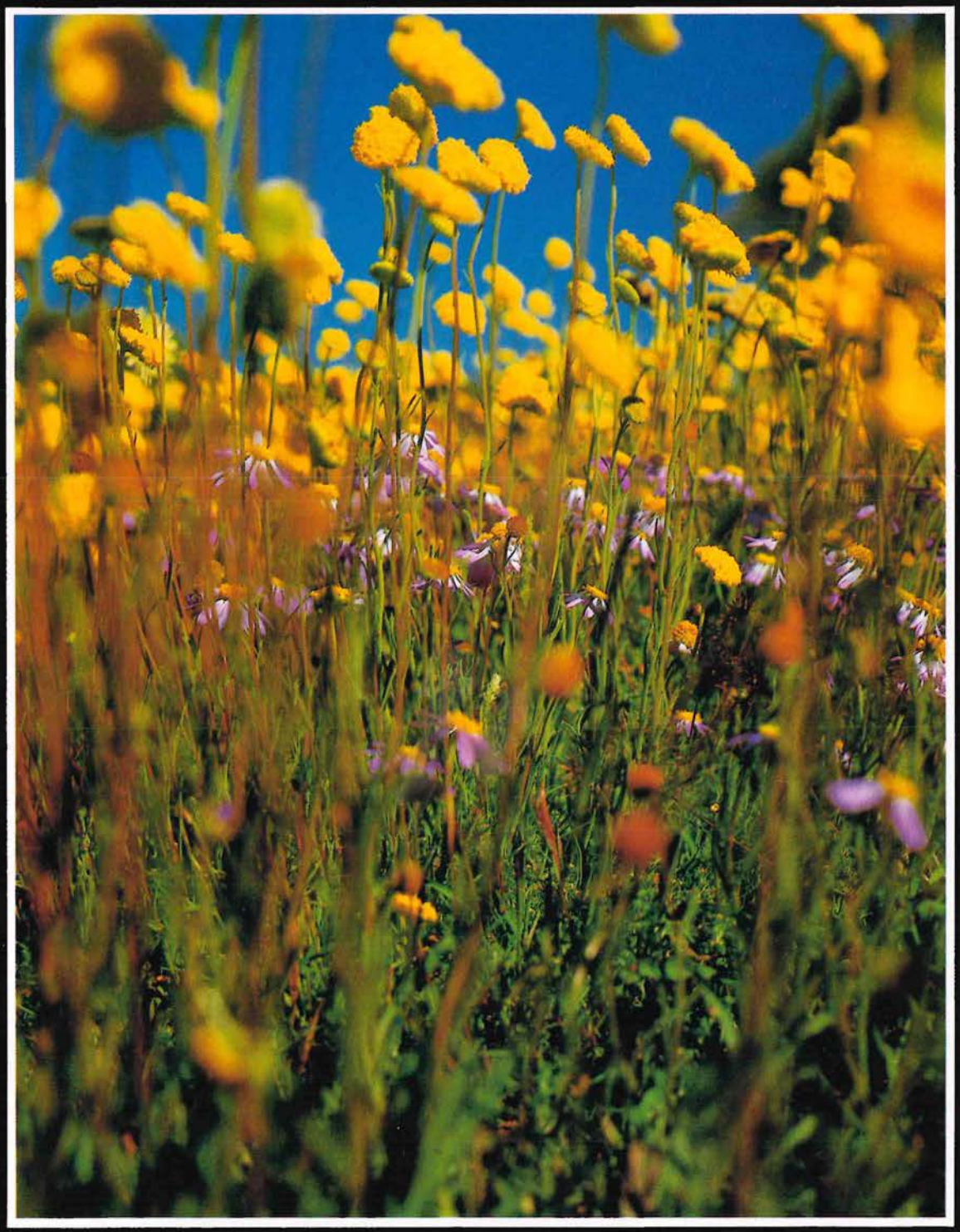
Landscope

Volume 1 June 1985



The Journal of the Western Australian Department of Conservation and Land Management.

INSIDE:

- Darwinias of the Stirling Range
- Solving the jarrah forest land-use conflict
- Hamersley Range National Park — a photographic profile
- Search for the western bristlebird

Landscope Volume 1 June 1985

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Editor: Marianne R. L. Lewis B.A., M.A.(Hons).
Assistant Editor: Helen K. Bradbury B.A., M.Phil.
Designer: Trish Ryder
All maps by Department of Conservation and Land Management Mapping Section.

Page preparation Typographix—Perth
Offset plates by Photolitho-PM.

Printed in Western Australia by the Government Printing Office ISSN 0815-4465.

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The Department of Conservation and Land Management acknowledges the contribution by Dr. John Sharpham, the Associate Director of Academic Affairs at the Western Australian Institute of Technology, in the preparaion of this publication.

Front Cover

Wildlife is a term that applies to both fauna and flora in their native environments, and includes the smallest insect, the largest mammal, the daintiest flower and the tallest tree. Co-ordinated land management will keep our wildlife everlasting, like these everlastings *Helipterum craspedioides and Helichrysum davenportii* which, every spring, carpet the semi-arid regions of Western Australia in profuse colour. Photo: Cliff Winfield

Minister's Message

Western Australia's land is among the most ancient in the world, and because of our isolation and climate, much of our flora and fauna is unique — evidenced by the 8000 plant species that are indigenous to this State.

The Western Australian Government has a responsibility to protect our unique landscape for our current use and, in particular, for the use of future generations.

To help us achieve our objective the Government has amalgamated the Forests Department, the National Parks Authority and the Wildlife Branch of the Department of Fisheries and Wildlife to form the Department of Conservation and Land Management.

The new Department will co-ordinate the functions of its predecessors and will utilize the combined resources at its disposal to encourage effective and lasting land management practices in Western Australia.

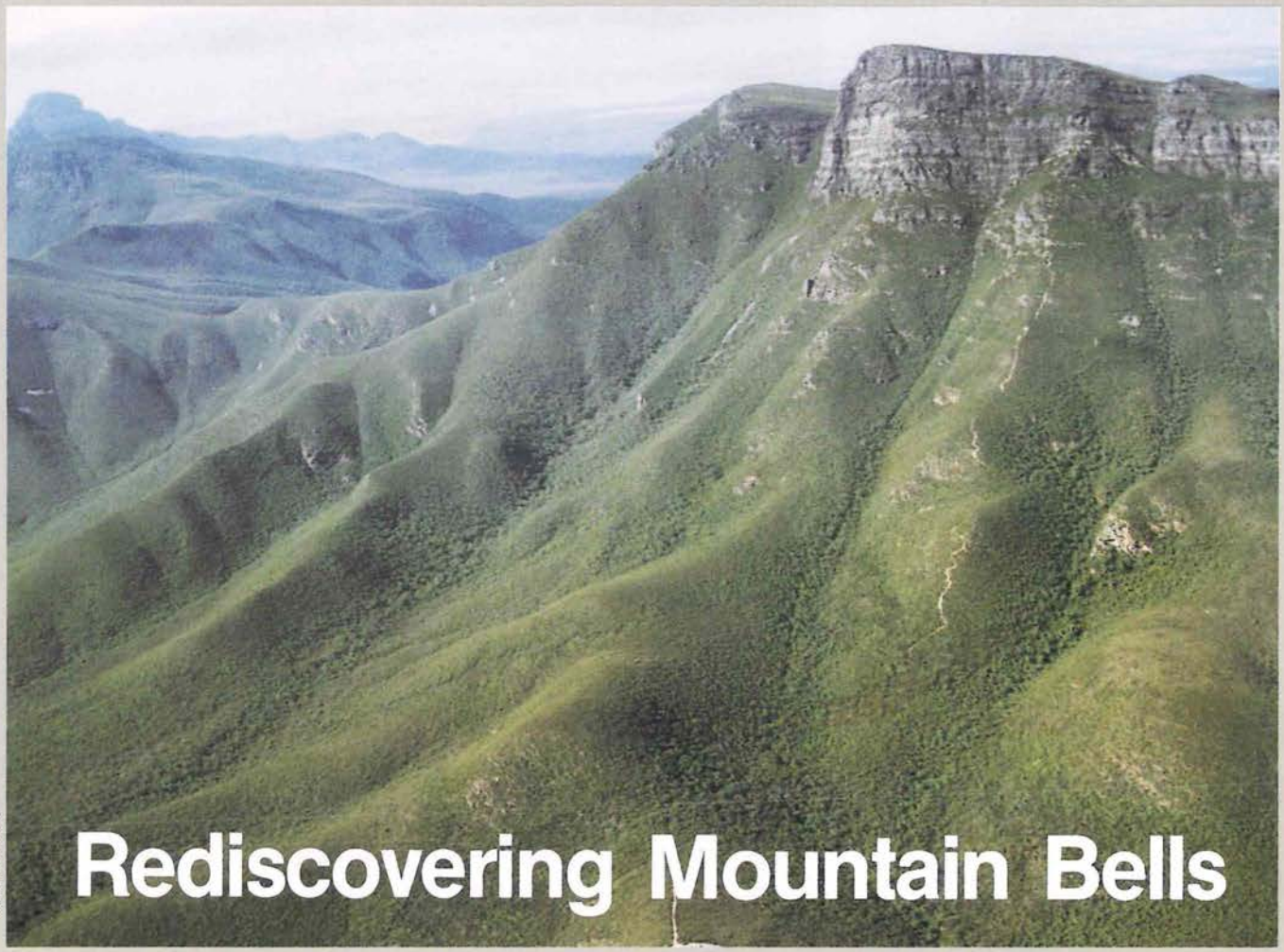
To operate effectively the Department of Conservation and Land Management will encourage public participation in its operations and at the same time will keep the public informed of its practices.

The publication of this magazine — Landscope — will play an important role in keeping the public and staff informed about the valuable scientific work being carried out in Western Australia by the Department.

The publication of this, the first issue of Landscope, indicates the success that can be achieved through the combined efforts of people who were previously employed by the amalgamated Departments.

I commend them on the success of this magazine and I look forward to reading future editions.

Ron Davies
Minister for Conservation and Land Management
Western Australia



Cliff Winfield

Rediscovering Mountain Bells

Bluff Knoll, the highest point of the Stirling Range and home of *Darwinia squarrosa* and *Darwinia collina*.

by
Botanist
Greg Keighery

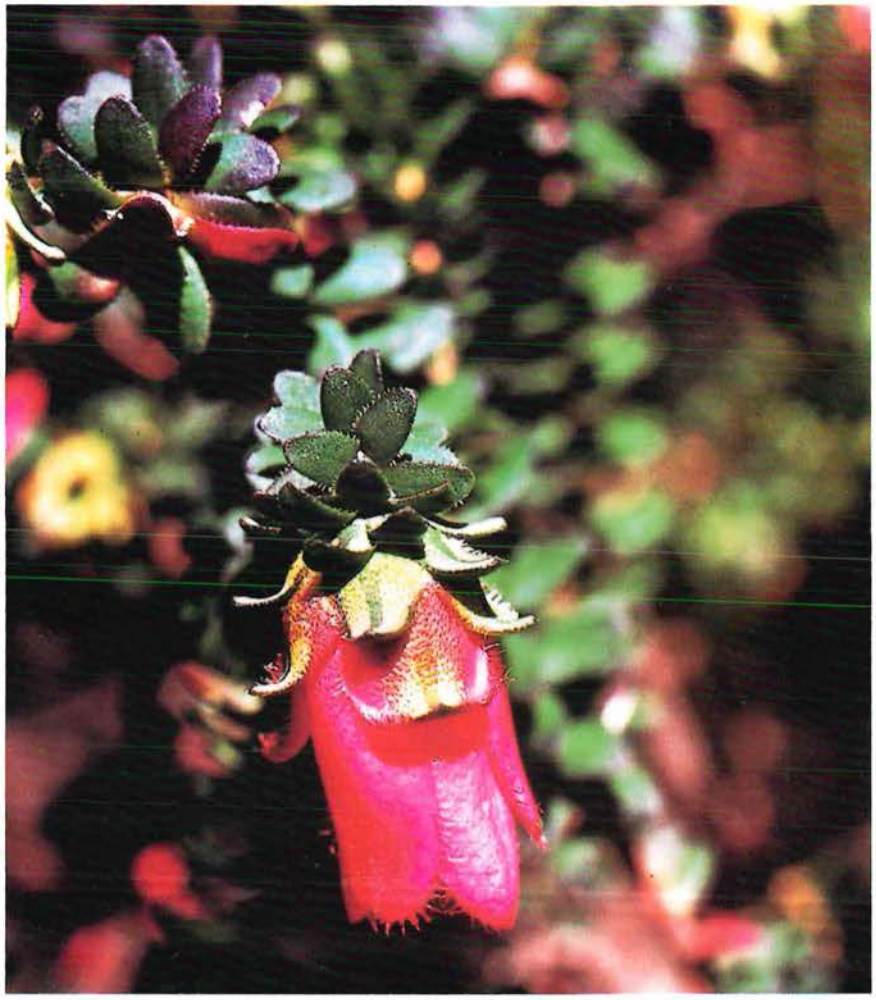
It was one of the more rewarding moments of my many visits to the Stirling Range when in September 1981 after a long, hard, wet climb I first saw, in full flower on Mt Success, a previously unknown species of mountain bell.

The Stirling Range, rising to a height of over 1,000 metres, is the nearest approximation to a mountain range that the subdued topography of Western Australia has produced. Now enclosed in a magnificent National Park, the range is home to almost 1,000 species of flowering plants, including 60 that occur nowhere else.

As a scientist I have been associated with the range since 1977 when I first became interested in the lovely and varied plants, mountain bells (*Darwinia* species). At this time their names were confused, so work began to obtain more information about the total flora of the range, with special attention being paid to the mountain bells. The results of seven years' work are now to hand, revealing a fascinating history and description of the *Darwinias* in this region.

Greg Keighery

This unnamed *Darwinia* species differs from *Darwinia squarrosa* (opposite) in that the bracts are slightly more red in colour, and the flowers protrude. This is the only bell confined to a single peak.



Greg Keighery

The false bell, *Muiriantha hassellii* mimics the *Darwinia* form. However the bell is actually a single flower, unlike the bell of the *Darwinia* which is composed of flower-like leaves called bracts.

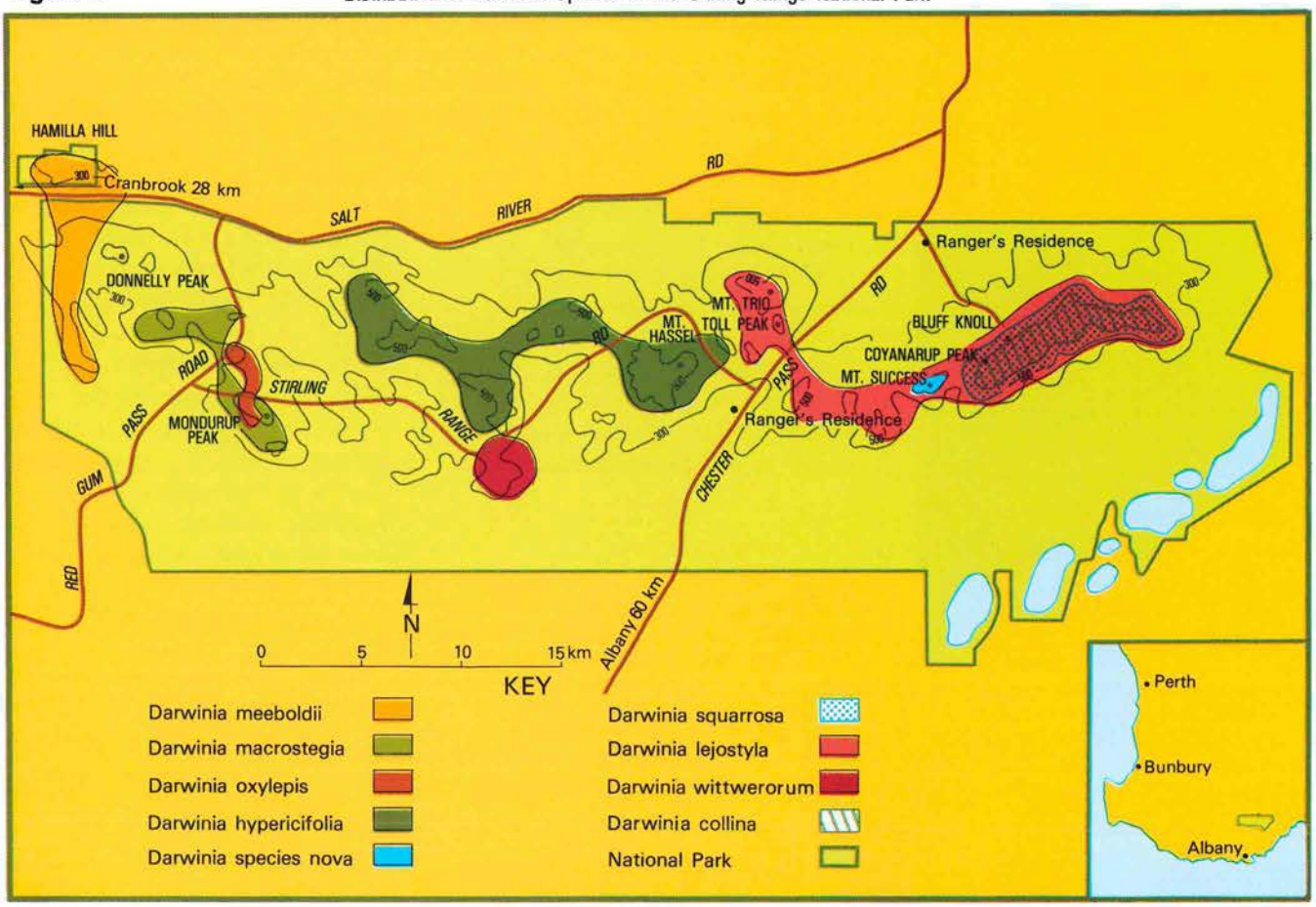
All of the mountain bells belong to the genus *Darwinia* (named after Erasmus Darwin, grandfather of Charles Darwin). The genus is a member of the family Myrtaceae, and is closely related to the Geraldton waxes *(Chamelaucium)*, Albany swamp daisy *(Actinodium)* and the feather flowers *(Verticordia)*. The genus *Darwinia* in Western Australia is comprised of approximately 60 species (about 15-20 are unnamed), and can be divided into several very discreet sections. One of these sections contains the mountain bells and the very rare *Darwinia carnea*, the only member of the group found outside the Stirling Ranges.

Close-up

The bell of the *Darwinia* is in fact a cluster of flowers that hang down and are enclosed by colourful petal-like leaves referred to as bracts. One plant frequently mistaken as a *Darwinia* is *Muiriantha hassellii*. This genus, a member of the Rutaceae family, has pale yellow, slender bells and is endemic to the range. It can be distinguished from *Darwinias* in having a solitary flower per bell, and in flowering in autumn and early winter, not spring and early summer. All species of *Darwinia* attract birds who feed on the nectar produced by the plant and who pollinate the flowers. *Muiriantha* is also pollinated by honey-eating birds and has probably mimicked the shape of the *Darwinias* in order to attract pollinaters.

The distribution of each species of mountain bell is shown in the accompanying map. One popular misconception is that the bells are confined to particular peaks. This is not generally true, although most occur within well defined regions, either upon several peaks or in the valleys between them. Always they occur above the 300 metre contour level, and on acid sandy clay soil.

Figure 1 Distribution of Darwinia Species in the Stirling Range National Park

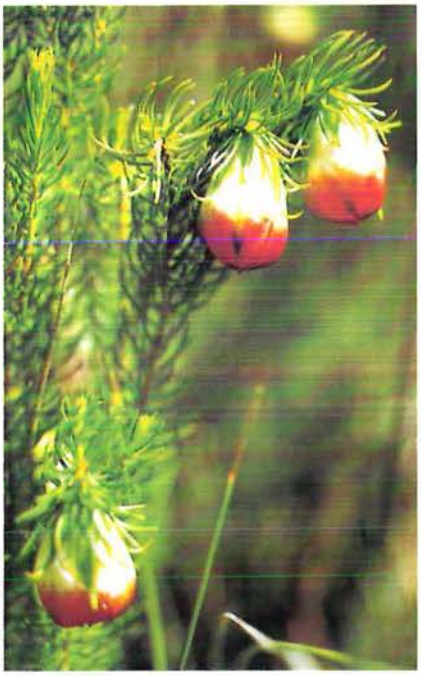


The simplest way to consider each species is to discuss them in a geographical sequence from the driest area (Cranbrook) to the wettest (Bluff Knoll — East). The first bell encountered is the Cranbrook bell *(Darwinia meeboldii)* which is the emblem of the Cranbrook Shire and occurs on the Hamilla Hills and the far western margin of the range. Originally this species was thought to be confined to Donnelly Peak, but our subsequent searches have failed to locate it on this peak. There are two distinct colour forms, the yellowish Hamilla Hills form and the paler Western Stirlings form. It is important that both forms be preserved, as the Hamilla Hills form is the Cranbrook emblem and is characteristic of this group of mountain bells.

The second species is Gillham's bell, *(Darwinia oxylepis)*, long considered a form of *Darwinia lejostyla*, but always considered distinct by longtime Cranbrook resident Alf Gillham. Our studies show it to be deserving of separate species status, and we then discovered that James Drummond had collected it on his visit to the range in 1848. His material had been described as a species of *Genetyllis* by Russian botanist Turczaninow in 1852, and subsequently ignored by English and Australian botantists. However, the original name has now been resurrected as this species is considered to be closely related to *Darwinia meeboldii*, not *D. lejostyla*. It is confined to lowland regions rather than the peaks of the Stirlings.

Cliff Winfield

Left
Darwinia meeboldii is the emblem of the Cranbrook Shire and shows the characteristic bell shape of the species.



Greg Keighery

The third species encountered is the tulip darwinia or the Mondurup bell *(Darwinia macrostegia)*, a plant with an untidy straggling habit, but with large bells showing red veins that may vary from almost white to nearly pure red. In Europe during the nineteenth century this species was widely cultivated from seeds sent back by James Drummond, but it is rarely grown now. *Darwinia macrostegia* prefers high wet slopes of the larger western peaks.

Left:
Darwinia wittwerorum was named after Ernst and Magda Wittwer in 1981. Note that the bell structure is rounder than most other mountain bells.

Cliff Winfield

In the central part of the range grows the lowland species, *Darwinia wittwerorum*, named after Ernst and the late Magda Wittwer. This is a small erect shrub, which occurs on only a few sites in the central Stirlings, and can be easily distinguished by its small almost closed bells, tinged red at the base. It too was previously placed in *Darwinia lejostyla*.

On all larger peaks of the central Stirlings, one finds the widespread *Darwinia hypericifolia*. Closely related to *Darwinia. macrostegia*, it shares the same scrambling habit, but differs in having narrow few-flowered heads covered by pure red bracts.

Finally, just before the high eastern peaks, *Darwinia lejostyla* (note: *lejostyla* not *leiostyla*) can be found, west of Chester Pass on Mt Trio and Tolls Peak. This is the second widespread species,

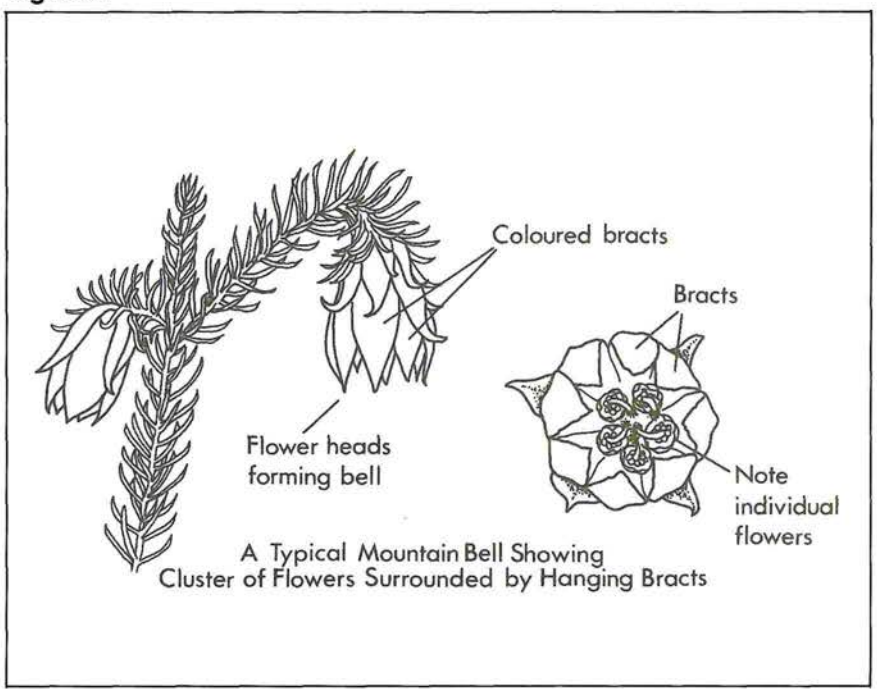
Left:
The Mondurup bell, *Darwinia macrostegia*. This bell was most frequently grown in nineteenth-century Europe from seeds sent to London by James Drummond in 1850. It gained the name tulip bell because of the resemblance of the bracts to a variegated tulip flower.

Below:
Darwinia oxylepis growing beautifully on the slopes near the eastern end of the Stirling Range National Park.

Cliff Winfield

and the only one that crosses Chester Pass. *Darwinia lejostyla* has two distinct forms, a montane form with long, bright pink bracts, and a valley form, with upturned light pink spreading bracts (known only to occur in the valleys below Bluff Knoll). Our studies indicate that these two forms should be recognized as separate sub-species of *Darwinia lejostyla*. James Drummond found the valley form during his visit to the range, then climbing higher he found *Darwinia squarrosa*. However, since he normally found only one bell per peak on the western hills he did not climb further. Hence he never saw the montane form of *Darwinia lejostyla*, nor *Darwinia collina*, which was not named until the late 1920s.

Figure 2



A Typical Mountain Bell Showing Cluster of Flowers Surrounded by Hanging Bracts

Right and Below:
Darwinia hyperificolia occurs on Mt Hassell and other peaks in the central part of the Stirling Range National Park.

Greg Keighery

Greg Keighery

The valley form of *Darwinia lejostyla* was once confused with members of the genus *Genetyllis* but has now been confirmed as a *Darwinia*. Note the beautiful pink colour of the bracts.

The other mountain bells are all confined to the high, wet eastern peaks. *Darwinia squarrosa* occurs generally at lower levels than *Darwinia collina* which is confined to the high plateau. The two species do not normally occur together. *Darwinia squarrosa* descends the wetter valleys and, for example, occurs in a very localized position just above the waterfall on Bluff Knoll. This species with its fringed leaves and pink bracts is very distinctive. *Darwinia collina* (aptly named in Latin as "dweller on hills") is the most spectacular species of all the bells. In places where the soils are very shallow it grows as a dense shrub covered in large lemon-lime bells (they are often tinged with red on Bluff Knoll and Coyanerup Peak).

The final species, discovered on Mt Success in 1981 and currently unnamed, is probably the rarest mountain bell. It is

Below:
The mountain form of *Darwinia lejostyla*. This bell is probably the most commonly encountered by tourists who climb the peaks around Chester Pass (especially Bluff Knoll).

Greg Keighery

closely related to *Darwinia squarrosa* but differs in having a smaller bell, short red bracts and a scrambling habit (see photo on page 4).

New Discoveries

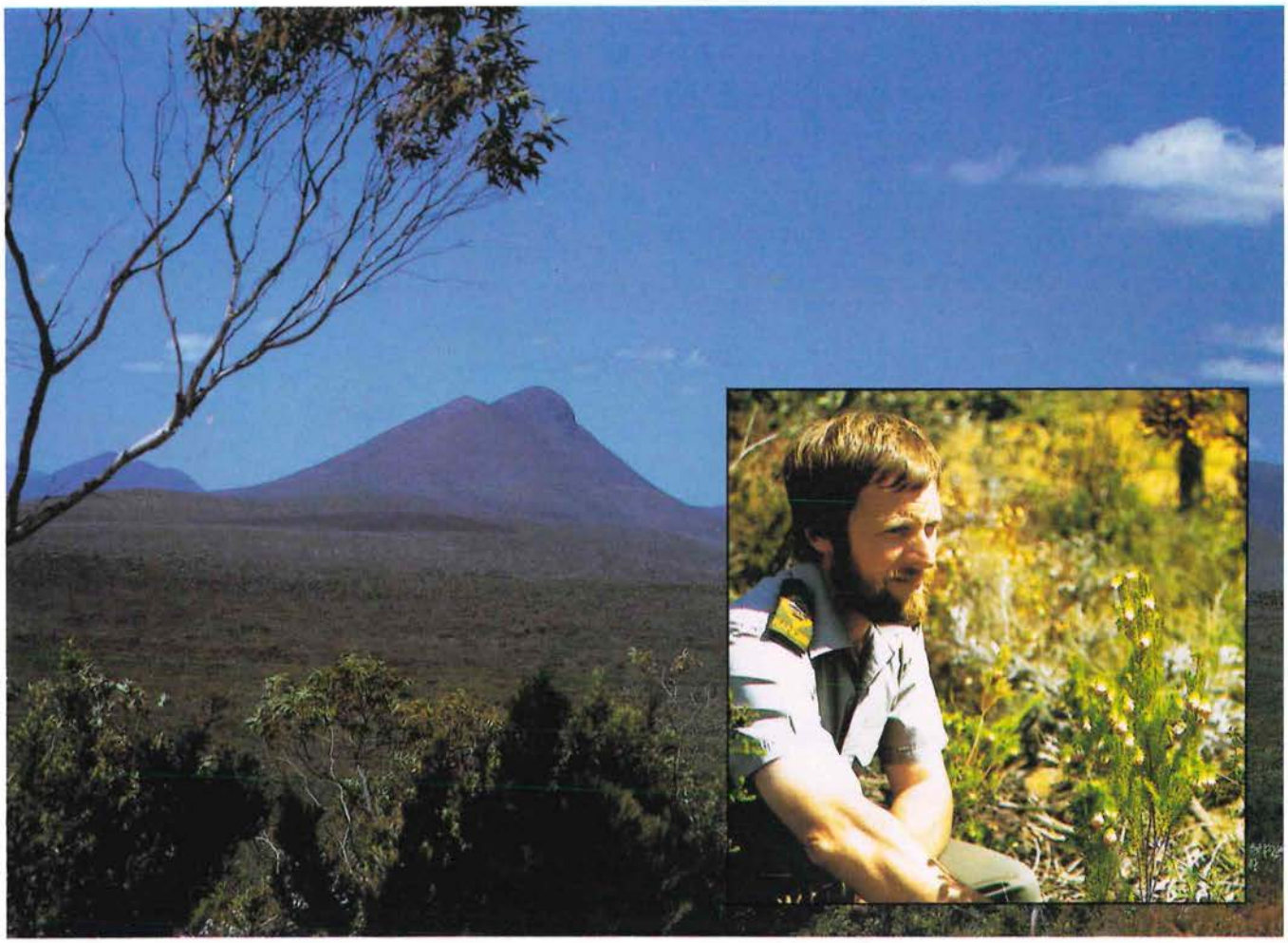
One final point of interest to note in the mountain bells is the presence of interspecific hybrids. As can be seen from the distribution map and notes on each species, the bells rarely occur together, being separated either geographically or altitudinally. In cases where two species do meet, hybrids can be found. So far, two hybridizing populations are known, *Darwinia collina* x *Darwinia lejostyla*, and the unnamed species hybridizing with *Darwinia lejostyla*. The latter hybrid is a very attractive plant, and the population is one of the largest naturally hybridizing populations of wildflower known in Western Australia.

Greg Keighery

Darwinia collina occurs high in the range, in the vicinity of Ellens Peak and Coyanerup. Its almost translucent colour and profusion make this one of the most spectacular of the mountain bells.

Below:

Ranger Martin Loyd shows one of the *Darwinia witterorum* plants growing in the Stirling Range National Park.



Cliff Winfield

Greg Keighery

This phantom hybrid was found on Tolls Peak. It is a cross between *Darwinia lejostyla* and *Darwinia hypericifolia*.

Below:

This lovely hybrid is a cross between the unnamed species and *Darwinia lejostyla*. It is currently being cultivated and should prove a very good garden plant. Being a hybrid, this plant grows easily from cuttings.

Greg Keighery

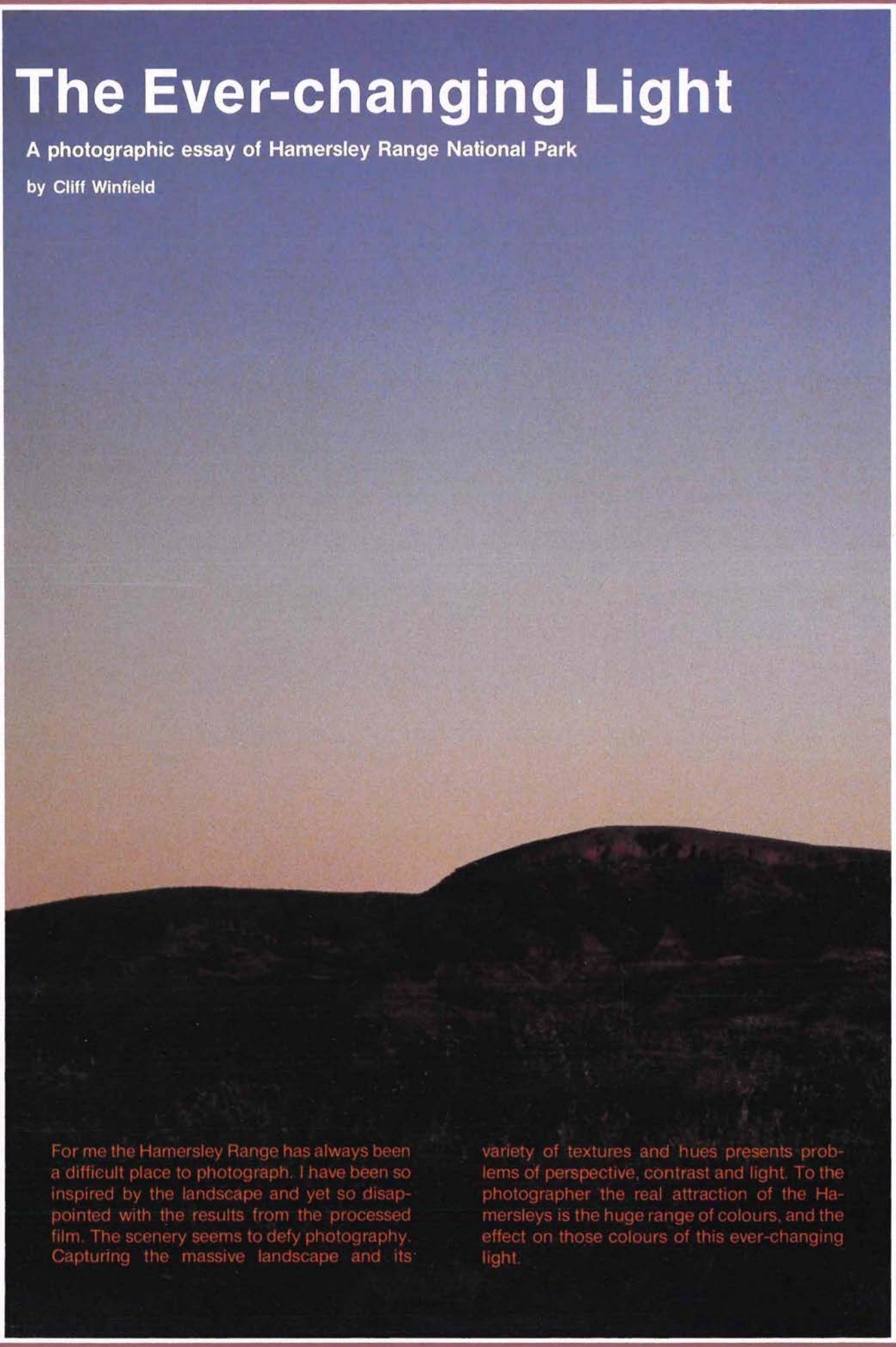
The delight of working in the range, apart from the scenery and the flowers, is that one is able to make new and exciting discoveries even on well trodden territory. As an example, while climbing Tolls Peak to check flowering of the only bell recorded on this peak for a visit by a group of overseas botanists in 1984, we discovered three hybrids between *Darwinia lejostyla* and *Darwinia hypericifolia*. These phantom hybrids, in a large population of normal *Darwinia lejostyla*, were found on or near a track on a deep valley opposite Mt Hassell (where *Darwinia hypericifolia* grows). Apparently birds visit *Darwinia hypericifolia* on Mt Hassell, then fly across the intervening valley floor, up the gully and into the *Darwinia lejostyla* population to feed. Along the track edges the hybrids can grow and survive. This sort of hybrid has only been documented in the genus *Darwinia* in this area in Western Australia. Who knows what other unusual and exciting discoveries await us with the mountain bells of the Stirling Range?

I would like to acknowledge that the work undertaken in the Stirling Range National Park was, for a number of years, a co-operative effort between myself and Dr Neville Marchant from the Western Australian Herbarium.

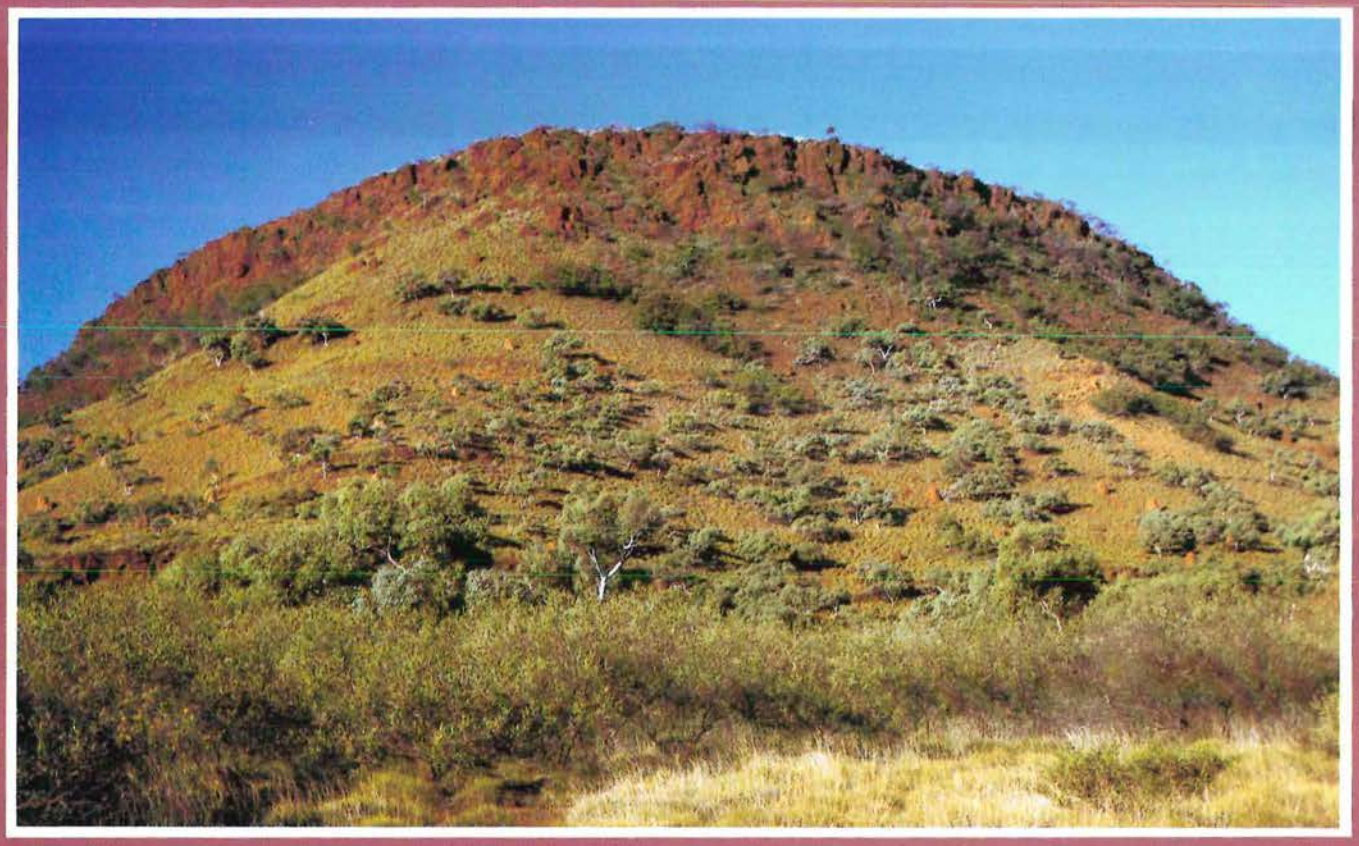
The Ever-changing Light

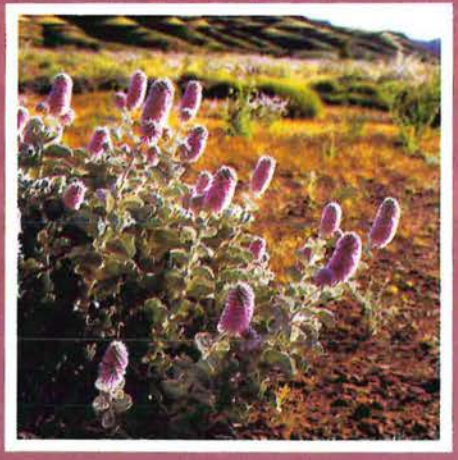
A photographic essay of Hamersley Range National Park

by Cliff Winfield

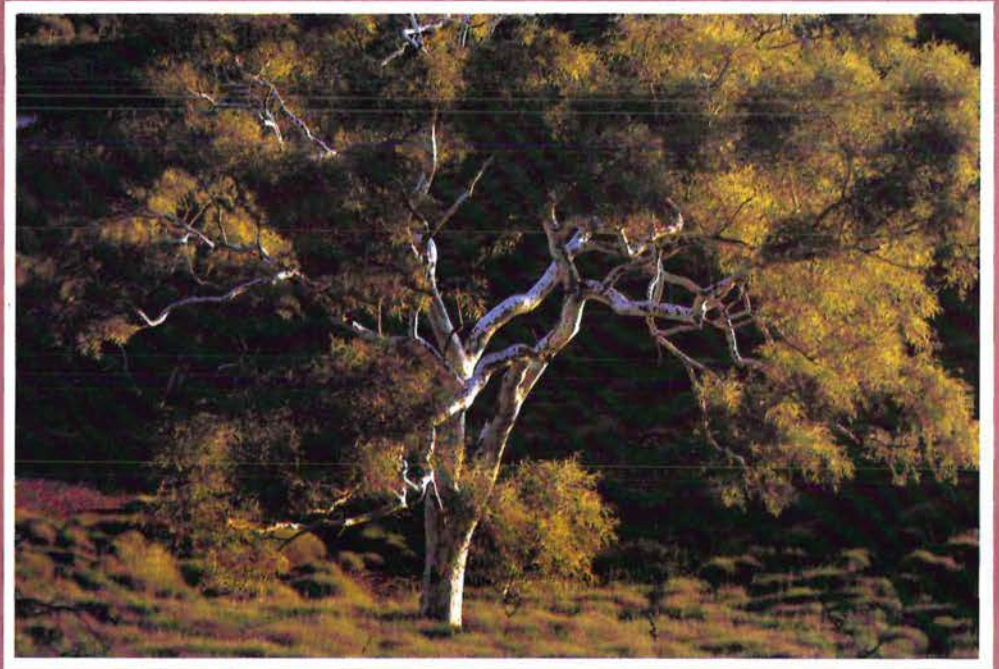


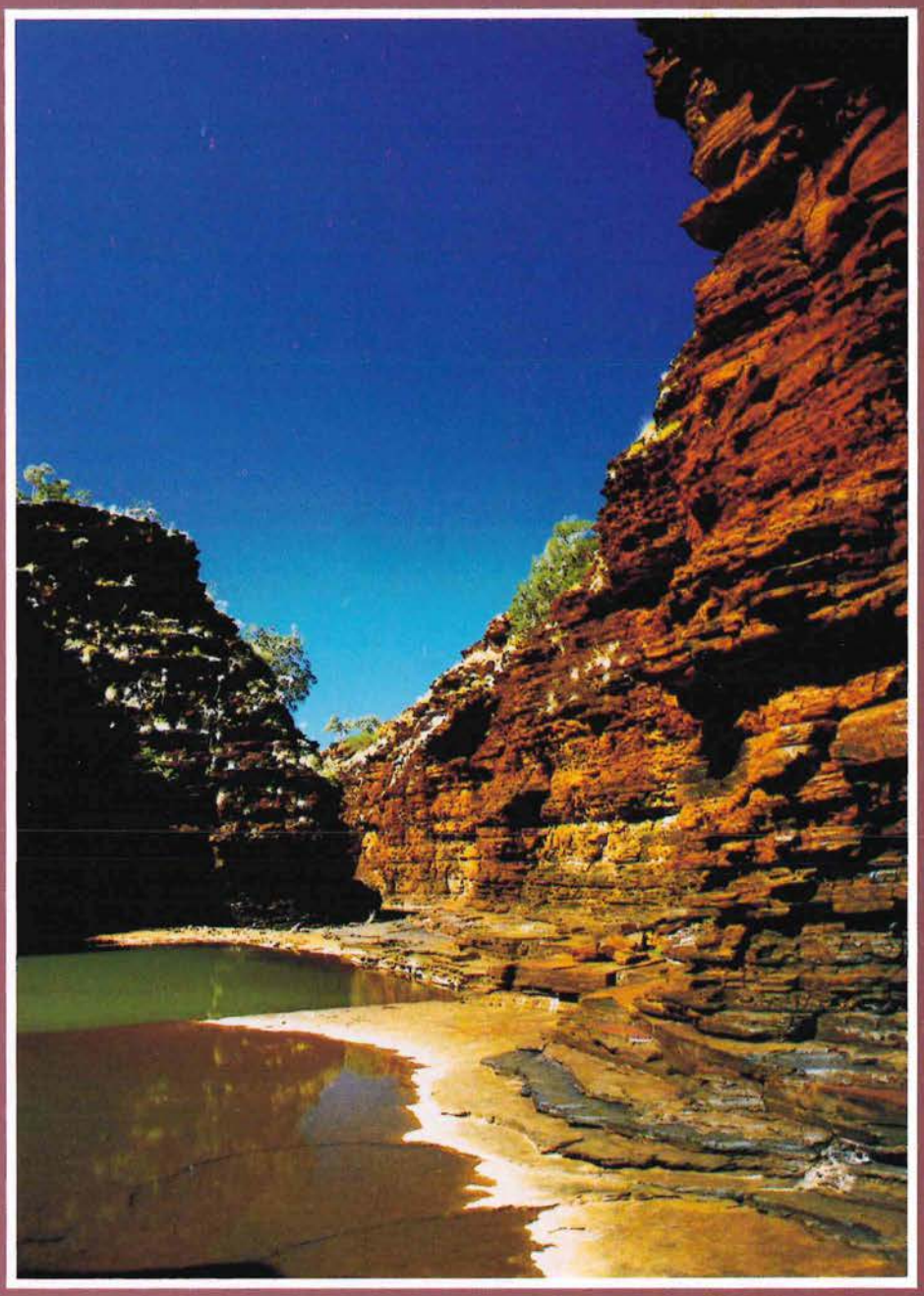
For me the Hamersley Range has always been a difficult place to photograph. I have been so inspired by the landscape and yet so disappointed with the results from the processed film. The scenery seems to defy photography. Capturing the massive landscape and its variety of textures and hues presents problems of perspective, contrast and light. To the photographer the real attraction of the Hamersleys is the huge range of colours, and the effect on those colours of this ever-changing light.



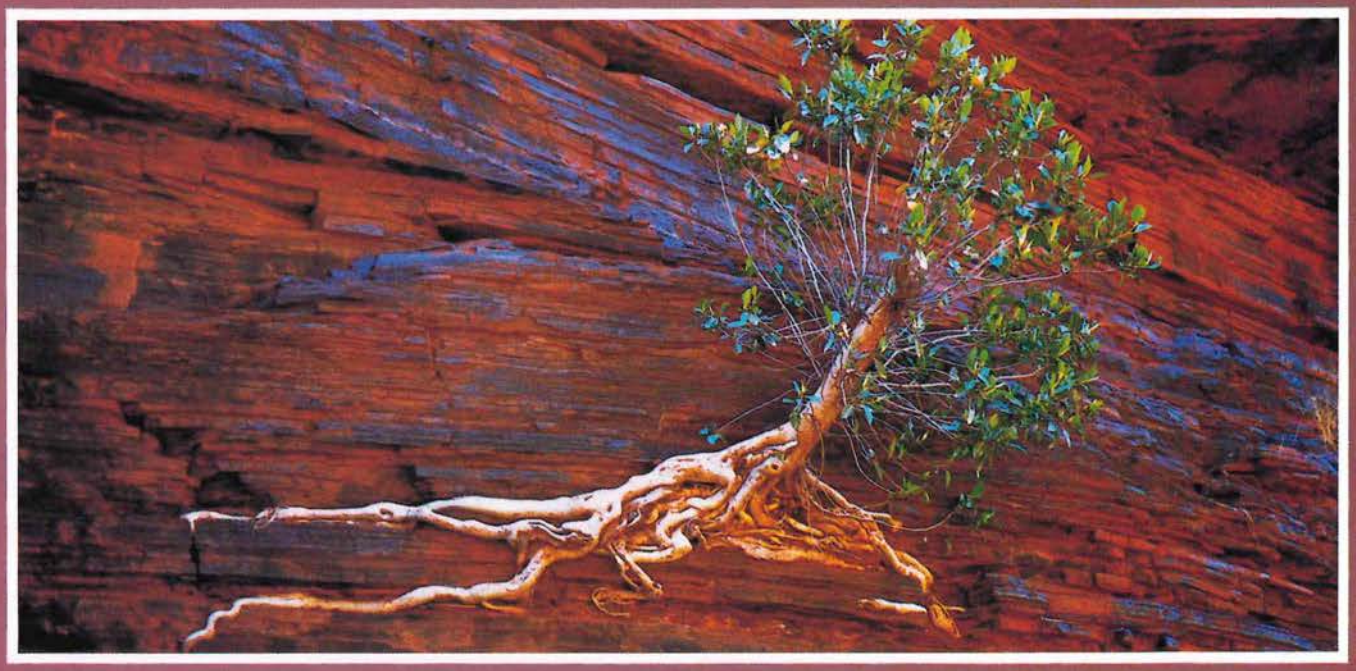


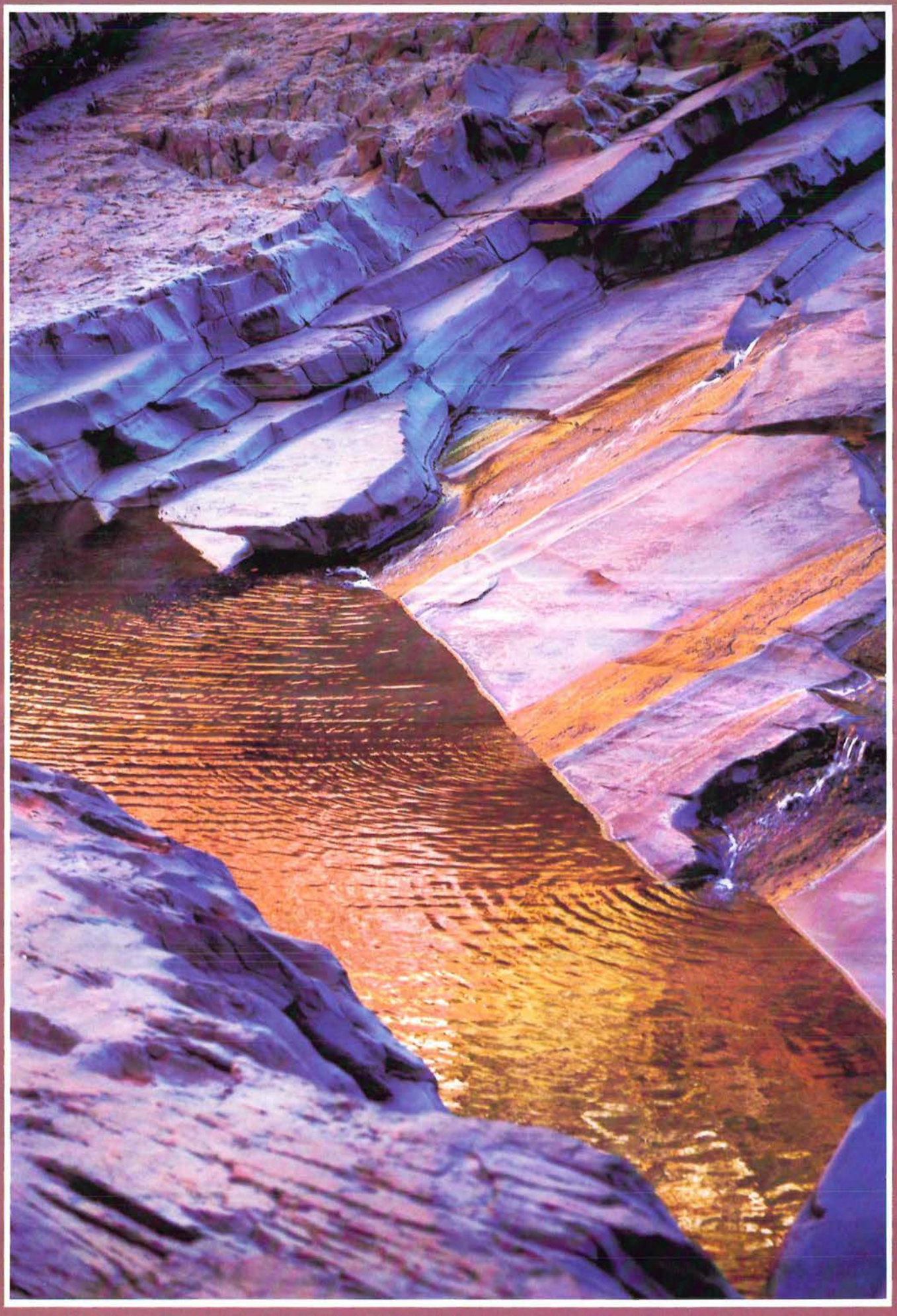
Oblique morning sun highlights the form of the snappy gums *(Eucalyptus leucophloia)* on the ridges. Gradually light on the eastern slopes illuminates the red rock hills. On the plains the pastel pink mulla-mullas *(Ptilotus rotundifolia)* contrast softly with the harsh ground.



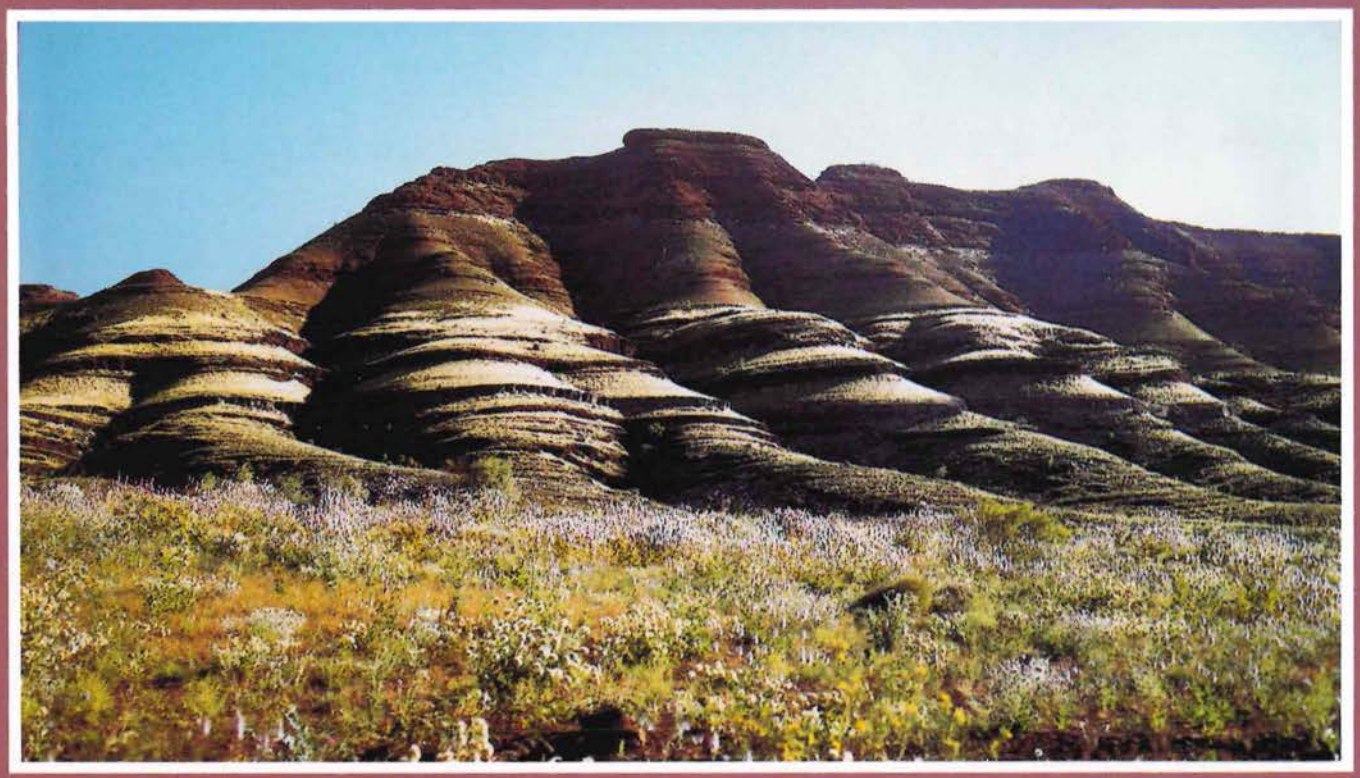


As noon approaches, the walls and floor of Kalamina Gorge are a spectrum of colour. A rock fig *(Ficus platypoda)* clings tenuously to its stony ground.



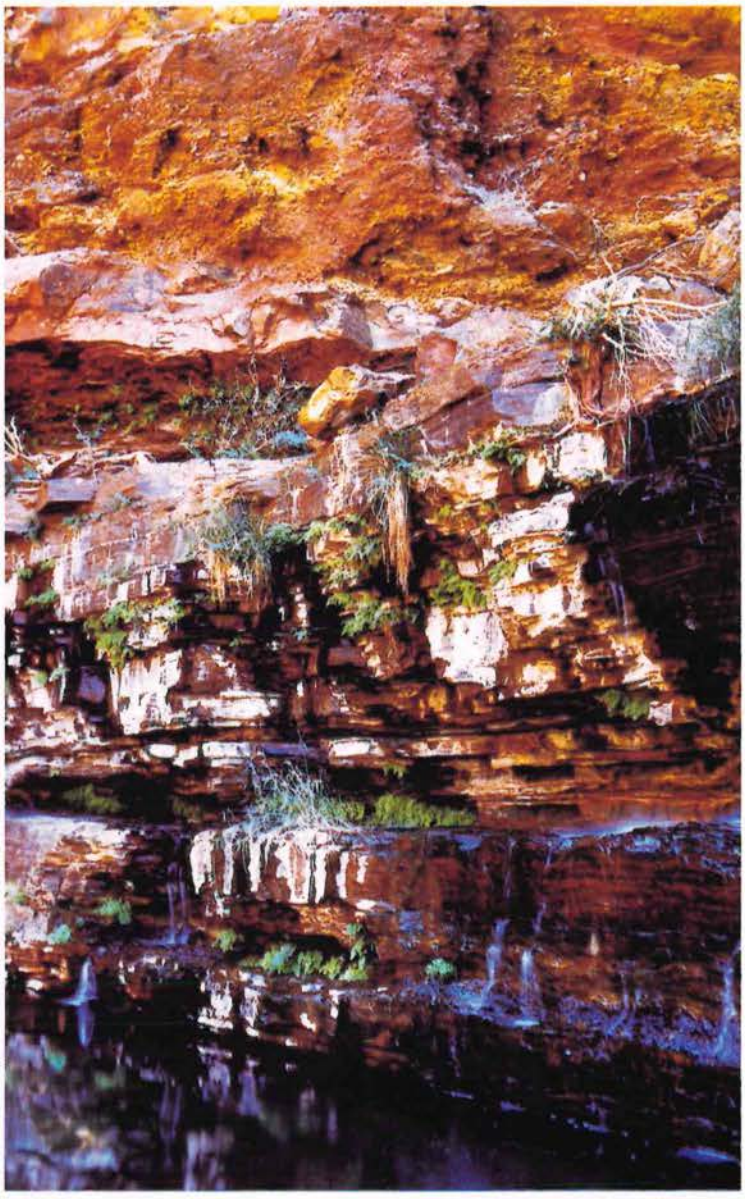


Hamersley Gorge becomes an eldorado, its stream reflecting the dark blue sky and the golden stone chasm.



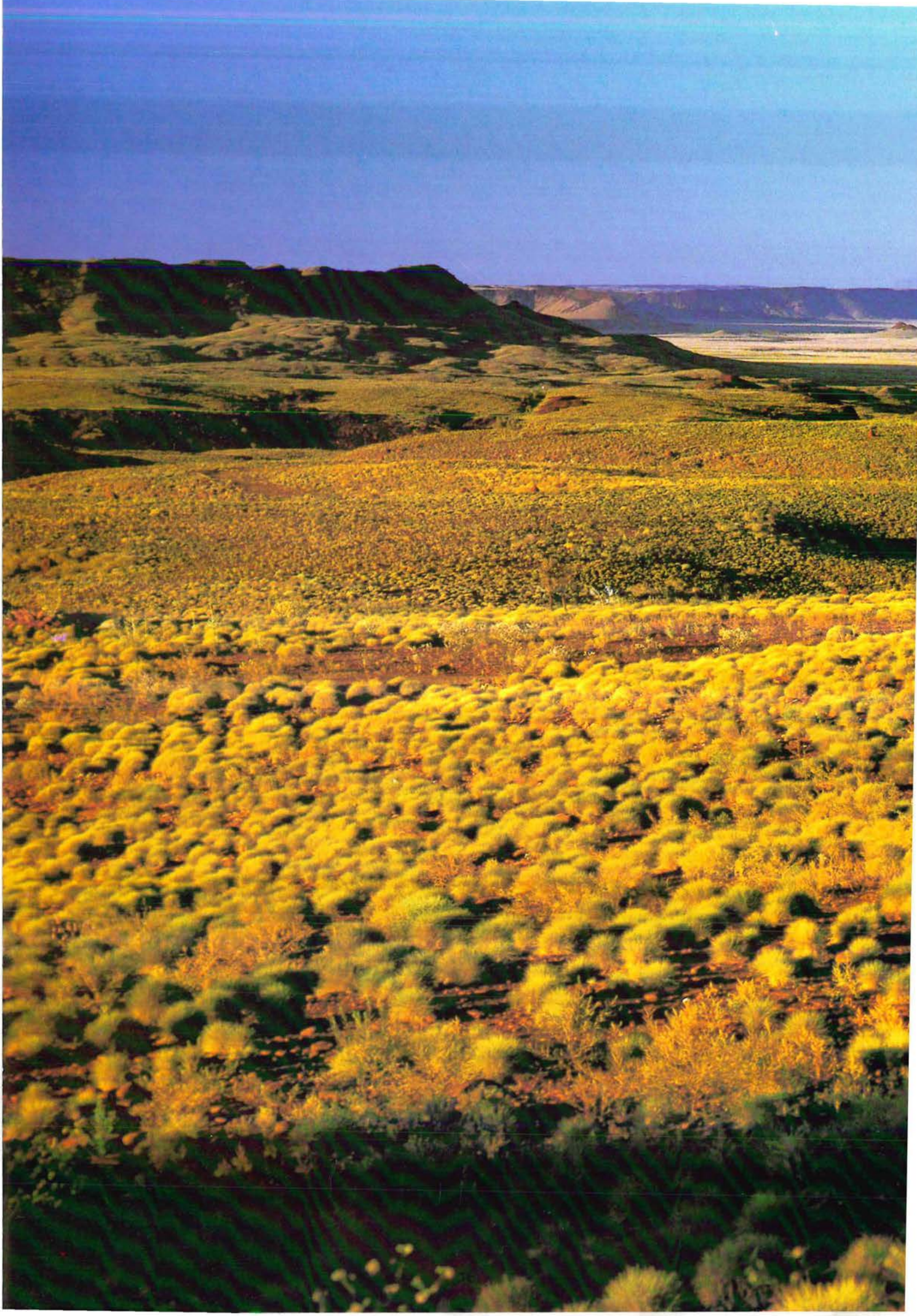
The afternoon glare accentuates the layered scree slopes and backlights some Sturt peas *(Clianthus formosus)* that escape encroaching shadows.

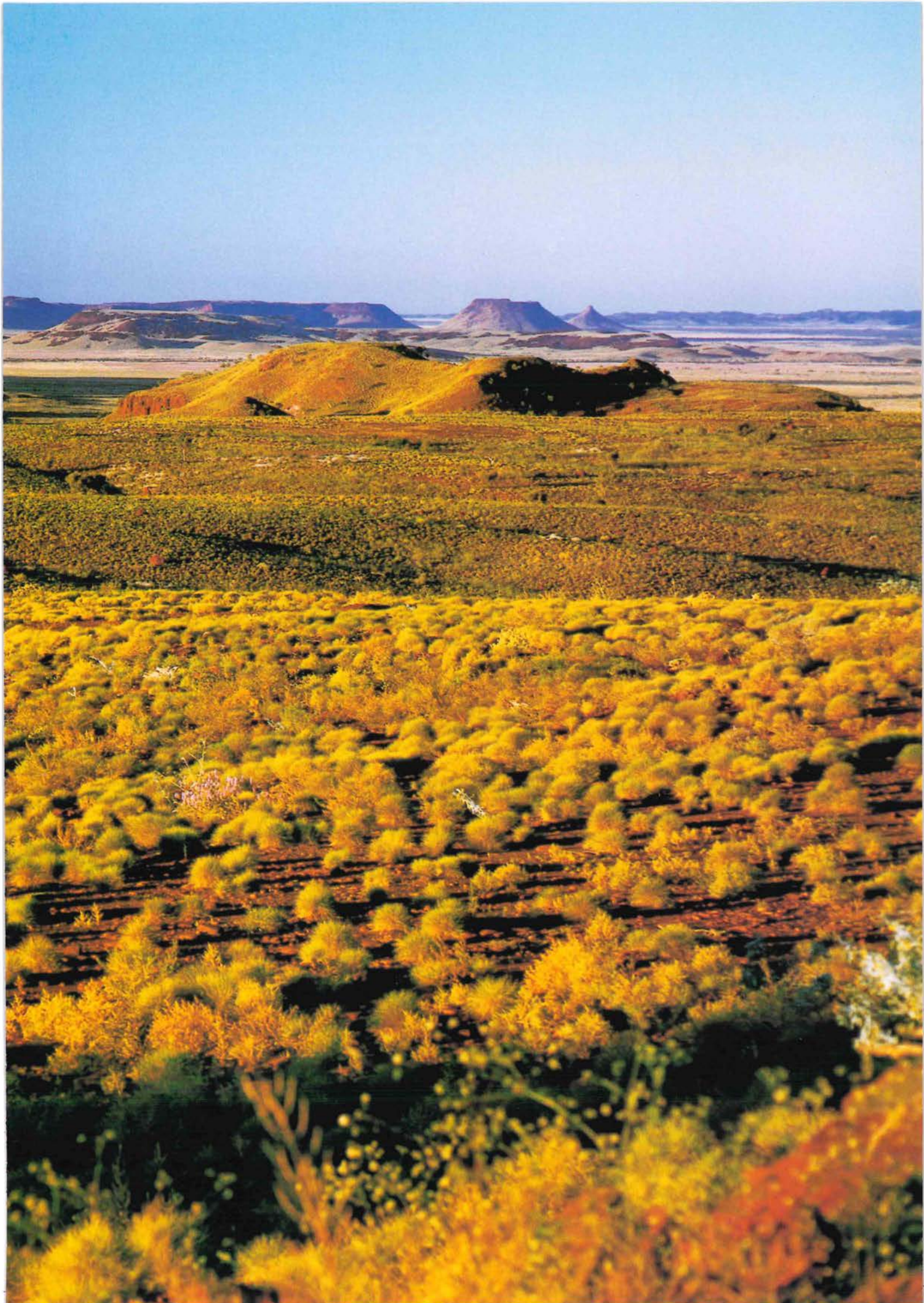
Some of the deepest gorges occlude all direct sun and create a moist environment. Delicate ferns inhabit the wet walls of Circular Pool in Dales Gorge.



Centrefold

There are three national parks in the Pilbara. This photograph from Mt Herbert lookout in the Millstream Chichester National Park was taken by Cliff Winfield from the Department of Conservation and Land Management.





Park Profile

Hamersley Range National Park

Size and Location

The park is large, occupying an area approximately 100 x 60 kilometres (618,000 hectares) in the central Pilbara of Western Australia. The nearest towns are Wittenoom, 10 kilometres outside the northern border, and Tom Price 10 kilometres outside the western boundary.

Access

The most popular method of access to the park is by road in conventional vehicles. Although all roads into the park are unsealed, the surfaces are usually passably smooth except after rain. There is very little permanent water in this region and there are great distances between service points. Motorists are advised to be relatively self-sufficient. Many tourist coaches visit the Hamersleys, and commercial flights are available to Wittenoom.

Attractions

The Hamersley Range is the remnant of a 2,000 million-year-old plateau. Over time, heating and cooling and water have eroded and cracked the hard rock, and sculptured deep gorges and canyons into the landscape. The spectacular colours of the rusty scree slopes contrast with the vegetation in the moist valley floors of some of the deeper gorges: shaded from the hot sun, delicate ferns grow beneath cadjeputs and river gums. Many of the gorges have permanent pools of fresh cool water which become streams after heavy rains and cascade over the strata of rock. The park is rich in wildflowers but their abundance varies from month to month and according to the amount of rain received.

Accommodation

There are four campsites within the park, all with toilet facilities, barbecues, tables and seats. Campers are charged a nightly fee. Outside the park, hotel/motel accommodation is available at Wittenoom and Tom Price.

Best Time to Visit

From April to September the weather is mostly very pleasant with comfortable day temperatures (around 30°) and cool — sometimes cold — nights.

Wildflowers are most prolific from June through August, so this period attracts the most visitors. May and August school holidays are particularly busy.

Further Information

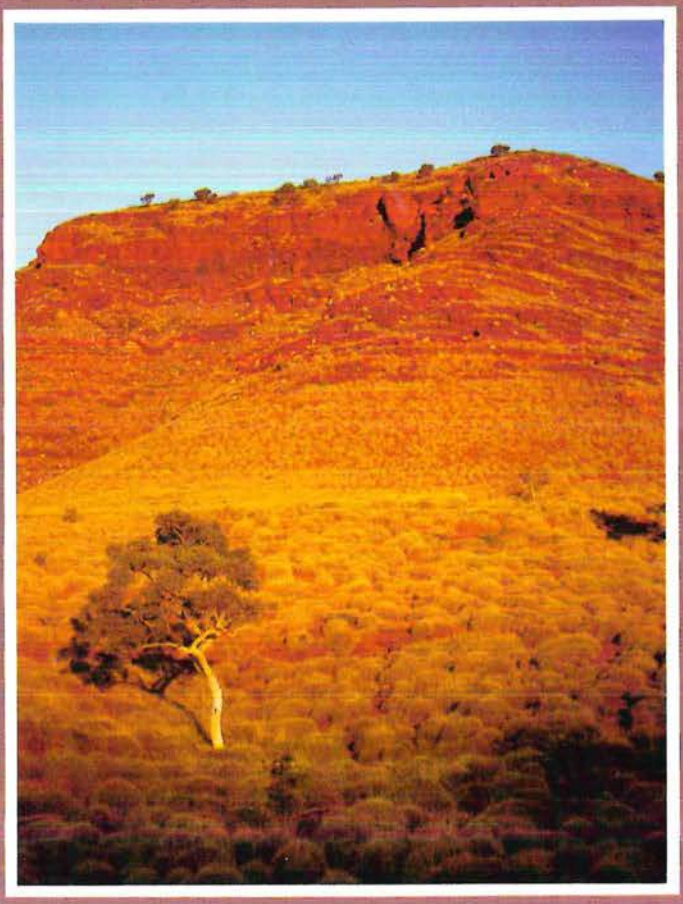
A brochure and park map are available from: Department of Conservation and Land Management offices at —

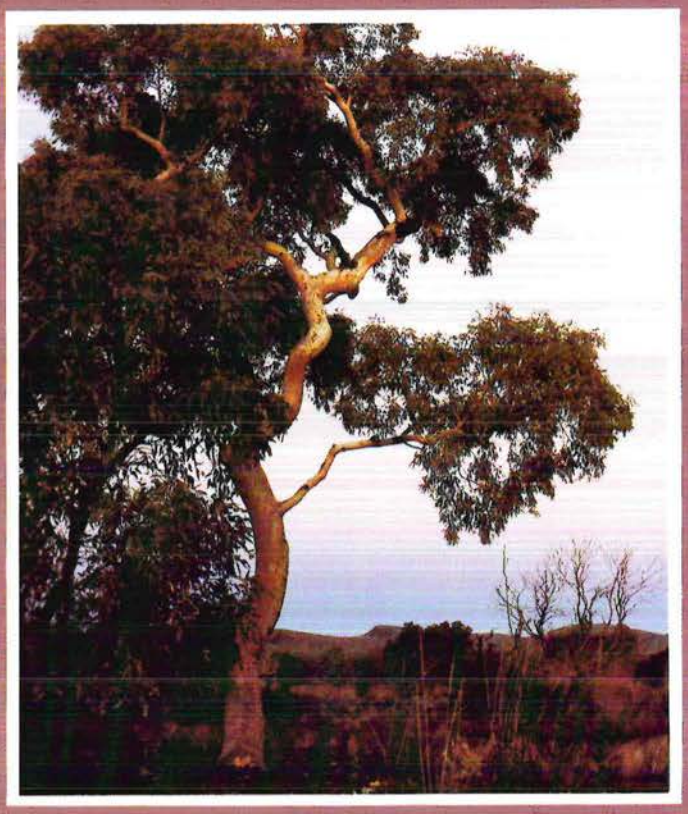
PO Box 119
Karratha WA 6714
Phone: (091) 86 8291

PO Box 104
Como WA 6152
Phone: (09) 367 6333

or

Ranger
PO Box 73
Wittenoom WA 6752

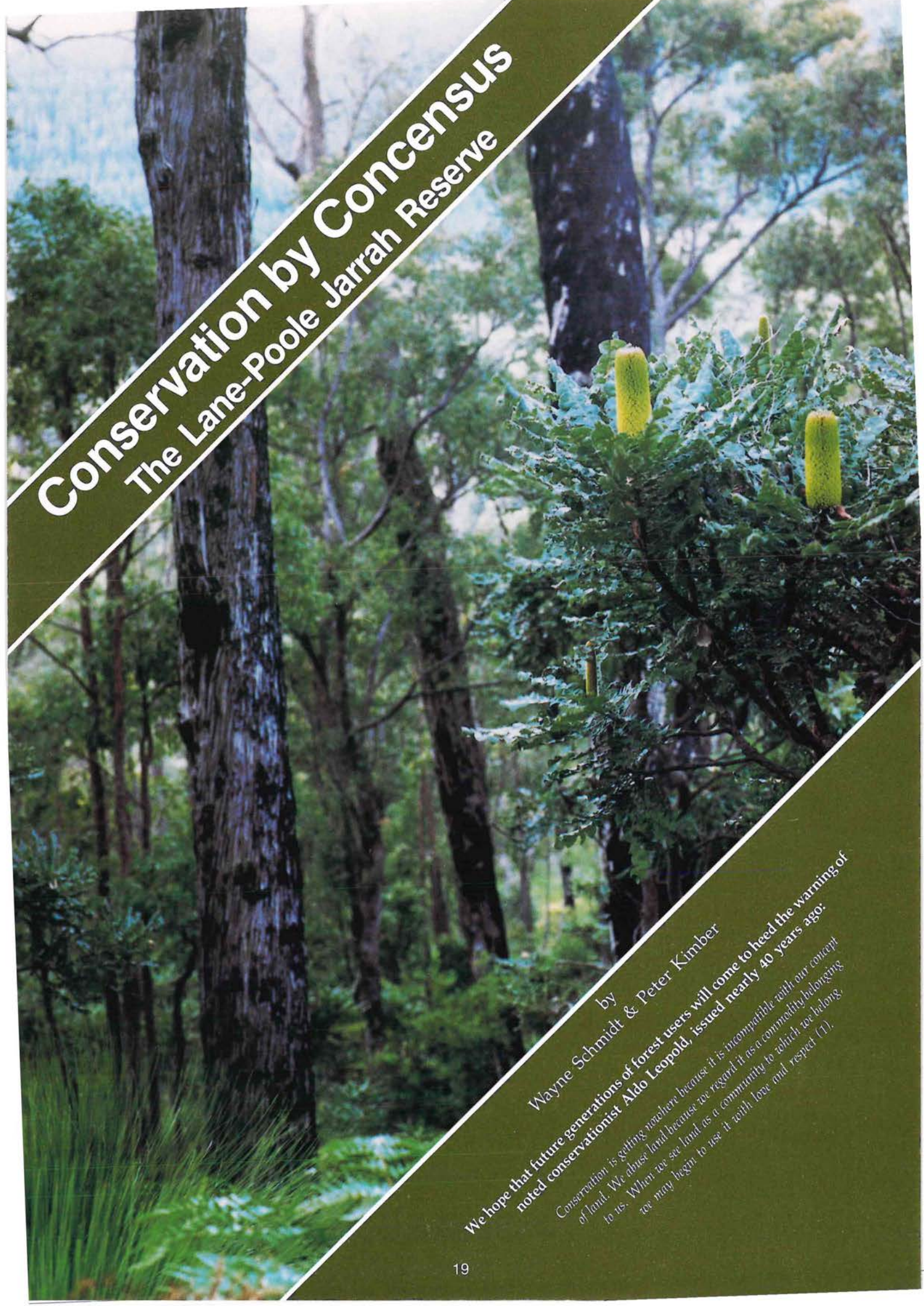




Top:
The sunset enriches spinifex slopes with bold reds.

Above:
Last light: blue creeps over the eastern horizon and beckons nightfall.

Conservation by Concensus
The Lane-Poole Jarrah Reserve



by
Wayne Schmidt & Peter Kimber

We hope that future generations of forest users will come to heed the warning of noted conservationist Aldo Leopold, issued nearly 40 years ago:

Conservation is getting nowhere because it is incompatible with our concept of land. We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect (1).

Public debate over the use and management of Western Australia's forest areas has been a lengthy and at times heated one. Earlier this century, the dedication of State forest was itself the subject of debate, as foresters fought to reserve the remaining tracts of forest from agricultural development. In recent times, the debate has focused more on issues relating to how State forest is to be used and managed. It is a debate which is likely to continue in one form or another for as long as there are people with differing philosophies and values.

However, despite the range of opinions which exist on this topic, there is wide agreement within the community on the need to preserve representative areas of forest for future generations. Witness for example, the statement from the 1971 Committee of Inquiry into the Mining Act, an inquiry undertaken (in part) to advance and safeguard mining interests in this State:

> *. . . it appears to us that the forests have so many other advantages to the State and the people that commercial production is not the only reason why they should be preserved.*
>
> *. . . forests should be safeguarded not only for these [commercial] reasons but because they are a scenic and tourist attraction and provide a natural habitat for the indigenous plant and animal life which occurs naturally in a forest of indigenous trees (2).*

The recent debate over areas of forest preservation has been not so much a question of if, but rather where and how much. The differing perspectives of the conservation movement, industry and other community groups to the recent designation of a major reserve in the jarrah forest is evidence of this fact. Though the details and implications of this initiative may continue to be argued for some time, the designation of the Lane-Poole Jarrah Reserve provides an example of constructive consultation and negotiation between groups with widely disparate interests and values.

This article describes some of the background leading to the establishment of the Lane-Poole Jarrah Reserve and outlines the progress which has been made in planning for its future use and management.

The Lane-Poole Jarrah Reserve: Perth's Playground

The jarrah forest has played a key role in the development of Western Australia, dating back to the earliest days of settlement. Jarrah timber, or Swan River mahogany as it was known, formed the basis of a thriving export industry as well as supplying local building needs. By the turn of the century, the forest was being heavily cut to supply eastern states' and overseas' markets and the timber developed an international reputation for its strength, durability and attractive appearance.

Since then, the jarrah forest has continued to increase in importance to the community, but for reasons quite apart from its commercial timber value. Perhaps its main value today is the protective mantle on the catchments which provide the major source of fresh water for the inhabitants of the coastal plain. Without access to this supply, the existence of Perth would be jeopardized.

The jarrah forest is also the backyard for Perth, Bunbury and other coastal communities. Each year, tens of thousands of residents and visitors are attracted to the forested plateau and river valleys, many to picnic and camp, others to sightsee or simply enjoy the beauty and tranquility of the bush. In this context, the jarrah forest is an integral and irreplaceable part of the lifestyle of these communities—part of their heritage.

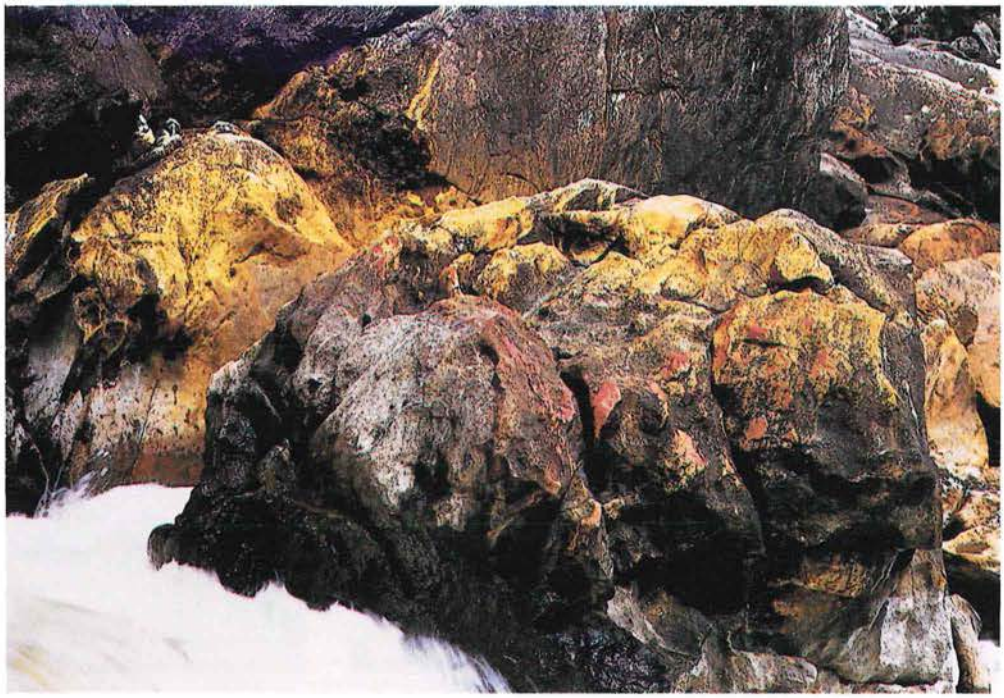
Recently, the northern jarrah forest has become the focus of public concern and debate over its future use and security. The main controversy has centred on the clearing and mining of State forest for bauxite and the resultant impact on water quality, conservation and recreation. This issue is compounded by the presence of jarrah dieback disease, and the problems associated with its detection and control. These issues have been the subject of several major inquiries and reviews, including the report of the Darling Range Study Group and the System 6 inquiry.

Efforts to reserve a major area within the jarrah forest extend back nearly 100 years. In the 1890s, the State Government was persuaded by scientific opinion of the day to set aside a large reserve for flora and fauna in the Murray District between Pinjarra, North Dandalup and Bannister. However, pressure to release this area for timber production soon mounted and the purpose of the reserve was subsequently changed in 1907. [3]

Since 1974, substantial tracts of State forest have been designated as Management Priority Areas (M.P.A.s) for the conservation of flora, fauna and landscapes (see Forest Focus Nos 18 and 22). *[4 5]* These M.P.A.s were selected to reserve within State forest representative examples of the various forest ecosystems which exist throughout the south-west of the State.

Conservation M.P.A.s have been afforded special management status under five year working plans inherited from the Forests Department *[6]* and enjoy the same security of tenure as an 'A' class reserve. However, this tenure provides no protection against land use activities such as mining and water supply and the M.P.A.'s are considered by some to be too small. Consequently, the future security of fauna and flora within the M.P.A. system has been a source of debate and uncertainty.

The concept of a reserve protected from exploitative uses such as bauxite mining



Cliff Winfield

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Above:
In the western parts of the reserve rock-rimmed pools and large granite boulders create a distinctive riverscape.

Right:
The stark white bark of bullich *(Eucalyptus megacarpa)* forms an attractive contrast to other vegetation types in the reserve. Bullich stands are reported to have been part of the favoured habitat of the noisy scrub bird.

Below
The Lane-Poole Jarrah Reserve is dissected by the Murray River. Current plans for the reserve attempt to solve the conflicts between conservation and recreation in the river valley.

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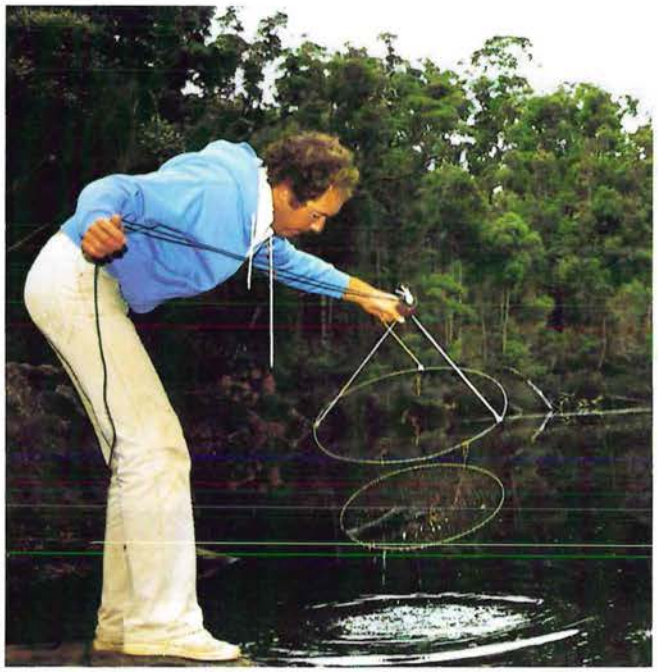

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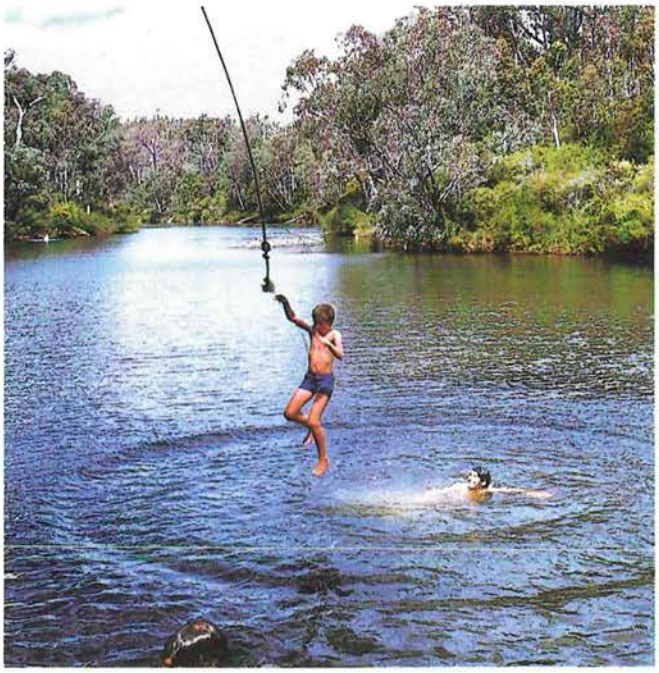

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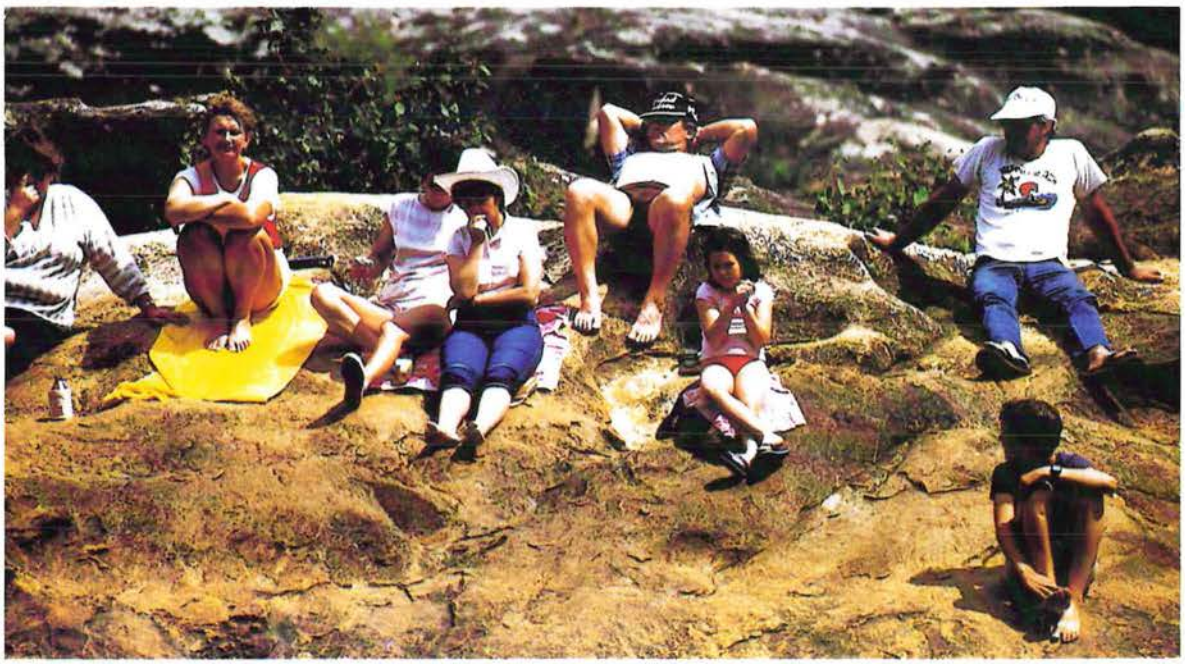
Les Harman

Above Left:
Human and aquatic life conflict during marroning season. The marron numbers have decreased recently as a result of environmental conditions and heavy fishing. Management of the Murray River's marron population is now being examined.

Above Right:
Water inter-play can be refreshing and stimulating.

Left:
The jarrah forest is home to many creatures, some small and furry, others large and scaly, like this racehorse goanna *(Varanus tristis)*.

Below:
Forest visitors enjoy the summer sun near Baden-Powell Water Spout.



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originated with the Conservation Council of Western Australia, Inc., which submitted a proposal to the System 6 inquiry calling for the creation of a reserve of some 77,000 hectares centred on the Murray River Valley. *[7]* The Conservation Council recommended that the reserve be based on conservation M.P.A.s administered by the Department of Conservation and Land Management, plus M.P.A.s designated for scientific study and recreation. These areas were to be linked by corridors of adjoining forest.

The proposal, which was later amended to incorporate a total area of 94,000 hectares, initially met with strong opposition from mining and timber interests. Their concern centred on the loss of resources considered essential for the long-term operation of industry. The resulting polarization of views presented a major obstacle to the creation of the reserve.

However, in subsequent negotiations, a successful compromise position has been achieved. The companies have relinquished part of their claims to the main reserve area. In turn, the State has agreed to scale down the size of the area to be reserved and to reduce the size of the connecting corridors between southern and northern parts of the reserve.

The result is a 54,000 hectares park which forms one of the State's major conservation and recreational assets, combining the upper Murray River with some of the best stands of virgin jarrah, plus areas of wandoo, blackbutt and bullich forest.

A Remarkable Forest

The Lane-Poole Jarrah Reserve encompasses a variety of environments, ranging from the steeply forested valley slopes and rock-rimmed pools of the Murray River near the Darling Scarp to the more open, undulating jarrah and wandoo woodlands further east.

Terms such as unusual and unique have frequently been used in describing these forested landscapes. These qualities are not so much attributable to the scenic appeal of the forest as to the physical adaptations which enable it to grow in this environment. The Darling Plateau is a harsh environment, characterized by infertile soils, periodic droughts and subject to occasional wildfires. The very presence of a high forest under such conditions is nothing short of remarkable.

Of all the tree and shrub species which occur within the reserve, none is more remarkable than the jarrah *(Eucalyptus marginata)* itself. Through its highly specialized root system, which is able to grow in the concrete-like soil in parts of the scarp, the jarrah is able to extract sufficient moisture year-round to not only survive but flourish.

Jarrah also has other characteristics which aid its survival following intense bushfires. The bark is thick to insulate the stem from heat, and the trunk and branches of the tree have hundreds of dormant buds beneath the bark. If the canopy of the tree is destroyed by fire, these buds are stimulated to shoot and form a new crown of leaves.

As a forest tree jarrah tends to dominate the dry upland areas within the reserve. On the lower slopes of the reserve, marri *(Eucalyptus calophylla)* occurs in greater numbers and may predominate in moist gullies.

Other species of eucalypts, most of which grow on moister sites, are also found within the reserve. In the western portion of the reserve where the valleys are relatively narrow and steep, the soils are usually more fertile red loams. The lower slopes of these valleys support yarri *(Eucalyptus patens)* — or Western Australia blackbutt as it is also known — and flooded gum *(eucalyptus rudis).*

The former is a magnificent tree, equalling jarrah in height, and frequently of much larger girth. It generally occurs in a mixture with jarrah on the deep valley loams, but also grows on the sandy margins of the more shallow eastern valleys. Flooded gum, on the other hand, is confined to areas along the Murray River which are subjected to periodic flooding.

In the eastern part of the reserve, the landscape flattens out into a series of broad undulating valleys and low ridges. Here wandoo *(Eucalyptus wandoo)* forms an attractive woodland on the clay flats.

Still other areas of the reserve support bullich *(Eucalyptus megacarpa),* a striking white-barked eucalypt which occurs in pure pockets in gullies near the western fringes of the Darling Range. Its occurrence is very localized and generally confined to the orange silty soils that occur on the edges of some swamps.

Apart from the dominant eucalypts, a variety of smaller understorey trees occur in various mixtures throughout the reserve. These include bull banksia *(Banksia grandis)* which often grows in pure stands on disturbed areas, sheoak *(Allocasuarina fraserana)* which occupies sandy sites and snottygobble *(Persoonia longifolia),* a small graceful tree with dark, flaking bark and long, narrow leaves. Other species such as the native pear *(Xylomelum occidentale)* and a second species of persoonia *(Persoonia elliptica)* occur sporadically throughout the forest. The lower layer of forest vegetation is formed by shrubs and herbaceous plants, of which there are some 500 species within the reserve. They include many of our better known wildflowers, such as blue lechenaultia, pink boronia, native wisteria, and prickly moses.

As well as the large number of species, the understorey flora of the northern jarrah forest is characterized by an amazing diversity of plant forms. These range from delicate spider and donkey orchids to such sculptural oddities as the common blackboy *(Xanthorrhoea preissii)* and the zamia palm *(Macrozamia riedlei).* The latter

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Above:
The jarrah forest attracts a range of recreation activities, some of which may conflict with each other.

Maxine Copeman

Left:
Loving it to death. Overcrowded camping and unrestricted vehicular access can lead to degradation of the forest environment as well as to the decline in the enjoyment of visitors.

Below:
Vandalism is a world-wide problem in forest as well as urban environments. The creation of the reserve is intended to prevent scenes like this from re-occurring.

Cliff Winfield

species is not a true palm, but belongs to the cycads, a small group of dioecious plants (separate male and female plants) which are distantly related to the conifers. The blackboy is a member of the family of plants which includes the lillies.

In recent times, research by Havel *[8 9]* and others has greatly extended our understanding of how these plants are distributed across the forest landscape. It was this research that led to the original designation of the system of conservation M.P.As in the northern jarrah forest, and ultimately to the declaration of the reserve itself. With this increased knowledge has come a growing appreciation of the biological variety which exists throughout the jarrah forest. The recognition of the richness and diversity of the forest has led in turn to increased community awareness of the need to maintain this ecological asset.

In contrast to the flora, there is less known about the fauna of the jarrah forest. Many species are nocturnal and/or highly mobile, making their detection difficult. Fauna populations are also subject to periodic fluctuations as a result of various disturbances. Consequently, the preparation of detailed lists of species involves many years of painstaking research, and this work is not yet complete.

A number of fauna surveys have been carried out in the jarrah forest, several within the reserve itself. Based on this work, the area supports an impressive range of species. *[10 11 12]* Twenty-eight species of mammals (21 native and seven introduced species), 21 species of reptiles and amphibia, 10 species of fish and 78 species of birds are either known inhabitants or occasional visitors to the Lane-Poole Jarrah Reserve.

Included in this tally are native marsupials such as the mardo *(Antechinus flavipes)*, the short-nosed bandicoot *(Isoodon obesulus)*, the brush-tailed wambenger or native squirrel *(Phascogale tapoatafa)*, the chuditch or native cat *(Dasyurus geoffroii)* and the quokka *(Setonyx brachyurus)*. Few people realize that the quokka, better known as a resident of Rottnest Island, is common in the swamps and valleys throughout the jarrah forest.

Although this inventory of species is incomplete, it indicates that the Lane-Poole Jarrah Reserve supports a large variety of fauna. Future studies will provide more detail on the occurrence and habitat requirements of individual animals. Such surveys will also provide records of insects and soil fauna, of which very little is presently known. It is partly due to this scarcity of information that the reservation of representative forest ecosystems is essential. These reserves provide the best chance of ensuring the survival of plant and animal communities while developing a better information base about the ecology of individual species and populations.

Use, Preservation, or Both?

Designation of a reserve is only the first step in protecting a physical environment. However, for such reservation to succeed, there must also be a programme of planning, management, and monitoring. This is particularly important in areas where public use places increasing demands on the natural environment.

The establishment of the Lane-Poole Jarrah Reserve is a response to a strong community desire to safeguard conservation values. At the same time public use of the river valley for recreation must be maintained. This dual commitment in itself presents potential conflicts, as certain outdoor recreation pursuits may be incompatible with conservation objectives. For instance, the social nature of activities such as picnicing and camping can lead to the over-use of popular areas. Other activities such as trail-bike riding can disturb soil, damage vegetation and spread dieback disease.

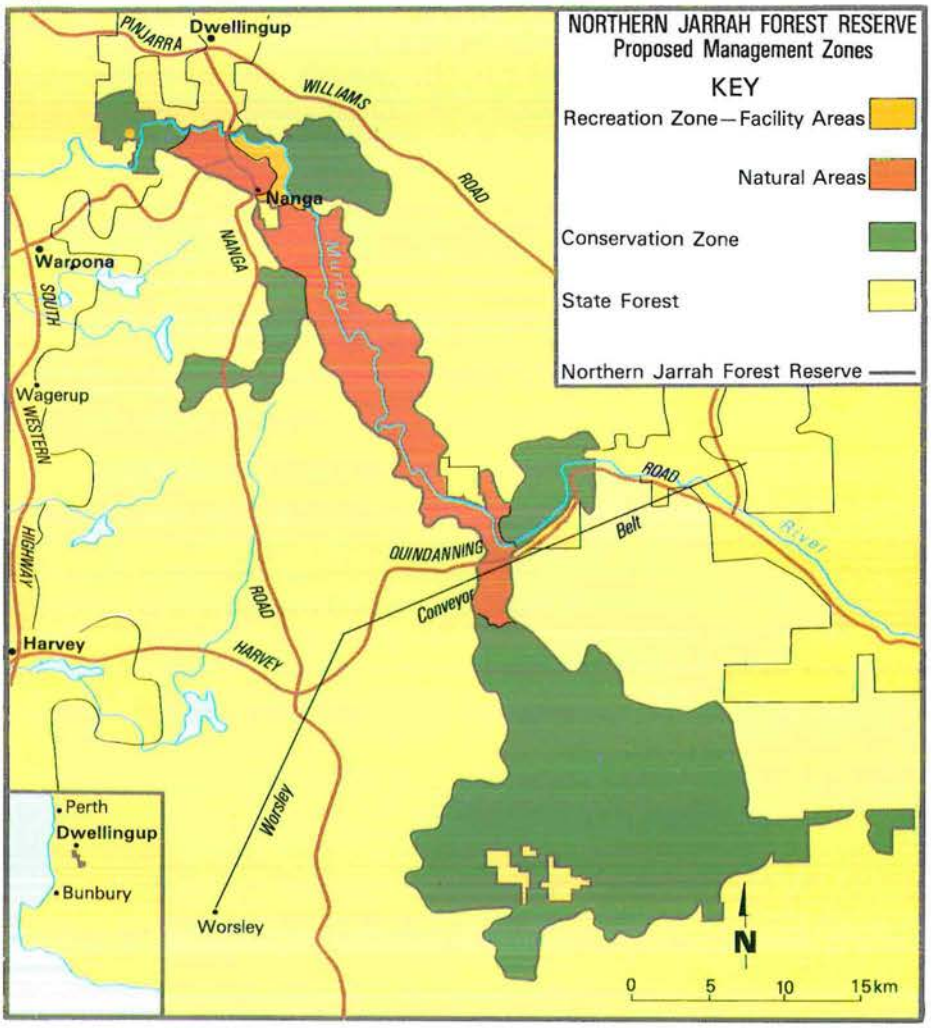
There is a need for a balance between preservation and recreation. This can best be achieved by directing people pressures away from areas of high conservation value into less sensitive zones. Approximately three-quarters of the reserve has been zoned for conservation (refer to figure 3). This area, comprising zones designated in the System 6 study as having high conservation value, will be secure from future mining and timber extraction and will be afforded special management protection from other uses.

The remainder of the reserve (along the Murray Valley) has been designated as a recreation zone. Though some of this area may be subject to future exploitation for bauxite or timber, these activities will be subject to strict rehabilitation requirements. In the case of timber harvest, the impacts on the forest ecosystem are temporary and mainly aesthetic.

Within the reserve, current management proposals provide for varying degrees of vehicular access and development. At one end of the spectrum there will be a recreation zone stretching from Nanga Bridge in the west to where Yarragil Brook joins the Murray River. Within this section of the valley, visitors will be catered for through the provision of camping and picnic facilities, walk trails, canoe launching areas and river access points. Vehicular access along the river will also be controlled. In some areas, road access leading to badly eroded and compacted sites has been closed and adjacent parking areas provided.

Between Nanga Bridge and Scarp Pool and upstream of Yarragil Brook, public access

Figure 3



- **Recreation Zone — Facility Areas**

  Areas in which developments designed to accommodate both short and long-term visitors to the reserve will be provided. A range of facilities including picnic and tent camping areas, self guiding tours, walk trails and interpretative shelters will be planned with the minimum of interference to the natural environment.

- **Recreation Zone — Natural Areas**

  Areas which are maintained in their natural state and where vehicular access will be restricted to existing roads and/or tracks required for management purposes such as fire control. Low key developments such as walk trails and back-pack campsites with simple ablution facilities will be provided.

- **Conservation Zone**

  A zone possessing plant and animal communities and/or archaeological, geological and landscape features of such significance that it should, as far as practicable, be preserved intact. To minimize human interference, assisted means of access will not be permitted except in the interests of safety or research. However, major established roads will be maintained where appropriate.

along the river will be largely restricted to walking and canoeing in order to maintain the tranquility of the riverscape. Some facilities suited to low intensity activities (such as backpack camping) will be provided in special areas, but these will be kept to a minimum.

As planning for the reserve proceeds, the type and level of public use the Murray Valley can sustain will be assessed. It is important that both the physical environment and the quality of the recreational experience of the visitor are maintained. At some stage it may be necessary to further regulate activities in order to preserve the natural forest values which have attracted visitors to the area in the first instance. Sensitive planning and site design can do much to alleviate problems resulting from inappropriate uses and over-crowding, but widespread public understanding and support is required if these management problems are to be overcome.

Fire Management

The role and use of fire in the management of the jarrah reserve is also receiving special attention. The influence of fire on the ecology of the jarrah forest has been the subject of numerous studies. Although existing knowledge is by no means complete, it is evident that most plants within the forest have adapted to, and frequently make use of, periodic fires to stimulate reproduction.

Some species, for example, possess a woody underground growth which enables them to re-shoot after a fire. Others, particularly the grass-like plants, retain their buds or growing points 10 centimetres or more beneath ground level. If a fire consumes their foliage they are able to rapidly form new shoots from these underground buds. Still other plants, such as the wattles, seed prolifically throughout their short life span (usually less than 10 years). By

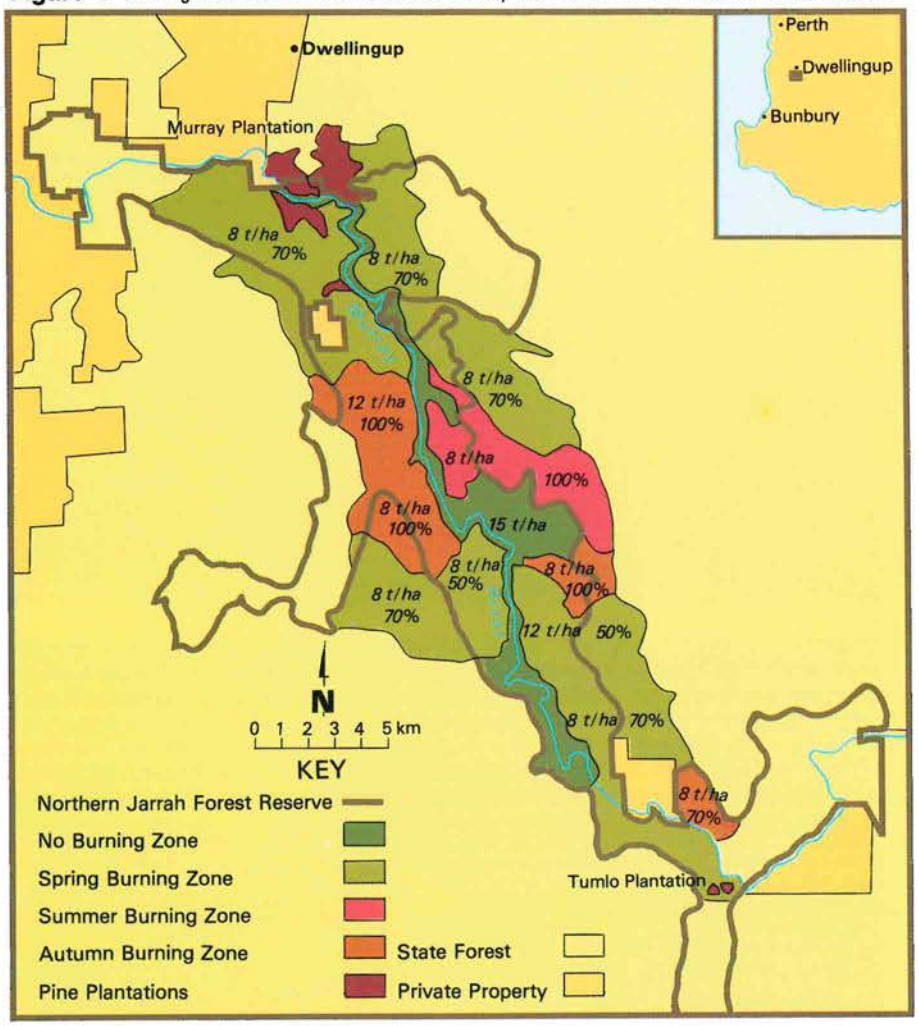
the time the parent plant dies, the soil beneath them contains millions of seeds but the plants only reappear when the seed is stimulated to germinate by the heat of intense fires.

Not all plants within the jarrah forest, however, are adapted to the same fire pattern. Some plants thrive with frequent, low-intensity fires; other species are favoured by less frequent hotter fires. The same applies to the forest fauna, so preparing a fire management plan to suit a range of different plant and animal communities is a very complex task.

This task is further complicated by the need to balance ecological considerations against the protection from fire of property and human life. Some readers may recall the severe bush fires of 1961 which burnt towns and ravaged the Dwellingup forests, including a substantial portion of the Lane-Poole Jarrah Reserve. Today a regular programme of prescribed burning to reduce forest fuels, coupled with an effective detection and fire fighting system, has greatly reduced the risk of a catastrophic wildfire in the area.

Given the two objectives of protection and maintenance of ecological values, a fire plan for the reserve is being prepared (see figure 4). Prescribed fires which vary in frequency and intensity are proposed and fuel-reduced buffers around private properties, pine plantations, recreation sites and other sensitive areas will be maintained to ensure public safety. The costs and practicality of the plan, and its capacity to meet ecological objectives, remains to be assessed.

Figure 4 Burning Treatment for the Recreation Priority Area of the Northern Jarrah Forest Reserve



- Burn boundaries utilize nearest tracks already constructed rather than the reserve boundary.
- Percentages refer to total area burnt within the burn boundary.
- Period between burns will be based on predicted fuel accumulation shown on the plan, for example 12 tonnes per hectare, eight tonnes per hectare.
- Protected area to remain unburnt within the period of this plan.

The Future

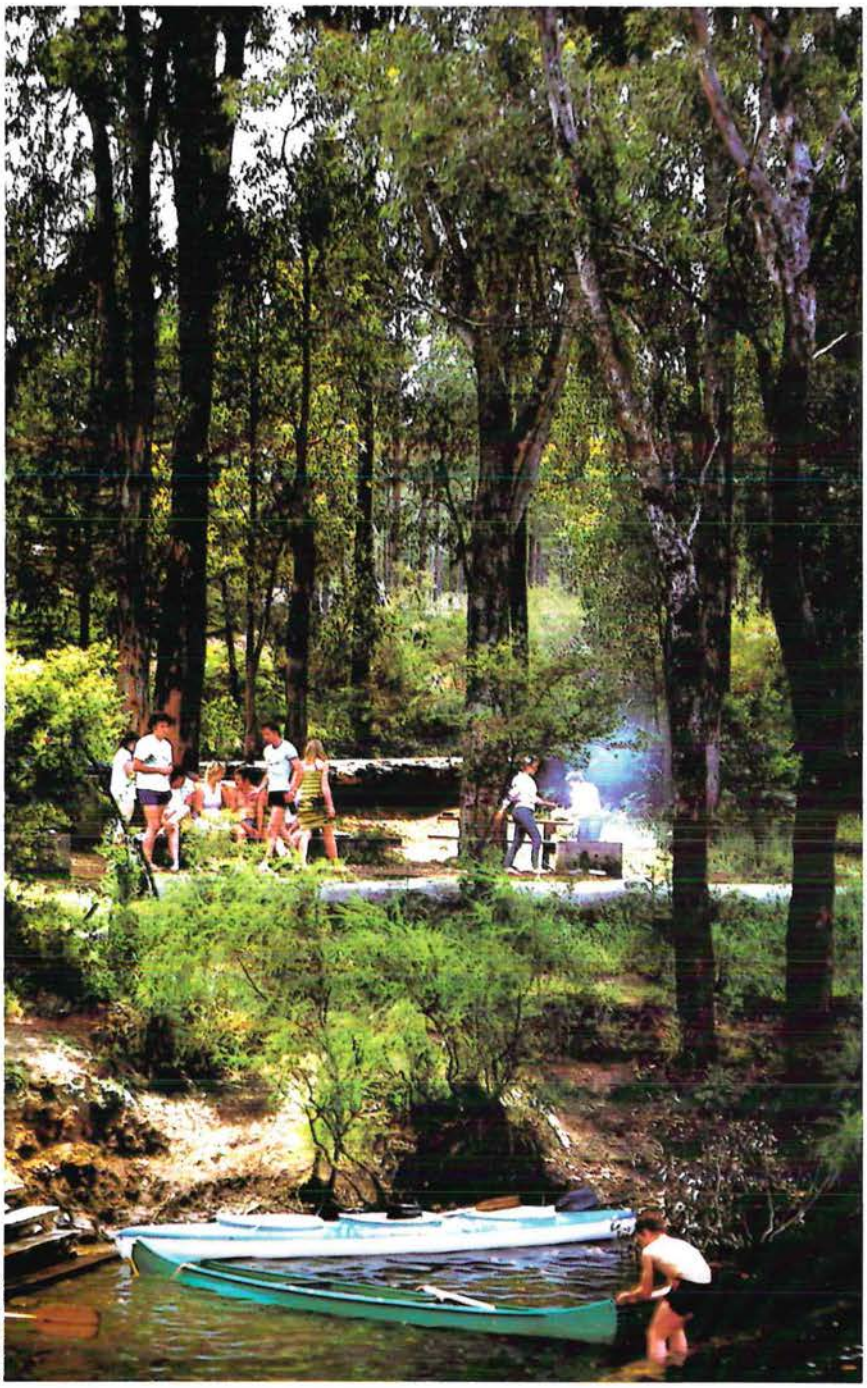
Although the initial boundaries of the reserve have been decided upon and planning for its use and management has commenced, details concerning the reserve's classification have yet to be finalized.

A Reserve Advisory Committee has been established comprising representatives of the Murray and Waroona Shires, the Conservation Council of Western Australia, Inc., a local landowner and relevant Government departments. The purpose of this committee is to advise the Department of Conservation and Land Management on management objectives and the contents of management plans. To this end, the committee has been actively involved in identifying and resolving many of the issues discussed in this article.

A full-time planning officer and project planning team have been appointed and have commenced work on the preparation of a detailed management plan for the reserve.

The zoning of the State's forest areas to meet the whole range of community demands has been in progress now for over 10 years. The Lane-Poole Jarrah Reserve is the latest development in the continuing attempt to reconcile often incompatible but legitimate demands, and to ensure that

Les Harman



Cliff Winfield

the interests of conservation, recreation and industry are recognized and catered for.

The ultimate success of the conservation by consensus approach to forest resource management will depend on whether it receives the combined support of all sections of the community.

Management plans and programmes, if they are to reflect and respond to public needs, should be based on input from as wide a cross section of the community as possible. Consequently, your views on the future management of the Lane-Poole Jarrah Reserve are both needed and welcomed. For further information please contact the Department of Conservation and Land Management, Como.

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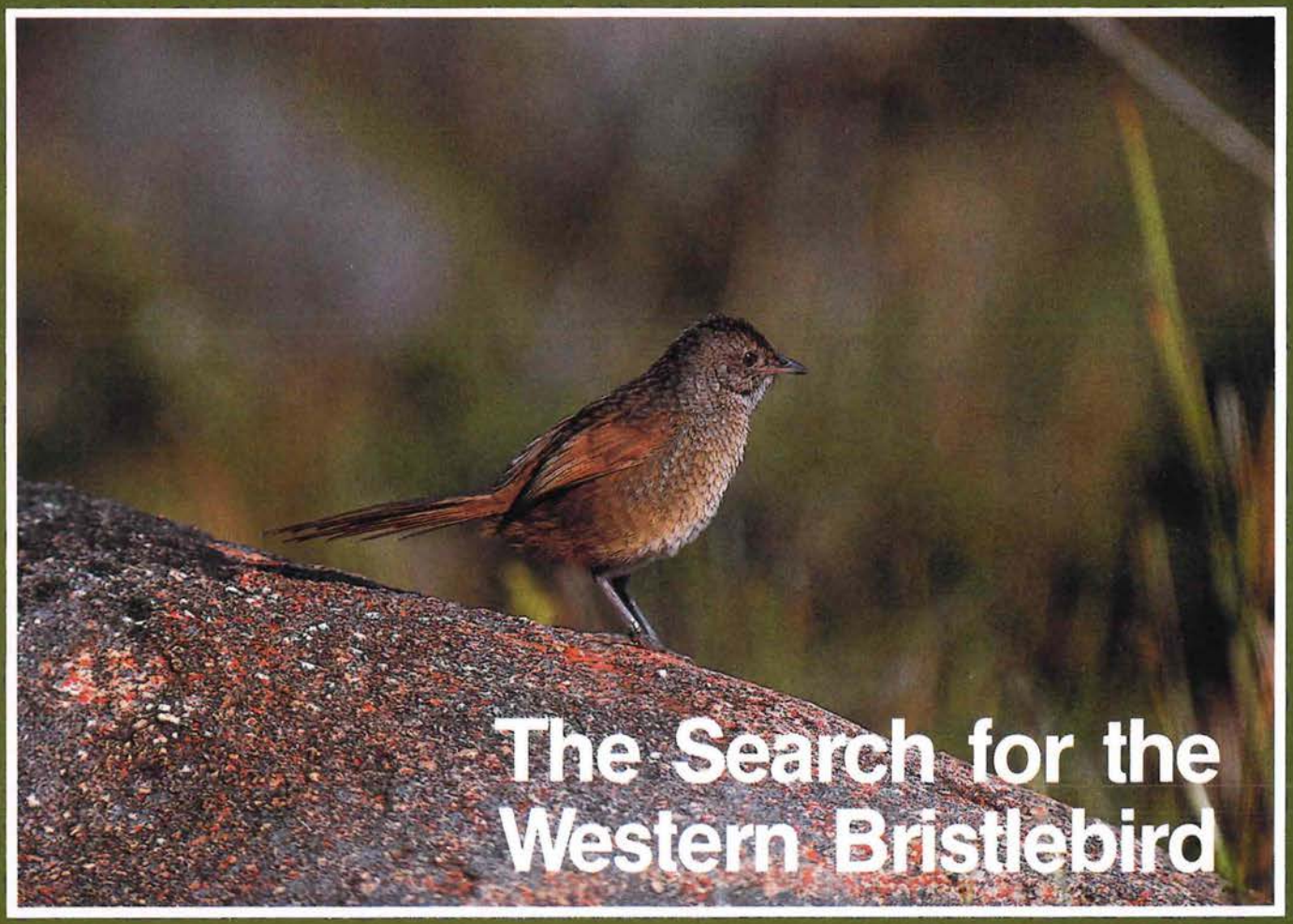
Above Left:

Fire is an important component in the jarrah forest. Some parts of the reserve were subjected to intense fires little more than two decades ago.

Left:

The construction of barbecue and river-access facilities are designed to make recreation easy while preserving the riverbank environment.



G. Chapman

The Search for the Western Bristlebird

by
Malcolm Taylor
B.Sc., Dip.M.S.

The western bristlebird of putjeritj *(Dasyornis brachypterus longirostris)* is extremely rare and restricted to southern coastal areas of Western Australia near Albany.

The shy retiring nature of the bird together with its preference for dense coastal scrub habitat combine with a brown camouflage to make it an extremely difficult bird to observe. It is a weak flier and tends to seek out the thickest cover for protection.

The western bristlebird probably had a widespread range from Perth to Esperance at the time of European settlement, as the bird was first found in reeds near Perth in 1839. Since that time it has only been observed in the Albany region on the south coast. Its rapid decline has been attributed to the clearing of the dense coastal scrub and increasing frequency of burning of the scrub, its natural habitat.

The western bristlebird probably had a widespread range from Perth to Esperance at the time of European settlement, as the bird was first found in reeds near Perth in 1839. Since that time it has only been observed in the Albany region on the south coast. Its rapid decline has been attributed to the clearing of the dense coastal scrub and increasing frequency of burning of the scrub, its natural habitat.

Curiously, a closely related species, the western rufous bristlebird *(Dasyornis broadbenti)* which has a bright rufous brown head, was discovered by A. W. Milligan in October 1901 at Ellensbrook, Western Australia, and further reports of sightings were received from the Cape Naturaliste to Cape Leeuwin area. It is now presumed extinct as it was last recorded in 1940.

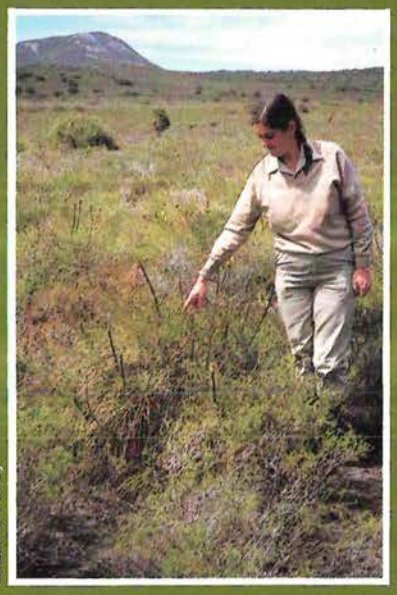
Western Australia now possesses only remnant populations of the western bristlebird, but fortunately, a population is located within the boundaries of Two Peoples Bay Nature Reserve. In 1965 another colony was discovered at the Waychinicup River some 17 kilometres to the east of Two Peoples Bay by Julian Ford and a further population was found in the Fitzgerald River National Park in 1976. However, it is likely that the total population does not exceed 250 pairs.

It is in the Two Peoples Bay Nature Reserve that resident Reserves Officer Graeme Folley together with volunteer observer Lesley Harrison have undertaken a systematic search for the western bristlebird.

This reserve is well known for its colony of the very rare noisy scrub-bird *(Atrichornis clamosus)* but also contains other rare species of birds including the western whipbird *(Psophodes nigrogularis)* and the western bristlebird. Graeme commenced his search of this important nature reserve in 1981 and he soon confirmed that the western bristlebird is

Graeme Folley

The nest is hidden in the centre of the clump (usually nests are 400 millimetre above ground level).



Graeme Folley

Graeme Folley

Centre:

Typical south coast heathland habitat of the western bristlebird. The observer is pointing to the nest site in a *Dasypogon bromeliifolius* plant. Mount Gardner is in the background.

Above:

Bristlebird nest showing size and construction from woven grass. Note the landing platform at the entrance. This is the first photograph of a western bristlebird nest for 50 years.

extremely difficult to deal with. It can rarely be seen in flight as it is a very poor flier and inhabits only the densest closed heath habitat which provides the ideal hiding place for this bird with its shy secretive nature. In these areas it is often difficult for observers to walk, let alone see the birds. Nevertheless, Graeme's patient search is beginning to yield valuable results.

After 640 volunteer hours of patient searching there was much excitement when finally Lesley found a nest in a *Dasypogon bromeliifolius* plant. Graeme was naturally delighted as he was able to take the first photograph of a western bristlebird nest for 50 years. The nest was positioned in the centre of the clump about 300-400 millimetre above ground level and was constructed of woven grass, complete with a landing platform area. A population size of 80 pairs has now been estimated.

The western bristlebird lays two eggs, dull brownish-white in colour with purplish-brown blotches and spots. Unfortunately, the shy nature of the bird results in ready desertion of the nest at the slightest disturbance. It would therefore be necessary to close areas of the reserve from human interference during the breeding season.

The fact that Graeme only observed the birds in areas of the densest closed heath suggests that fire may have been one of the reasons for their rapid decline in other areas. It takes at least eight years for closed heath to regenerate sufficient cover after a fire on the south coast. The shorter burn intervals that are commonly utilized by the farming community in the region would render farmed coastal areas unsuitable as western bristlebird habitat.

The survey is continuing, but the results to date will aid in securing existing colonies of western bristlebird against further decline by helping to ensure that suitable habitat management techniques are developed. In the long term it may even be possible to reintroduce the species into parts of its former range where its habitat requirements can be met. Some success has already been achieved in re-establishing a colony of noisy scrub-birds on Mount Manypeaks (see SWANS Vol. 13 No. 2). The decline of the western bristlebird may have ceased and its fortunes changed due to the work now being undertaken by Graeme and Lesley.

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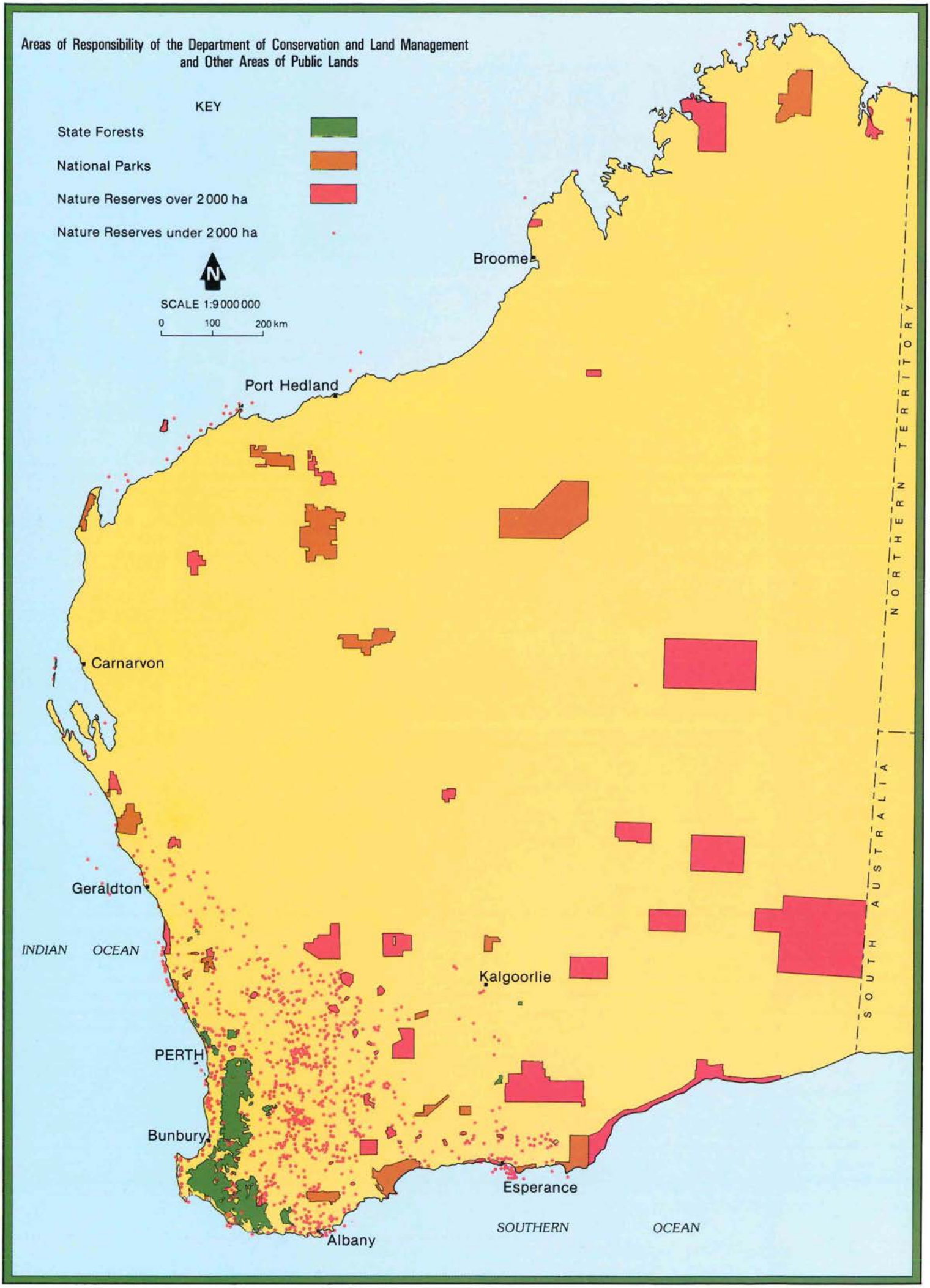
Areas of Responsibility of the Department of Conservation and Land Management and Other Areas of Public Lands
KEY
State Forests
National Parks
Nature Reserves over 2 000 ha
Nature Reserves under 2 000 ha
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SCALE 1:9 000 000
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Broome
Port Hedland
Carnarvon
Geraldton
INDIAN OCEAN
Kalgoorlie
PERTH
Bunbury
Esperance
SOUTHERN OCEAN
Albany
SOUTH AUSTRALIA
NORTHERN TERRITORY

Looking Back

Looking Back is the place for your photographs of Western Australian wildlife. Please send to the editor only your highest quality transparencies.

This mother and daughter euro *Macropus robustus* were spotted by photographer Cliff Winfield in Cape Range National Park.