period which allows CALM staff to plan for the needs of other forest activities such as tourism, commercial operations, and habitat regeneration. Buffer zones (400 m to three kilometres wide) are identified where fuel reduction will be needed. In the year of the burn, environmental impacts are assessed before the burn is approved; then all involved persons, assets, properties or operations are identified. A detailed 'prescription' is then prepared: a set of objectives, a calculation of the type of burn which will meet them, the weather and fuel moisture which must exist on the day of the burn, and the lighting pattern to be adopted. Boundary tracks are then cleaned up, and other preparations undertaken.

As fuels in the forest begin to dry, CALM alerts neighbours about proposed burns. Warning signs are placed, and announcements are made on ABC radio on the day of the burn. Staff compare the day's weather forecast, fuel moisture conditions, etc., with the conditions prescribed. If the conditions match, guidelines for smoke dispersion are checked. If these are acceptable the burn goes ahead, controlled by skilled, professional crews.

At the end of each day, edges are made safe. A senior officer inspects the burn before it is considered safely completed.

RESTRICTIONS

The planned burning program has a wide range of constraints. Some occur naturally, such as weather conditions, limits to funds and manpower, and the need to avoid special areas. Others are statutory; for example, the Bush Fires Act states, amongst other things, that burns cannot be performed on days of very high fire danger; and burns are usually undertaken during a period determined by the local government authority. Smoke would occur with or without planned burns, but CALM sets management guidelines anyway to match the Environmental Protection Authority's air-quality standards. (See 'Where There's Fire, There's Smoke' in *LANDSCOPE*, Autumn 1993.)

The constraints have resulted in a decline in the area burnt each year. Forty-six per cent of the land managed by CALM in the south-west is now carrying fuels which are six years old or older. The figure is as high as 66 per cent in conservation reserves. This is of concern, especially in buffer zones, where fuels should generally be six years old or less. At present, 52 per cent of buffer zones carry older, heavier fuel. This means bigger wildfires are likely. Average fire size in 1988 was 14 hectares; in the summer of 1992-93 it was 46 hectares. The warning signs are ominous.

MAINTAINING THE RECORD

Western Australia has had a good record in forest fire control since 1961. There have been no major property losses, few large fires, few injuries or deaths and many significant 'saves' even under extreme conditions. More than 90 per cent of the fires that CALM staff attend in the forest are kept to less than 10 hectares. Most large fires have been in the more remote sections of the forest well away from settlements and occurred under extreme weather conditions. There have been many cases (e.g. Manjimup, 1978; Walpole, 1987; Augusta, 1992) where planned burning is the reason major wildfires did not burn out towns and large areas of forest.

CALM has a legal and moral responsibility to ensure that uncontrolled wildfires on the land it manages do not threaten life and property. But the Department also has the responsibility of ensuring that the ecosystems on this land are sustained and that public use for a variety of purposes is optimised. Planned burning is just one of the management strategies that are achieving this vital, delicate balance.

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