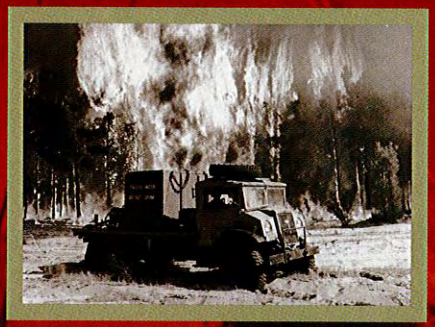
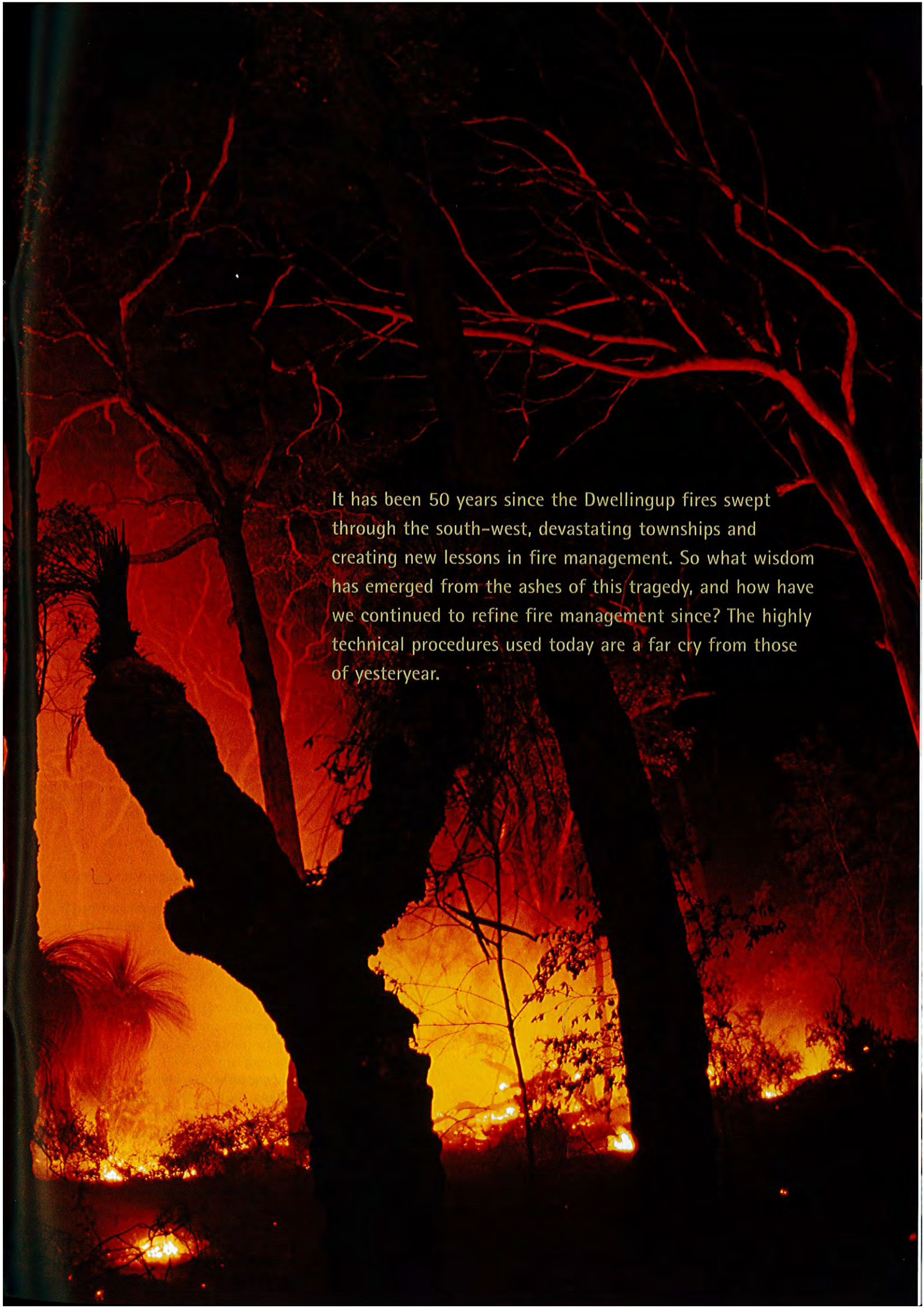
Lessons learned since the Dwellingup fires



by Murray Carter and Rick Sneeuwjagt



It has been 50 years since the Dwellingup fires swept through the south-west, devastating townships and creating new lessons in fire management. So what wisdom has emerged from the ashes of this tragedy, and how have we continued to refine fire management since? The highly technical procedures used today are a far cry from those of yesteryear.

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Main Each year DEC fire forces attend more than 600 bushfires like this one throughout Western Australia.
Photo – Brett Dennis/Lochman Transparencies
Inset The Forests Department used 'Chev Blitz' military trucks as firefighting vehicles from after World War II until the late 1960s.
Photo – DEC

Above The extensive program of prescribed burning that followed the catastrophic bushfires of 1960–61 has resulted in a dramatic reduction in large destructive bushfires.
Photo – Jeremy Chick/DEC

Before European settlement of Western Australia in 1829, Nyoongar Aboriginal people used fire widely and frequently for a myriad of reasons, although the actual frequency with which Aboriginal people burnt the forests is uncertain. Following European settlement, there was little attempt to deal with bushfires in the south-west until after the passage of the Forests Act in 1918 and the establishment of the Forests Department in 1919. Early foresters were concerned by the extent of fire damage from the severe forest fires that were allowed to run unchecked as a result of the cessation of Aboriginal burning and uncontrolled logging during the 1800s and early 1900s. From 1924 onwards there was an attempt to apply a fire-exclusion policy to most of the cut-over jarrah forests.

During the 1920s and 1930s, fire management involved, among other things, the subdivision of the forest into areas which had been cut over for timber and regenerated, and those which had not. Attempts were made to exclude fire from cut-over forests. Some limited prescribed burning to create 'firebreaks' (narrow strips of forest between two tracks) was undertaken in the remainder of the forest. But these narrow firebreaks did little to prevent wildfires burning much of the forest in the early years.

The policy of restricting the use of broadscale planned burning and improved fire suppression saw heavy fuels steadily accumulating with time in most forest areas by the 1940s. From the late 1930s onwards, wildfires had started to become very large and difficult to control as fuels accumulated across the region. There were major fires in the jarrah forest in 1949–50, and in the jarrah and karri forests in 1937 and in 1950–51. In the long-unburnt compartments with heavy fuel loads, fires became uncontrollable once they exceeded about one hectare in size, even under mild weather conditions.

Also at about this time there were large, intense fires in the southern forest national parks, notably in the area that is now Walpole-Nornalup National Park and adjoining areas, where whole hillsides of karri and tingle trees were burnt. Few, if any, people were killed by the fires because these areas were sparsely populated at the time. But something had to be done.

Right Fire crews igniting and controlling a roadside edge burn.
Photo – John Kleczkowski/Lochman Transparencies

Centre right In concert with a network of lookout towers, DEC's fleet of surveillance aircraft ensures most bushfires in the south-west are detected and controlled while still small.
Photo – Greg Simpson/DEC

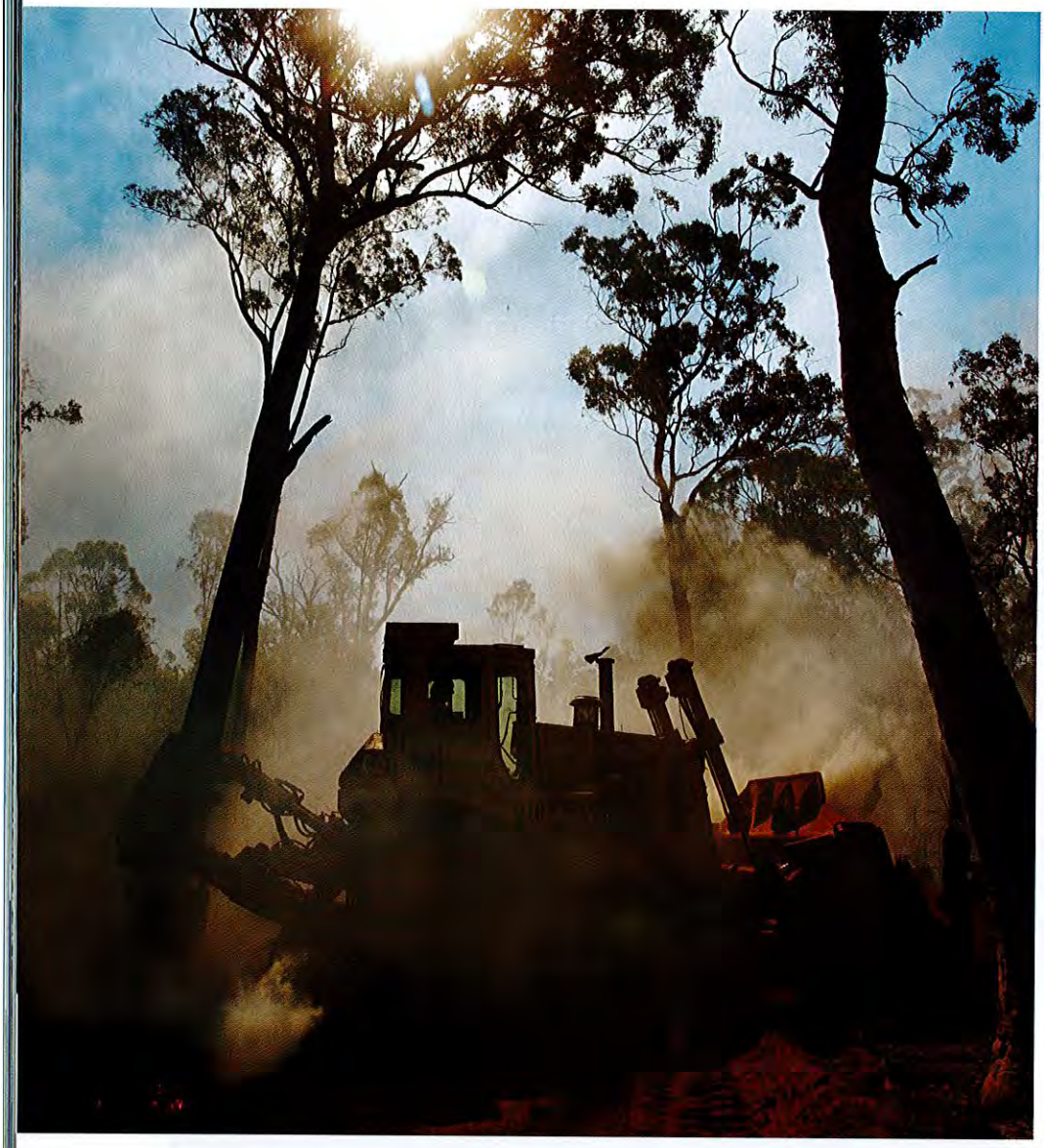
Below right Devastation after bushfire.
Photo – Jiri Lochman

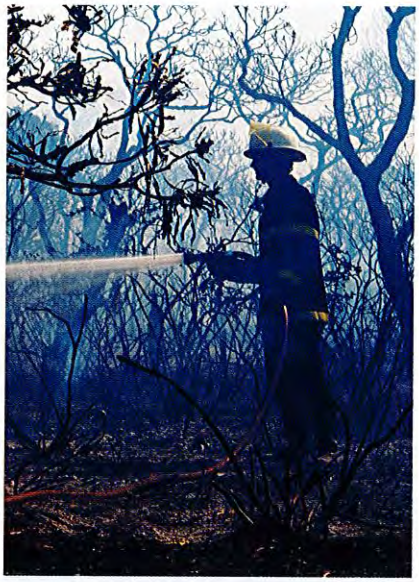
Management begins

Recognising that the attempted fire-exclusion policy was failing, and as foresters better understood the role of fire in the environment, in 1954 the Forests Department changed its approach by introducing a policy of broadscale prescribed burning to manage fuel build-up. Because of the heavy fuels in most of the areas prescribed to be burnt, implementation of the policy was cautious and slow at first. There were also technical constraints, especially a lack knowledge of fire behaviour on which to base planning and burning prescriptions, and a lack of trained and suitably experienced staff to undertake the work. Lack of access and problems with predicting fire behaviour in complex karri and karri-tingle fuels were also significant issues. As a result, little effective burning was actually undertaken in the dense southern forests.

The Dwellingup bushfires watershed

The inevitable consequence of the early fire-exclusion policy culminated in massive bushfires in the summer of 1960–61. Preceded by drought, ignited by numerous lightning strikes and fanned by strong hot winds, intense wildfires swept through the forests of the south-west (see 'The great teaching event: memories of the 1961 bushfires', *LANDSCOPE*, Autumn 2011). The town of Dwellingup was burnt, as were the smaller settlements of Holyoake, Nanga Brook and Karridale. There were serious losses of houses, buildings, infrastructure, pasture, stock





Top A firefighter dampening down vegetation.
Photo – Dennis Sarson/Lochman Transparencies

Above left A bulldozer constructing a fireline in a forest fire. DEC has a large fleet of earth-moving machinery to prepare prescribed burn boundaries and firelines.
Photo – Ron D'Raine/DEC

Above This specialised fire tanker with a high-lift pump is used to extinguish fires burning in branches and hollows in the crowns of tall trees.
Photo – Allan Jones/DEC

and fencing. Fortunately no-one died in the fires, but many were injured, and the cost to the community was enormous.

In the wake of the 1961 fires, a Royal Commission was headed by the director-general of the federal Forestry and Timber Bureau. The report of the commission contained many recommendations on preventing and controlling bushfires. From the point of view of the Forests Department, recommendation 20 was the most significant. It read:

> "The Forests Department [is to] make every endeavour to improve and extend the practice of control burning to ensure that the forests receive the maximum protection practical consistent with silvicultural requirements."

This did not represent a complete redirection of policy for south-west forests; rather it unambiguously endorsed the policy which had been adopted in 1954. The Royal Commission's recommendations were adopted in full by the government of the day.

Fire behaviour in the spotlight

The decision to expand the use of low-intensity planned fire to manage wildfire in WA forests initiated a program of scientific research and technical development to underpin fire operations. Over about 30 years of research, fire behaviour scientists developed a firm understanding of how forest fires behave (their speed and intensity) under different conditions of fuel quantity and type, fuel moisture content, weather and topography. They also developed fuel accumulation and fuel moisture models. This knowledge was incorporated into fire behaviour prediction tables and a prescribed burning guide (also known as 'The Red Book'), which is used by field staff in rating fire danger, planning and implementing low-intensity prescribed burns and in the suppression of bushfires.

The most recent significant research work conducted in this area was

Above One of eight fixed-wing waterbomber aircraft hired by DEC to help ground forces contain moderate-intensity bushfires.
Photo – Natasha Oke/DEC

Fighting fire from the air

In the past 50 years, the Department of Environment and Conservation (DEC) and its predecessors have made considerable progress in the use of aircraft for fire management in Western Australia. In the 1970s, the department introduced spotter aircraft to augment and partly replace the fire detection system which was based on lookout towers (it still maintains a network of 13 lookout towers). It also started using aircraft to waterbomb and contain small initiating bushfires. Waterbombing aircraft have proven to be effective where the aircraft are able to apply the water/foam drops within 30 to 45 minutes of a fire starting. DEC's aerial firefighting fleet includes:

Aerial detection
Nine American Champion Scout fire detection aircraft which fly about 4,500 hours each season.

One full-time chief pilot, a senior base pilot and 12 seasonal pilots for the operational season.

Aerial suppression
Eight fixed-wing fire bomber aircraft that fly between 600 and 800 operational hours each year, attending, on average, 125 fires and delivering 3.4 million litres of fire suppressant each fire season. Fire bombers travel at 300 kilometres an hour and deliver, on average, 2,300 to 3,000 litres of product each drop. These aircraft are essential in slowing the forward spread rate of developing fires to allow ground crews time to gain access to the fire.

Aerial ignition
Two AS 350 Squirrel helicopters, which travel at 220 kilometres an hour and carry an incendiary machine, pilot and three crew, to conduct aerial prescribed burning.

Two GA8 Airvan fixed-wing aircraft that travel at 230 kilometres an hour and can carry an incendiary machine, pilot and four crew.

Air crew
DEC staff are trained in-house for a variety of fire aviation roles including air attack supervisor, incendiary machine bombardier, air observer, air base manager, search and rescue monitors, aircraft officer, helitorch ground crew and incendiary operations supervisor.

'Project Vesta'—a seven-year CSIRO and Department of Environment and Conservation (DEC) project initiated in 1996 to investigate the behaviour and spread of summer bushfires in dry eucalypt forest with different fuel age and understorey structures.

Fire's environmental benefits

Studies into the effects of forest fires on soil physical and chemical properties, flora, fauna, water resource values and forest regeneration started in the early 1960s and have continued since. This work has resulted in a major increase in knowledge about forest ecosystems and their response to fire. While knowledge is incomplete, there is adequate information to devise and implement fire regimes that are likely to be beneficial to the environment over the long term.

A multitude of fire ecology studies has shown that many plant communities throughout the state need particular patterns of fire to maintain their floristic and structural diversity. Fires in a particular sequence or scale are

Right The habitat of mainland quokkas is protected and regenerated by prescribed fires lit under a range of fuel moisture and weather conditions.
Photo – Babs and Bert Wells/DEC

needed to provide diversity of habitat for many animals. It is evident that no single fire regime is optimal for all species, although it is clear that many plant and animal species and habitats are detrimentally affected by severe and large wildfires.

The existing knowledge of the interrelationship between fire regimes and biodiversity is used by fire planners and managers to develop and implement ecologically based prescribed burn programs designed to protect biodiversity. Strategies that are applied to different vegetation types and landscapes to achieve these objectives include varying the season, frequency and interval of fire based on knowledge of the responses of key fire-sensitive species and habitats. This is best achieved by conducting mostly patchy, low to moderate-intensity burns that create mosaic patterns, thereby adding to the diversity of habitats.

Managing smoke

Smoke is the inevitable product of both prescribed fires and bushfires. To minimise the impact of smoke from prescribed burns on residents and agricultural crops such as wine grapes, DEC has attempted to manage burns in the south-west forests for more than 20 years. Based on smoke plume distribution studies undertaken by CSIRO and the Bureau of Meteorology since the 1970s, computer models have been developed and applied to accurately predict the behaviour of a smoke plume from a planned burn. In combination with long experience of fire practitioners, the model has been used to determine the favourable weather conditions, burn size and suitable locations and burn lighting schedule that will result in minimal impacts of smoke emitted from DEC burns. Since the introduction of the smoke management system in the 1990s, the incidence of undesirable smoke and heavy haze events from prescribed burns has been reduced dramatically.

Building capacity

Over the past decade, Department of Environment and Conservation (DEC) and its predecessors have built a significant resource available both for prescribed burning designed to minimise the risks posed by large uncontrolled bushfire, and for response to bushfires when they inevitably occur in such a fire-prone environment.

Resources currently accessible within DEC include:

600 staff able to fill a wide range of incident management and support roles

300 frontline firefighters

98 fire trucks (medium and heavy tankers)

180 light fire units

10 low loaders (for shifting heavy machinery)

11 bulldozers

11 front end loaders.

Three specialised high-lift fire pumpers have been developed to enable the extinguishment of fires burning in the canopy of tall trees that would otherwise need to be felled to avoid the risk of fire escaping.

As many major bushfire incidents occur in remote locations, DEC has developed portable incident control centres and communications facilities that enable large numbers of incident leaders, support staff and fire crews to be managed and coordinated effectively. DEC's large mobile communications trailer is fitted with the latest satellite communications systems, internet connections, terminals, servers, radios, phones, faxes, plotters and printers.

Above left A DEC fire crew igniting gully vegetation to regenerate ageing fauna habitat.
Photo – Richard Reid/DEC

Above A bushfire operations briefing.
Photo – DEC

In recent years the incidence of smoke haze from planned burns exceeding the National Environment Protection Council standards for fine particulate matter in the Perth metropolitan area has averaged less than two occasions per year.

Teaming up

Fire management has become an increasingly national and international business. DEC (along with other WA fire agencies) is currently very active in several national fire coordination bodies including the Australasian Fire and Emergency Service Authorities Council and the Bushfire Cooperative Research Centre.

Over the past decade DEC has contributed teams of fire leaders and specialist staff to many interstate and international firefighting efforts, including deployments of expert fire team leaders to assist in large-scale emergencies in South Australia, Victoria, the United States and Canada.

The future

Over the years, bushfire management has become an increasingly difficult and complex business requiring a high level of skill, commitment and teamwork in the development and safe implementation of risk management, fire preparedness and prevention, prescribed burning operations, fire suppression and coordination, scientific research and education, public liaison and communication.

Cooperative arrangements with other fire authorities, both intra and interstate are critical to successful fire management, and significant effort is being, and will continue to be, applied to further improving these. Strong productive working relationships with other agencies that support fire management such as WA Police, Fire and Emergency Services Authority WA, Main Roads WA and the Bureau of Meteorology are also very important to effective and sustainable fire management into the future.

Maintaining a best practice science-based fuel reduction burning program has its own set of challenges and will continue to be an area of strong focus. Every effort is being made to maintain the professionalism and currency of skills of existing managers, while also preparing the fire managers of tomorrow.

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The United Nations General Assembly has declared 2011 as the International Year of Forests to raise awareness of sustainable management, conservation and development of all types of forests.

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