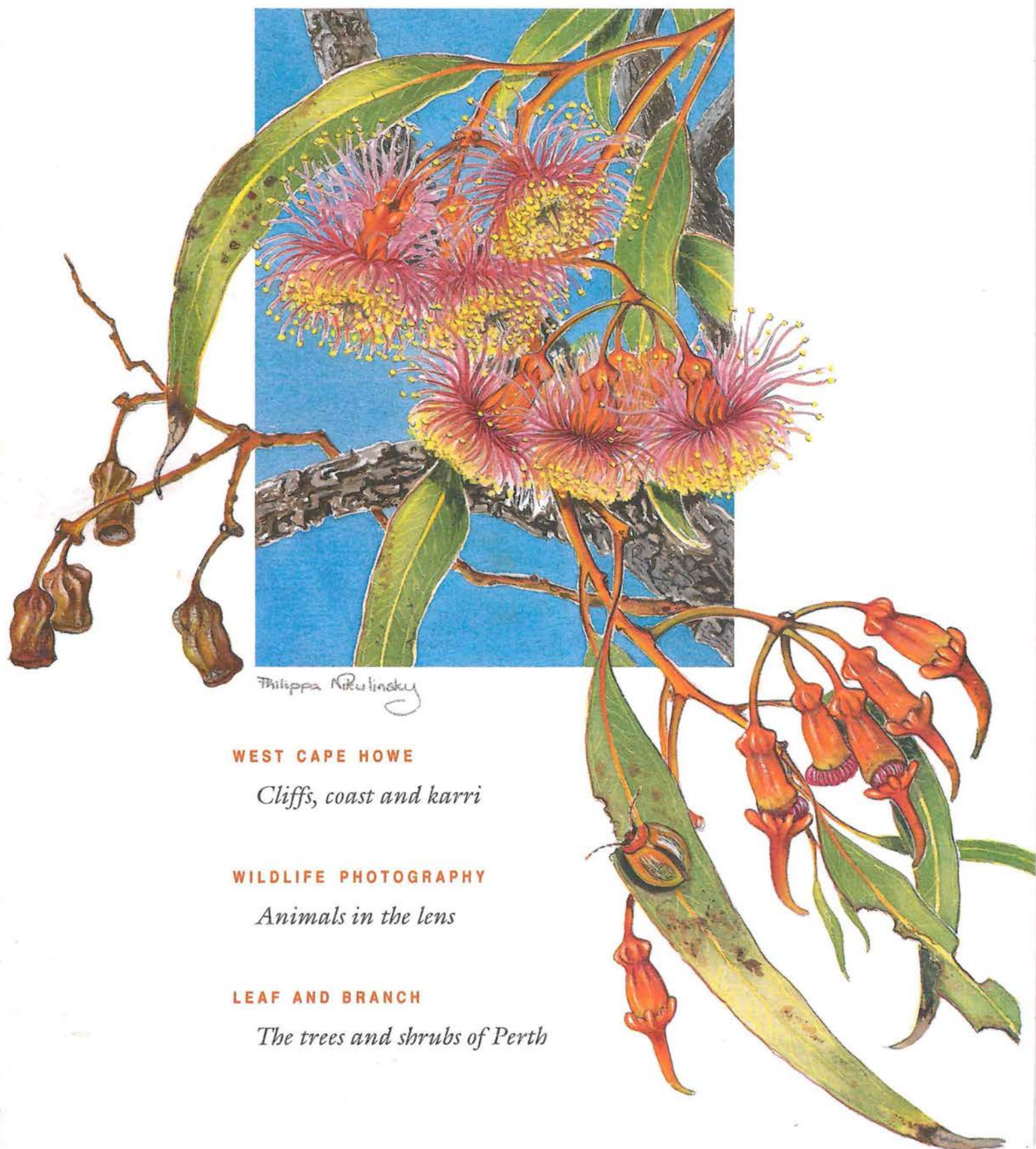


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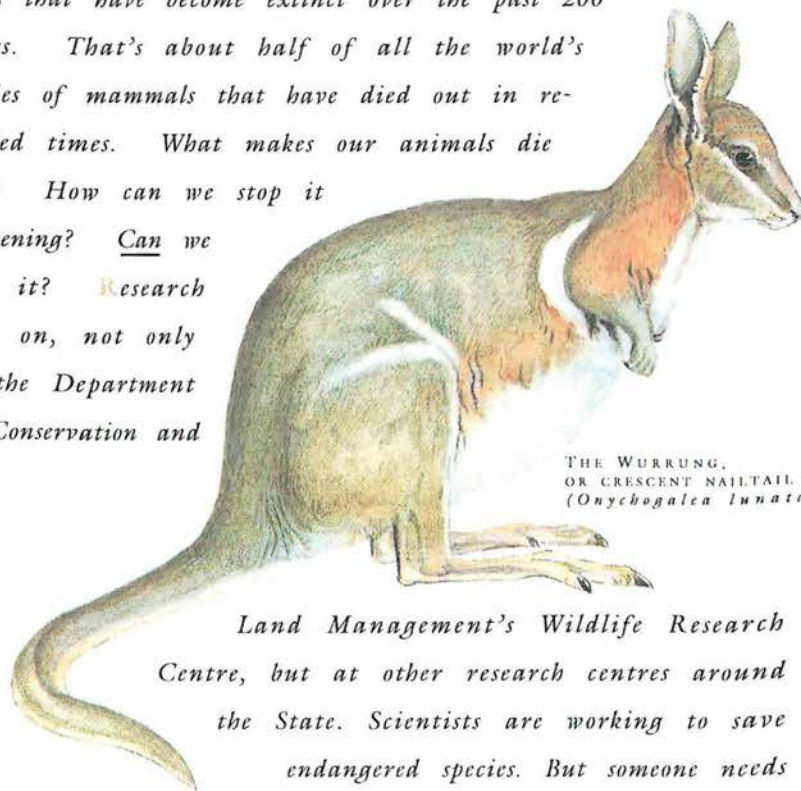
Animals in the lens

LEAF AND BRANCH

The trees and shrubs of Perth

EXTINCT

The last time anybody saw the crescent nailtail wallaby was in 1956. It's just one of the 18 species of Australian mammals that have become extinct over the past 200 years. That's about half of all the world's species of mammals that have died out in recorded times. What makes our animals die out? How can we stop it happening? Can we stop it? Research goes on, not only at the Department of Conservation and



THE WURRUNG,
OR CRESCENT NAILTAIL WALLABY
(*Onychogalea lunata*)

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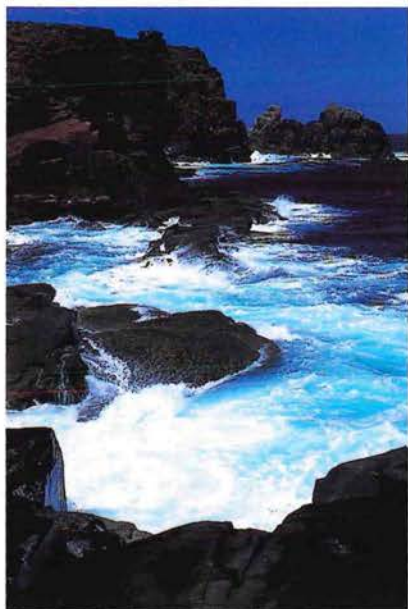
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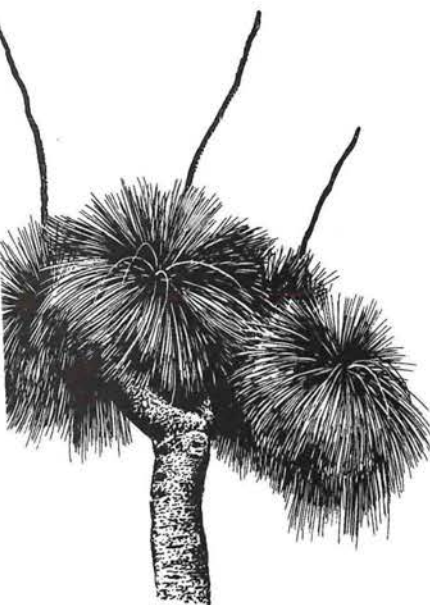


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Hang-gliders plunge over the edge and rock climbers hang off the sheer cliffs. But West Cape Howe, one of WA's newest national parks, has many other attractions. See page 10.



Perth's own trees and shrubs are hardly known - or grown - by locals. A new book aims to change this. Turn to page 22.

LANDSCOPE

VOLUME SIX NO. 2 - SUMMER EDITION 1990/1991



What makes a good wildlife photograph? On page 28, one of WA's best wildlife photographers explains how to catch animals in the lens.



Parasitic pests? Or a good excuse for a kiss! We look at some of the fascinating facts about mistletoe on page 50.



Bandicoots under the house and a possum in the stove. They are just a few of the many attractions of Perth Forest and a special weekend course that brings people face to face with wildlife. See page 50.

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COVER

Coral gum (*Eucalyptus torquata*) grows naturally only in WA's Goldfields, in a small area between Coolgardie, Kalgoorlie and Norseman. However, it is widely planted as an ornamental, and the seeds of this 'Eucalypt Emigrant' (see page 41) have been exported to arid countries all around the world.

Illustrated by Philippa Nikulinsky.



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VOLUNTEERS FOR CONSERVATION

The General Assembly of IUCN, which took place in Perth in early December, pointed to the enormously increased interest in conservation throughout the world. There has been spectacular growth in non-government organisations, many of which were directly represented at the General Assembly. There was no doubting the strength of their voice in that forum.

What is not so spectacular, but growing just as vigorously, is the number of people prepared to volunteer their services towards practical conservation projects. During 1990, I am gratified that CALM has received the support of more than 750 registered volunteers working in a huge variety of ways - a growth rate of more than 100% in a year.

To name a few projects: people are helping in saving dolphins and whales (with greater success than in many other countries), acting as guides and campground hosts, interviewing visitors, and assisting in the herbarium. These are all tasks which we otherwise would not be doing. Volunteers help us to do our job - for the benefit of the State, for other members of the public, and for conservation itself.

Our CALM volunteers are special: their only reward is the deep satisfaction of knowing their work is important. If you would like to join, please register on (09) 362 0777, or contact any CALM office.

Chris Haynes

Chris Haynes
Director, National Parks

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A MESSAGE TO OUR READERS

Here at LANDSCOPE, we've been trying to guess which stories in the past five or six issues may have made the strongest impressions on our readers. Our magazine is a window on Western Australian conservation, forests and wildlife, so the articles and photography that land on our desks are often spectacular.

'Rising from the Ashes', in the spring edition of 1989, comes readily to mind. That was the story of Kings Park's wildflower explosion only months after a devastating bushfire. 'Shore Survivors' (Summer 1989-90) looked at the stranding of whales, dolphins and seals along the WA coast. In the autumn edition of 1990, 'Seasoned with Fire' scrutinised 'prescribed burning' in our forests; and 'Where the Shore Meets the Sea' gave a fascinating tour of the either-or, in-between world of the intertidal zone on our beaches.

These stories sum up what LANDSCOPE is all about.

In the winter issue of 1990 we were spoiled for choice. 'Numbat Dawn' recounted the exhilarating news that, with help from CALM's Wildlife Research Centre, the numbat, Western Australia's faunal emblem, may be recovering from predation by the fox. 'Lightning Strike' was a powerful description of what can happen when lightning crackles into the forests; 'To Fly like a Bird' explored the aerodynamics of birds and the physics of flight; and 'Chip off the Old Block' reported progress on the use of cloning technology to improve wood production in tree plantations.

After that there was the spring issue of 1990, which we had to delay while we shaped its contents around the

World Conservation Union (IUCN) conference in Perth last November; LANDSCOPE was in the conference kit for each of the 1500 international delegates. We presented status reports on threatened species of animals ('The Disappearing Mammals') and plants ('Growing in a Wild State'), and offered a sharp and rousing analysis of CALM's vision for our forests for the 21st century ('Forests for the Future').

These articles formed a marvellous array of knowledge, interest and concern. We'd like to think that this issue is similarly endowed, although in a lighter vein. 'Leaf and Branch' (p. 22) offers new ways of looking at the trees and tall shrubs that are native to Perth. 'A Room at the Top' (p. 33) presents the story of fire-lookout trees in the South West; 'Eucalypt Emigrants' (p. 41)

shows that great things can grow from small beginnings; and 'Much Ado about Mistletoe' (p. 50) reveals one of the oldest air transport systems of all.

In LANDSCOPE we see nature's plenty, with stories about forests, marine life, national parks, and wildlife under threat. But we've also talked about timber, old mill towns, computers in bushfire control, firefighting techniques, methods of surveying the Nullarbor, and devices for trapping rock-wallabies.

One article in particular, 'Animals in My Lens' (p. 28), is symbolic of our magazine. Into the world of trees and wildlife comes a human: treading softly, but bearing the skills and craft of technology. For us and for many of you, that's LANDSCOPE.

What do you think?

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BUGS AT THE BOTTOM OF THE GARDEN

Bugs, bats and birds around metropolitan Perth are keeping eager schoolchildren and conservation-minded volunteers on their toes.

Members of Perth Wildlife Watch - a World Wide Fund For Nature (Australia) project supported by the WA Gould League, WA Naturalists Club, and the Kings Park Board - spend their spare time searching in suburban gardens, parks and bushland for populations of common and elusive fauna which still share our suburbs. Results of population studies from the two-year project will give an insight into where wildlife live around the city, and how they are coping with the spread of suburbia and consequent loss of habitat.

Coordinator Boyd Wykes runs Wildlife Watch activities from the Kings Park Education Centre. With the help of volunteers and groups of schoolchildren, he regularly traps reptiles in Kings Park as part of a ground fauna project - legless lizards, bearded dragon lizards, beetles and scorpions

are among those found in his carefully set pit traps. Other Perth Wildlife Watch activities include training primary school students as Earth Caretakers, mist-netting for bats and banding birds.

Suburban bird species of interest to watchers have included parrots and cockatoos, fairy-wrens, willy wagtails, frogmouths and honeyeaters.

Boyd believes that conservation begins at home, and that Western Australians need to care for their own backyard wildlife before they look at wider conservation issues.

'Perth's original wildlife has been vastly reduced by too-frequent fires, introduced plants and animals, pesticide use, and a totally inappropriate concept of landscaping,' he said. Green deserts of lawn and European plants maintained by pesticides are far more common in Perth than well-managed gardens, parks and reserves of local plants, with the small and larger animals that can live there. Our spreading suburbia has an almost complete lack of ground-foraging mammals such as bandicoots, and birds such as fairy-wrens.'

The spider-hunting wasp
Cryptodeilus tuberculatus.
Photo - Otto Gleich



Boyd said he and fellow wildlife watchers had been surprised by the richness of reptiles remaining in Kings Park, despite the number of introduced plants and frequent fires there. Hundreds of logs have been put back into burnt sections of the park by volunteers to ensure a quicker return of animals to these areas. However, Boyd said that any more fires in the

A wolf spider, family Lycosidae, genus Lycosa.

Photo - Otto Gleich

park in the next few years would be disastrous for wildlife.

When the project finishes in May 1991, a wildlife diary will be published with weekly notes on what to look for, based on Perth Wildlife Watch findings, with space for the public to continue making notes for their own gardens.

DONKEY ORCHID RESEARCH CONTINUES

Artificial pollination trials on the Canning Vale population of Purdie's donkey orchid (*Diuris purdiei*) - one of four endangered donkey orchids in Western Australia - were undertaken in spring.

The orchid is found in seven sites on the Swan Coastal Plain at Pinjarra, Armadale, Canning Vale, Harvey and Anketell.

Developers of the Canning Vale site, Winthrop Joint Venture for Livingston Estate, entered an agreement with CALM in May 1989 to fund a research program on the donkey orchid, allowing the four-hectare site containing the orchids to remain undeveloped for three years.

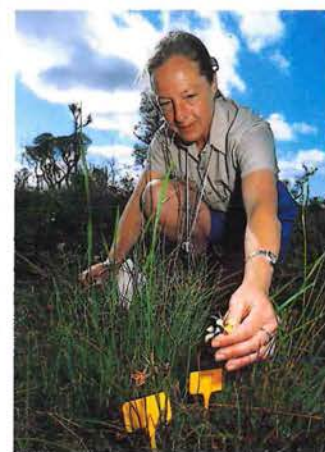
The program will help establish a management plan for the entire species to ensure its survival in the wild.

In conjunction with CALM senior research scientist David

Coates, botanist Dinky Goble-Garratt has been studying the Canning Vale population.

She said that pollinator activity had been low during flowering, which began in late September and continued for four weeks.

Photo - Courtesy Mary Martin and Associates



PRIZE FOR BUNGLE?

Conservation of one of WA's most spectacular natural areas - Purnululu (Bungle Bungle) - has made the national park one of four finalists for a world environment tourism award, Tourism for Tomorrow.

The Kimberley attraction is vying for the award with the Masai Mara game reserve in Kenya, a beach maintenance operation in the Seychelles, and the Seven Spirit Bay wilderness park in the Northern Territory.

The award was launched by the British travel industry to encourage managers of the world's tourist attractions to

protect and improve the environment for tourists and the local population. Winners of the award will be announced early in 1991 by a judging panel chaired by conservationist David Bellamy.

Purnululu (Bungle Bungle) National Park is managed by the Department of Conservation and Land Management with the involvement of the traditional Aboriginal custodians, members of the Purnululu Aboriginal Corporation. It is a wilderness/adventure destination with four-wheel-drive access and low-key development.

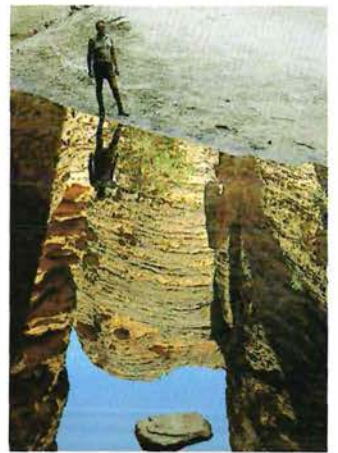
Forty-six entries from 14 countries were received for Tourism for Tomorrow. They included coral reef reclamation projects, protection of



Four times more people see the Bungle Bungle massif from the air than visit by road.

CALM Ranger Bob Taylor at Cathedral Gorge, one of the Park's most visited sites.

Photos - Carolyn Thomson



endangered animals, redesign of resort areas, creation of nature reserves, and water and sewerage schemes - all leading to improved quality of the environment.

NUMBAT IMMORTALISED

This beautiful wood carving of a numbat (*Myrmecobius fasciatus*) combines art with technology. Made from small regrowth eucalypt logs, the carving is a VALWOOD® product, the end result of a four year small eucalypt processing study by the Department of Conservation and Land Management (CALM).

The VALWOOD® process turns waste wood and low-grade timber into high-quality furniture and art.

The numbat carving is the work of well-known Western Australian wood carver Jenny

Scrayen, and was a farewell gift from CALM to the man who pioneered VALWOOD® - Phil Shedley.

Phil retired from CALM's Wood Utilisation Research Centre (WURC) in October after 42 years in forestry. The original project manager for VALWOOD®, Phil is hoping to continue working for CALM in a consultancy role to expand the use of VALWOOD® in Australia and overseas.

VALWOOD® products will be on show in Italy at the Milan Furniture Fair in April 1991.



Photo - Gerhardt Freudenthaller

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A RARE PEAL OF BELLS

Botanists are combing the Wheatbelt for a rare bell flower, now known only in two populations.

Bell flowers (such as the mountain bells described in *LANDSCOPE*, Winter 1985) belong to the genus *Darwinia*. They consist of tight clusters of hanging flowers, surrounded and hidden by large colourful petal-like bracts. These bell flowers are only found in the South West of WA; the eastern Australian species do not have the bracted heads of flowers.

The large petal-like bracts of Darwinia carnea give the plant its bell-like shape.

Photo - Tanyia Maxted



The Mogumber bell, *Darwinia carnea*, was first discovered in 1928 by the Government Botanist, Charles Gardner, in the Babilion Hills between Mogumber and New Norcia. Some specimens were brought into cultivation and are highly prized horticulturally. The last sighting of the Mogumber bell at the original locality was in the 1970s. Until November 1990 it was thought to be extinct in the wild; then botanist Ted Griffin rediscovered it in an area of ungrazed bushland not far from the original locality. Even more recently, CALM contract botanist Jan Gathe has discovered another population in the same area. Specimens of these rediscovered populations are now in cultivation at the Kings Park nursery.

A very close relative of the Mogumber bell is the Narrogin bell, discovered in 1978 on private property at Narrogin. Only six plants were found, and the small area of ungrazed vegetation was fenced off by the WA Wildflower Society. After the elimination of rabbits, the threatened species recovered and the number of plants rose. In May 1990



Botanist Jan Gathe examines one of the Darwinia carnea plants in the Kings Park nursery.

Photo - Tanyia Maxted

the population count stood at 36. The Narrogin bell is also being grown in the Kings Park nursery.

If you know where the

Narrogin or Mogumber bell is to be found, please contact Neville Marchant at CALM's Western Australian Herbarium on (09) 367 0500.

SPOTTED KANGAROOS

A survey in the forests of the South West has shown that kangaroo numbers are about the same as they were 20 years ago. A total of 803 western grey kangaroos were spotted, compared to 709 in a similar survey in 1970.

On the other hand, the survey exposed a dramatic decline in the numbers of western brush wallabies over

the past 20 years. The 1970 survey found that the brush wallaby was quite common, particularly in the northern jarrah forest. Two hundred and seventy-seven wallabies were recorded (10.4 per 100 kilometres). However, only 32 western brush wallabies were counted in the recent survey - 1.1 per 100 kilometres.

For the survey, almost 200 volunteers, including CALM staff, spent two hours on an October evening driving slowly through State forest. Spread out between Wanneroo and Walpole, between them they covered a distance of 2895 km. They recorded kangaroos, wallabies, emus and feral animals such as pigs, together with vegetation type and age

since the most recent fire.

CALM researchers Per Christensen and Graeme Liddelow, who conceived and planned the surveys, suspect the wallaby's decline is due to predation by the fox.

'There is evidence of an increase in brush wallaby numbers following fox control in one area of the South West,' Per said.

INDONESIA: WINNING BACK LAND

Environmental expertise from Western Australia is helping to overcome serious land degradation problems in Indonesia.

A three-year forestry research project to grow Australian trees on badly degraded land in Timor was recently extended for a further three years. Research began in 1987 to test potentially useful Australian tree species such as eucalypts, acacias and casuarinas in Indonesia's eastern islands, and to research techniques for culturing and establishing sandalwood. Scientists from the Department of Conservation and Land Management (CALM) and Curtin University have since travelled to Indonesia to contribute forest management,

agroforestry and watershed management expertise.

Timor is one of the poorest islands in Indonesia, and many of its people still practise 'slash and burn' agriculture. Dr Frank McKinnell (CALM) said that forests were being destroyed because of intense pressure to use land for agriculture, and because of over-grazing and uncontrolled fire.

'Far greater use of trees, both for reforestation of erosion-prone soils and as part of more sustainable agricultural systems, is essential,' he said.

The research is aimed at selecting suitable trees for the Timor environment: trees that are legumes - capable of improving the soil - and could also be used for fodder and



firewood, Dr McKinnell said.

Consideration is being given to a new project which would focus on overall watershed rehabilitation.

'Watershed rehabilitation is not just a matter of reforestation. It requires carefully developed, integrated land use planning, anthropological research to find successful ways of working with Timorese farmers, and a rehabilitation program which involves the cooperation of several

Young trees stand little chance of survival as they are trampled and eaten by cattle.

Indonesian government departments. It also involves more land management research towards the goal of sustainable land use.'

Curtin University Associate Professor John Fox leads sandalwood research for the ACIAR project. Sandalwood is used to produce oil by distillation, most of it going to Paris for the perfume trade; some of the wood is carved in

continued opposite

BARROW UNDER SCRUTINY

One of the most ambitious ecological studies ever undertaken in Australia has begun on Barrow Island in Western Australia's North West. The island is one of Australia's most important nature reserves, and is refuge to 13 native mammal species - four of which have either declined or become extinct on the mainland.

Research scientists have been granted \$240 000 by the Australian Research Council for a three-year study. The study will gather ecological data on a range of mammal, bird and reptile species and investigate how each species interacts with its semi-arid environment. West Australian Petroleum (WAPET) has committed resources worth \$25 000 a year to the project.

Because of its diverse fauna and lack of introduced plants

and animals, Barrow Island is one of the few places in WA where such a study is possible. Ecologists, biologists and physiologists from the University of Western Australia (UWA), the Department of Conservation and Land Management (CALM), Murdoch University and Sydney University will work side by side on the project.

In October, CALM successfully completed the first stage of an operation to protect Barrow Island's rare mammals from an introduced rodent - the black rat. After eradicating black rats from all but one nearby island, CALM staff had discovered them on the southernmost part of Barrow Island, which was previously thought to be rat-free. After an extensive trapping program

by CALM and WAPET on Barrow Island in August, scientists estimated that the rat population could number up to 1000.

Because of the threat to native mammals, birds and reptiles, CALM began a program in late September 1990 to rid the island of the rodents. Pindone-impregnated oats, a pesticide registered for rodent control that is used by the Agricultural Protection Board, were laid as bait. The oats were placed on raised platforms, inaccessible to non-climbing native mammals such as the golden bandicoot, spectacled hare-wallaby and the boodie.

Two species able to reach the baits, the northern brush-tailed possum and the western chestnut mouse, are susceptible

to the poison. CALM senior research scientist Keith Morris said that there had been a few deaths of these species in the baited area, but this had not affected their overall conservation status, as they occurred in large numbers throughout the island. He said that native species would recolonise from adjacent parts of the island once the baiting program was complete. Leaving the rats to spread would have been a far greater risk to Barrow Island's native inhabitants.

The first stage of the eradication program was successful, creating a 170-ha buffer between areas yet to be baited, and areas of Barrow Island with no rats. Baiting finished in mid-October and will resume early in 1991.



The effects of agriculture leave little native vegetation.

Photos - Professor John Fox

Bali for fans and ornaments. Dr Fox said that Javanese and Chinese records of the 13th and 14th centuries mention Timor as a source of sandalwood. Little else of tradeable value seems to have been used until the development of a beef cattle industry to Java in the 1910s. The dramatic increase of the cattleherd, together with poor agricultural practices, had led to a

dwindling resource of sandalwood.

Dr Fox said research was required on sandalwood to assist in developing effective methods of raising seedlings (sandalwood is a root parasite and requires a host), in planting (it is grazed by cattle), and in selecting trees for preservation of important genetic resources. In Australia, some sandalwood is being grown in the Kimberley, and access to seed from superior trees from Timor will be vital to the project.

ELLENSBROOK

There are many special places in Western Australia, away from the daily hum of city traffic. Ellensbrook, a National Trust home in Leeuwin-Naturaliste National Park near Margaret River, is one such place. Aborigines were attracted to the area by its combination of fresh water and seashore, features that draw us there still. Department of Conservation and Land Management district manager Ian Rotheram is one of many who have discovered its beauty:

'I first visited Ellensbrook when a friend wanted to show me a little-known but special and historical place within Leeuwin-Naturaliste National Park. Our walk of a few kilometres was rewarded when we came upon the old crushed shell and limestone home tucked into the sandhills next to the Ellen Brook.

'Alfred and Ellen Bussell spent a decade of their young lives at Ellensbrook in the mid-1800s. Theirs was a meagre existence, which gradually improved as their one-room hut was built onto and as they managed to sell some of their produce. Unhappily, two of Ellen's children died at Ellensbrook and are buried nearby, and she was apparently

glad to move to nearby Wallcliffe.

'Legend has it that long ago another young couple were drawn to the area. Nearby Meekadarabee, or resting place of the moon, is the resting place for two young Aboriginal lovers who eloped there until their families caught and killed them.

'The old sandy track has recently been upgraded to a road, and CALM has built a walk trail to the waterfall at Meekadarabee. Other facilities are proposed to ensure protection of this beautiful spot.

'There is still much to do around the home and in the national park. The Department of Conservation and Land Management (CALM) and the National Trust have to harness the enthusiasm and vision that many people have for Ellensbrook. In years to come it will be a special place for many Western Australians - a unique place in which to contemplate our cultural and natural heritage.'

Ellensbrook is a National Trust home.

Photo - Ian Rotheram

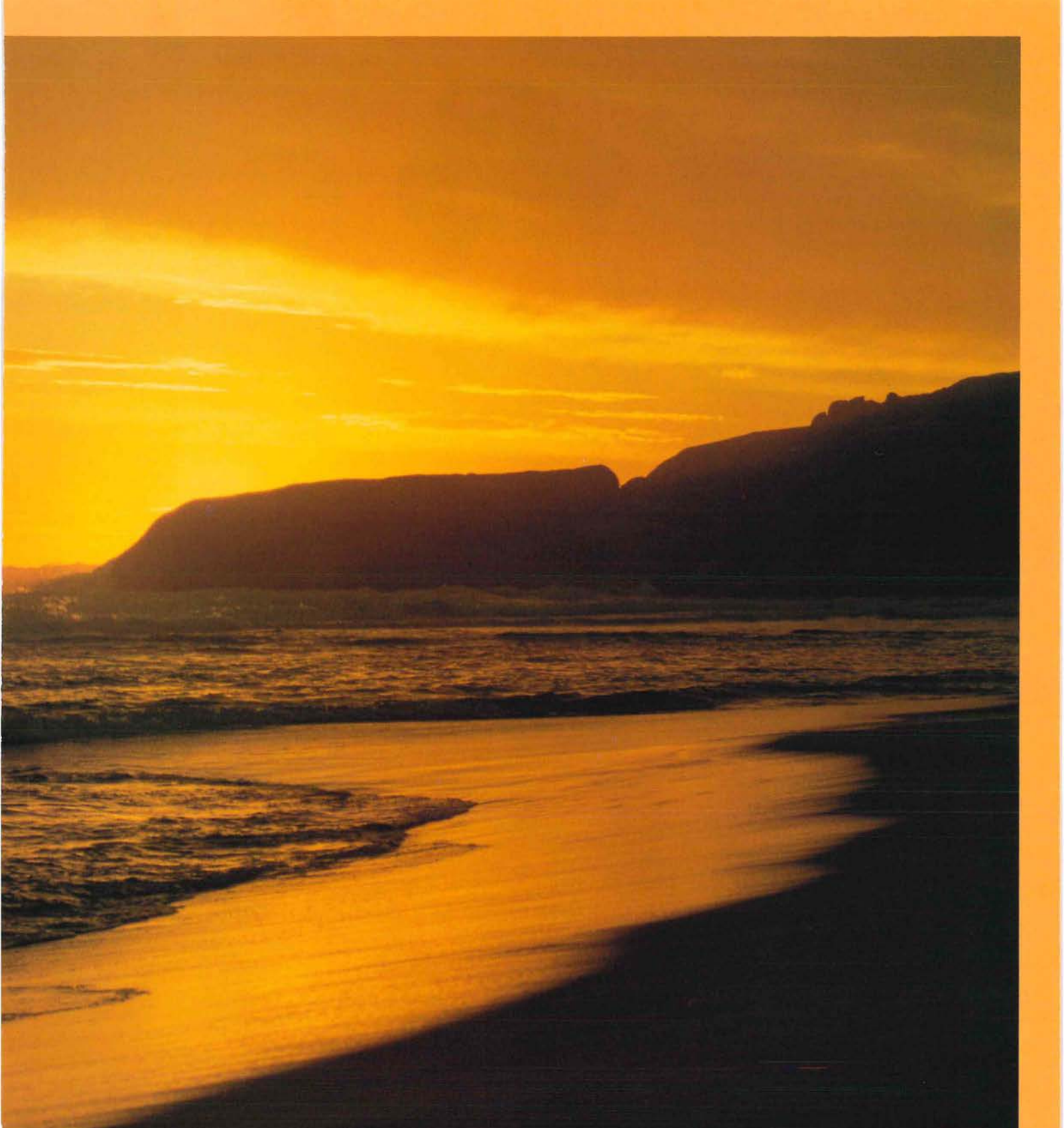


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West Cape Howe, now a national park, lies on Western Australia's southern coast between Albany and Denmark. Its coastline is dominated by rocky headlands, sheer cliffs and sandy beaches. Inland, the park rises to the north, coastal heaths giving way to jarrah and sheoak and to tall karri forest at the highest point near the park entrance.

This new national park is all ...

CLIFFS, COAST AND KARRI

by Ian Herford

DECLARED in 1985, West Cape Howe is one of Western Australia's most recent national parks. With an area of just over 3 500 hectares, the park is not large, but what it lacks in size it makes up for in scenic grandeur.

Prior to European settlement the area was used by the Minang people, who inhabited an area around Albany. Some of the older local residents can remember tribal groups travelling down the Hay River to the coast each summer. The river provided a convenient highway through the dense forest and the summer was spent on the coast with its abundant supplies of seafood. Corroborees were often held in the area. At the end of the hot season, the Aboriginal people would move inland once more.

The cleared rural landscape and ringbarked trees of Torbay, near the entrance to West Cape Howe National Park, are a vivid contrast to the shady karri forest just within the park boundary.

The tall karri forest supports a dense tall-shrub understorey of karri oak, karri hazel, karri wattle and the waterbushes. Where there is light and space, there are low shrubs of many blue-flowered species such as tree hovea, *Dampiera* and *Veronica*. Sedges and tufted plants such as *Cladium* and *Orthrosanthus multiflorus* are common on the wet, shady forest floor.



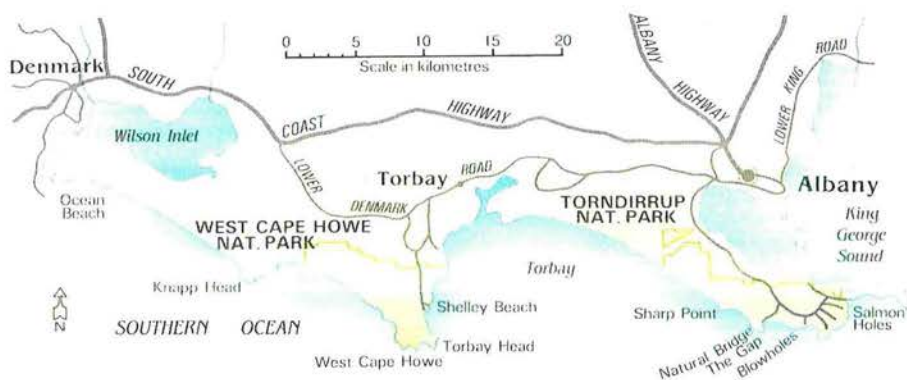
This is a regrowth forest. Logging began here last century. In 1884, Millars Timber Company built two of the first large mills in Western Australia at Torbay, just to the north, after securing a lease over 50 000 acres of forest. Karri was cut from the area to provide sleepers and timbers for the Great Southern Railway, which ran from Albany to Beverley and was built by the WA Land and Development Company, a large London concern. Timber cutting continued in the area until early this century.

Leaving the karri forest, less than a kilometre from the entrance, is just as startling as entering it. The vegetation drops to a low coastal heath within metres. Towards the coast, the landscape opens up and you can see Lake William, the largest of three freshwater lakes that are fringed with dense thickets of shrubs and sedge. A dense stand of the dark-leaved tree known as wattie (*Agonis juniperina*) mantles the lake. An unusual floating aquatic carnivore (*Utricularia*) is found on the lake itself. Albany pitcher plants are also common on the well-drained edges of Lake William. The lake

Lake William is one of three freshwater lakes in West Cape Howe National Park.

Photo - Martin Lloyd ▼

Photo previous page - Les Harman



was once open to the sea, but is now separated from it by a range of huge limestone hills along the coast. These hills were once coastal dunes.

As the road narrows and winds around the hills you can glimpse the ocean. To the east, the peninsula of Torndirrup National Park is abruptly terminated by Peak Head. Over the Southern Ocean lies Eclipse Island. On a clear day you can see the lighthouse built in 1926.

Up the hill is the lookout. From here you can see the clean white sand of Shelley Beach curving beneath steep limestone hills, which drop sharply into the sea. Across the water are Dunskey Beach and Torbay Head, the southernmost point in Western Australia. This point was named by English navigator George Vancouver in 1791. Vancouver also bestowed the name Cape Howe on the western headland. It was not until 1801, when Matthew Flinders sailed along this stretch of coast, that the prefix West was added to distinguish the Cape from another of the same name on the border between New South Wales and Victoria.

Fishermen often dot the beach, for West Cape Howe is renowned for its beach fishing. Salmon, herring and skippy are regular catches. Since the 1960s, a commercial fishing operation has also been based at Shelley Beach. Between February and April, you may see a small boat off the beach surrounding a pod of salmon with a net. The fish are hauled ashore, loaded into a trailer and taken to the processors by truck. Herring are also caught commercially at Shelley.

CLIFF-HANGERS

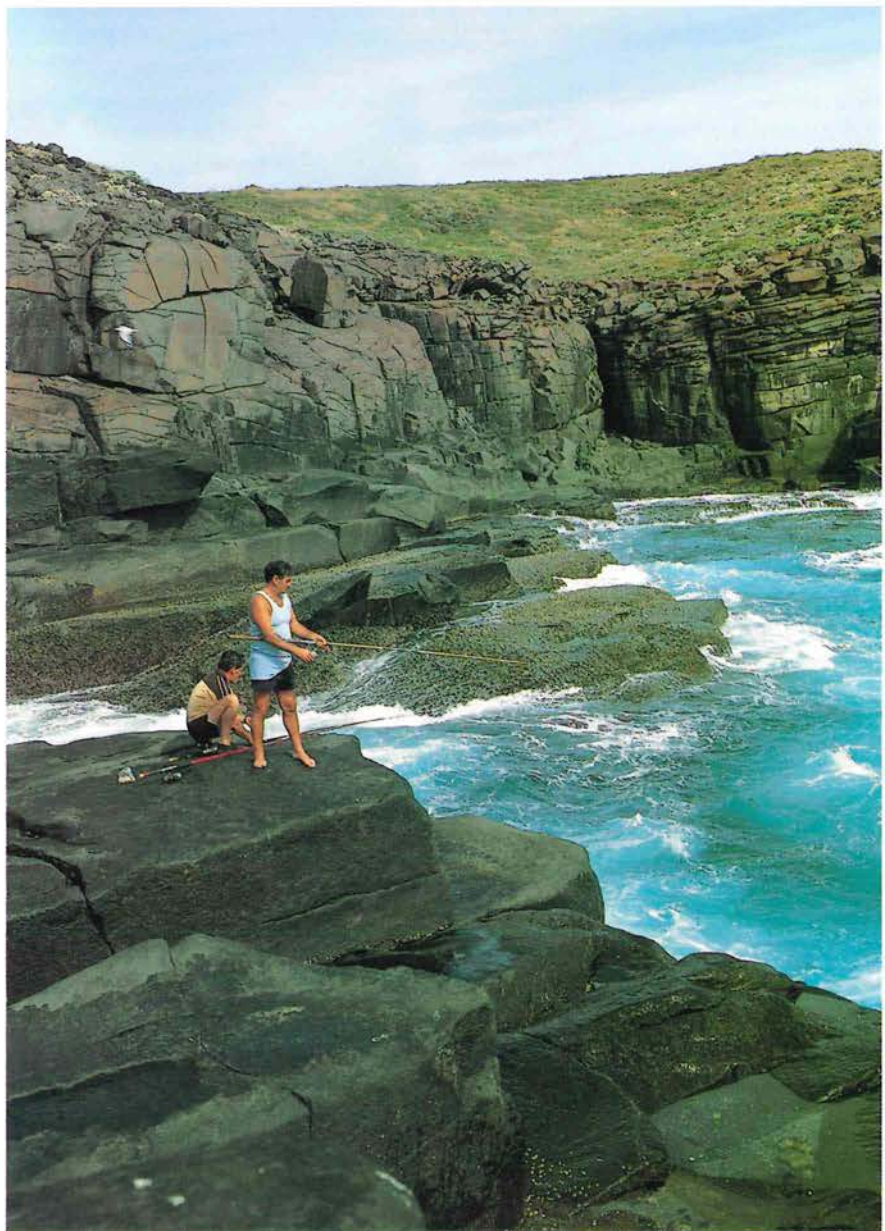
West Cape Howe is regarded as the premier hang-gliding site in Western Australia and, on long weekends and holidays, it attracts large numbers of enthusiasts from as far away as Perth.

The karri forest at the park's entrance has been regrown after it was logged last century.

Photo - Martin Lloyd ▲▲

West Cape Howe offers some of the best fishing on the South Coast.

Photo - Les Harman ►





They launch from the Shelley Beach lookout, and, if the wind is right, they are able to glide for as long as they please (the record is over eight hours) along the park's coastline. The steep cliffs create ideal updrafts for hang-gliding, giving gliders the unusual ability to take off and, after soaring to gain height, land at the same place.

If the wind doesn't allow this they can land at Shelley Beach. The beach is bounded at both ends by huge granite boulders, formed at the same time as the granites of the Porongurup Range, 79 km to the north.

The grassed area used to be larger than it is now, but was stripped back by enormous seas in the Southern Ocean storms of 1984 - a grim reminder of the potential danger of large seas on the South Coast.

CODE OF THE CAPE

Other areas are accessible only by four-wheel-drive. The road to the Cape itself turns off Shelley Beach Road. There is a Code of the Cape sign on the right side of the track. Its message is simple:

Please:

- Engage 4WD
 - Reduce tyre pressure to 110 kpa (16 psi)
 - Keep to the track
 - Take your rubbish home
- BE CAREFUL: Ocean swells and cliffs can be dangerous



The sign was installed with the assistance of the West Cape Howe National Park Association, which is keen to help protect the park. There is some more handiwork of local volunteers a little further on. A section of track which was badly eroded has been closed and covered with brush to help new vegetation to establish.

Four-wheel-drive tracks snake through the sand hills, forming an unsightly network of spaghetti strands across the park. Track erosion is a major management problem in West Cape Howe. This, as well as many other issues, is being addressed in a draft management

The 'black granite' cliffs of West Cape Howe are actually dolerite.

Photo - Ian Herford ▲ ▲

Students from the nearby Woodbury-Boston Environmental School examine the network of four-wheel-drive tracks that mar coastal dunes.

Photo - Ian Herford ▲

plan being prepared for the park. The draft plan has had extensive input from park users, and its recommendations should help restore and protect the park's vegetation, while accommodating recreational access.

CANVAS OF COLOUR

The park's fragile vegetation is well worth protecting. In spring the park is a canvas of blazing colour. The striking reds of templetonias, vivid blues of *Scaevola crassifolia* and pinks of the pimelias combine with the yellows of *Dryandra formosa* and slender banksia to create a showy display.

Scrub heath on sandy soils, characteristic of the South Coast, is common. Dense clumps of peppermint grow as tall as the winds allow and are home to the ringtailed possum. These shy animals are only ever seen on a night walk through the park.

The soft-leaved woolly bush also stands in defiance of the wind. Beneath it, jacksonias, melaleucas, and wattles form a dense shrub layer typical of the wind-pruned heathlands of the South Coast. Many of the shrubs in this area may have their heights genetically fixed to ensure they are not too exposed to coastal winds. Coastal variants of shrubs like *Lysinema ciliatum* and *Pimelia clavata* usually have thicker leaves than their counterparts in other places, and *Bossiaea linophylla* has redder leaves.

A rare finch, the red-eared firetail, lives in dense gully vegetation which it may have once shared with the famous noisy scrub-bird. A record in *Nests and Eggs of Australian Birds*, published in 1900, indicates that the bird bred in this area before its range contracted to the Two Peoples Bay Nature Reserve to the east. Another rare bird, the ground parrot, may also occur in the park - a number of visiting ornithologists believe they have heard its call.

WA Museum records also indicate that, at least in the past, the park has been home to the honey possum, quokka, woylie and numbat, although there have been no official records of these species for many years.

BLACK CLIFFS

At the last dune ridge, there are spectacular views of the Cape and the Southern Ocean. To the right, the coastline sweeps towards Bornholm Beach, famous for its salmon fishing, and on to William Bay National Park, 57 km to the west. Ahead, the dark cliffs of West Cape Howe contrast with the muted colours of the granites and limestones in the rest of the park.

The route to the Cape has several small tracks branching to the coast. The first of these winds to Golden Gates Beach, one of the area's best surfing spots. Others give access to rock fishing spots such as The Steps, which are among the best on the South Coast.

Just before the cliffs, the vegetation changes abruptly, becoming lower and more sparse. The soil, derived from the black igneous rock which forms the Cape itself, also changes colour. This rock, called black granite by the locals, is actually dolerite. It was squeezed up as molten rock from deep below the earth's crust and cooled below the surface, allowing the formation of relatively large crystals.

The constant salt spray and the heavy soils of the Cape create a perched saline wetland on top of the cliffs. This supports the dome-like shrub *Andersonia sprengelioides*, other species of *Andersonia* and samphires. This unusual vegetation formation is more extensively represented at West Cape Howe than at other south-coast locations.



Swamp bottlebrush (*Beaufortia sparsa*) usually grows in masses of two-metre-tall shrubs, with brilliant flowers in late summer.

Photo - Tony Tapper ▲

Some of the best rock climbers in Australia frequent the cliffs of the Cape.

Photo - Richard Rathbone ▼





As well as hosting unusual plants, the clayey soils of the clifftops are also home to a terrestrial crab. This strange creature prefers not to mix with its counterparts on the rocks below the cliffs.

The cliffs of West Cape Howe plummet 75 metres into the sea that pounds relentlessly at their base. The sheer drop and gusting winds make it a dangerous spot; even so, you may notice something move halfway up the cliff - a tiny human figure, with what looks like a thread of cotton trailing to the rocks below. The Cape offers some of the best rock climbing in Australia and attracts some of the world's best climbers.

The track continues towards Dunskey Beach, visible from the lookout above Shelley Beach. The short, sandy beach at the bottom of a steep hill is protected from the prevailing south-westerly winds.

SEA LIONS AND SPONGES

Off shore, sponge reefs provide the opportunity for divers to explore the rich marine life of the South Coast. New Zealand fur seals and Australian sea lions cruise along the shore in search of fish. Further out to sea, southern right whales, sometimes accompanied by their young, can be seen. These animals were hunted



almost to extinction by whalers, but are now gradually increasing in number. They can sometimes be seen from the park's cliffs and lookouts, particularly in winter.

West Cape Howe, despite its small size, is many things to many people. It offers an exciting range of recreational experiences. Though not everyone may wish to hang-glide, climb rocks or dive, the park provides a chance to get back in touch with nature. It is important for us all that such places exist. ▣

The wind- and wave-swept coast can be wild and dangerous, as a result of sometimes huge seas.

Photo - Tony Tapper ▲

Unspoilt Shelley Beach is one of the major drawcards of West Cape Howe. It can be reached by car - or hang-glider.

Photo - Jiri Lochman ◀

Ian Herford is the Planning Officer for CALM's South Coast region, and is currently preparing the Draft Management Plan for West Cape Howe National Park. He can be contacted at CALM's Albany Office on (098) 417 133. The draft management plan will be released in 1991 and will be available for public comment. Betty Swainson provided the inspiration for this article and Neville Marchant gave valuable advice on park flora.

LEAF BEETLES



THE MYSTERIOUS AUSTRALIANS

by Graham Hall

There are many native species of leaf beetle, yet little is known about them. In Australia they are kept down by natural predators; in South Africa and New Zealand, however, where they have no natural enemies, one Australian species turned into a scourge. After a visit from a beleaguered South African entomologist, Australian research scientists are now collecting and rearing leaf beetles to help unravel their mystery.

LEAF beetles are widespread in Australia (including Tasmania) and south-eastern Papua New Guinea. There are over 250 species, at least 30 of them in Western Australia, and new species are still being found. Yet anyone in Western Australia who attempts to identify a leaf beetle from the published descriptions will quickly run into trouble: the group's taxonomy is confused.

There are at least two reasons for this. First, one of the characteristics of leaf beetles is that they fade to a uniform dull colour when dead; yet early workers seldom examined living beetles or studied their biology. Second, what few biological

studies there are on leaf beetles have concentrated on the species found in eastern Australia and Tasmania, making it very difficult to identify species in this State.

Much remains to be discovered about leaf beetles, but some of their characteristics, and some aspects of their life cycle, are beginning to be understood.

FROM EGGSHELLS TO CYANIDE MISSILES

Leaf beetles are usually active from September to March. After mating, the female lays eggs on young leaves or shoots, or under bark scrolls. When the larva is

ready to hatch it draws its hatching spines, or egg-bursters, down the egg shell until they cut two slits, enabling the larva to force its way out. The larvae in an egg cluster hatch at about the same time, and consume their egg shells before moving off together in search of green food.

Both adults and larvae feed on leaves. The adults feed alone around the edges of a leaf, producing a scalloped effect, whereas the larvae will gorge on a leaf until they destroy it; then they will move to another. The mature larvae form loose congregations but feed voraciously as they move about.

When fully fed, the larvae drop to the ground and tunnel into the soil. The pupal cell is made of earth particles cemented together with a larva's secretions. When the adults emerge they fly in short, abrupt flights from one part of the tree to another. They are most active in early mornings and late



The leaf beetle *Paropsis elytrura* is widespread, and found on many WA eucalypts.

Photo - Peter Kelly ◀

Chrysophtharta varicollis is commonly found on flooded gum during September and October.

Photo - Peter Kelly ▼

Photo previous page - Scientists are attempting to breed this rare *Chrysophtharta* species in captivity.

Photo - Jiri Lochman



afternoons. Between these times the beetles remain under leaves, and if disturbed drop to the ground, where they blend in with the litter.

Although the story is different overseas, in Australian forests the damage by leaf beetles is slight. Many native enemies attack them. Birds and bugs eat the larvae, and some very small wasps parasitise the beetle eggs.

The tachinid fly is also known to be a parasite, this time of the larvae themselves, and it achieves the feat in spite of the latter's defences. Near the base of the abdomen, each larva has a pair of glands that release a clear fluid when jerked upwards. The secretion smells strongly of almonds, and contains cyanide. The brew appears to be deadly enough; meat ants coming into contact with the secretions are knocked down in 20 seconds and die within two minutes. How the fly parasites escape the cyanide treatment is a mystery, even though they approach the larvae with considerable caution. Yet escape it they do - it is not uncommon for 50 to 70 per cent of larvae in an aggregation to be parasitised.

BEETLES VERSUS EUCALYPTS

Some leaf beetles prefer certain trees, while others have a wide range of hosts. Closely related species often occur on very different groups of eucalypts growing in mixed stands. Certain leaf beetles in eastern Australia are so abundant on some eucalypts that they can cause crown



decline and even the death of young trees. As yet no leaf beetles are known to cause similar problems in WA. The flooded gum supports many species, but jarrah is not preferred by many beetles. It could be that jarrah leaves are tougher or have more toxic chemicals than other species.

In South Africa and New Zealand, where the beetles have been accidentally introduced, there are no natural enemies and there is an explosion of beetle numbers in large eucalypt plantations. In New Zealand the activity of one species

(*Paropsis charybdis*) has stopped the development of new plantations.

In the mid-1980s an entomologist from South Africa, Geoff Tribe, visited Western Australia to search for natural enemies of one particular leaf beetle (*Trachymela tincticollis*) that defoliates eucalypts in his country. Geoff realised that the beetle was originally from Australia, where leaf beetles are native. In South Africa *T. tincticollis* severely attacks tuart, which only grows naturally in the South West of WA but has been widely planted overseas. Furthermore, specimens of the beetle in the British Museum had been collected on tuart in south-western Australia. Geoff's detective work proved to be correct; he found *T. tincticollis* on tuart in the South West.



This *Paropsis* species is only known from Anderson Lakes Nature Reserve, north of the Stirling Range.

Photo - Jiri Lochman ◀

Paropsis geographica is usually found on tuart or flooded gum. Its eggs are often parasitised by tiny wasps.

Photo - Geoff Tribe ▲

Larvae of a *Paropsis* species, just before pupation.

Photo - Peter Kelly ◀◀



LEAF BEETLE OR LADYBIRD?

Leaf beetles make up one family (Chrysomelidae) of the beetle order Coleoptera. Another family contains the ladybirds (Coccinellidae), which are the only insects that look superficially like adult leaf beetles.

LADYBIRD

Adult size 1-7 mm
Adult colour Yellow to black spotted

Feeding
adults: predatory
larvae: predatory

Behaviour
adults: gregarious
larvae: solitary

LEAF BEETLE

Adult size 1.5-22 mm
Adult colour Bright, spotted or metallic

Feeding
adults: leaves
larvae: leaves

Behaviour
adults: solitary
larvae: gregarious



Geoff also found many other species of leaf beetles and documented their natural enemies. It was he who identified the two species of wasp parasites which are highly specific to *T. tincticollis* eggs. Because he found that these wasps could defeat the larvae's cyanide spray, they looked very attractive as a potential controlling force. Sure enough, when the wasps were released in South Africa they rapidly reduced the problem.

Geoff Tribe's visit was the catalyst for other research scientists to examine some of the leaf beetles in this State. Our forests and woodlands support a rich and diverse beetle fauna, most of them beautiful and fascinating. The work now under way is the first step toward understanding their life cycles and ecological requirements, so that future generations can enjoy their beauty and charm. □

Female *Paropsis elytrura* lay eggs in a characteristic whorl around twigs or leaf stems.

Photo - Peter Kelly ◀

Graham Hall is a consultant ecologist at CALM's Wildlife Research Centre at Woodvale. He works on leaf beetle taxonomy and ecology, and can be contacted on (09) 405 5123.



ENDANGERED!



Martin Thompson

THE GREATER STICK-NEST RAT

The greater stick-nest rat (*Leporillus conditor*) has been reintroduced into Western Australia after being extinct here for more than 60 years. This is part of a larger program to re-establish the species in its former range.

This attractive native rodent derives its name from the large nest of sticks it builds to protect itself from predators. These can measure up to 1 m high and 1.5 m wide and contain green vegetation as well as sticks and stones. Nests are added to or modified over generations and may be home for up to 10 animals.

Until recently, only one population (about 1000) of the greater stick-nest rat remained. It was on the Franklin Islands, in the Nuyts Archipelago off the far west coast of South Australia.

Greater stick-nest rats were once spread across central Western Australia to Shark Bay, and across South Australia into western New South Wales. They were last found on the Australian

mainland in the north-eastern Nullarbor Plain in the 1920s, and remnants of stick-nests made by either the greater or the now extinct lesser stick-nest rat can still be found in many parts of southern WA.

Their decline on the mainland is thought to be due to predation by foxes and feral cats, and loss of food sources with the introduction of rabbits and stock into their habitat. Stick-nest rats eat semi-succulent vegetation and depend on the foliage and fruits of perennial shrub species, rather than the seeds or grasses eaten by most native rodents, to see them through drought conditions. Unfortunately these species also form the diet of rabbits, sheep and cattle.

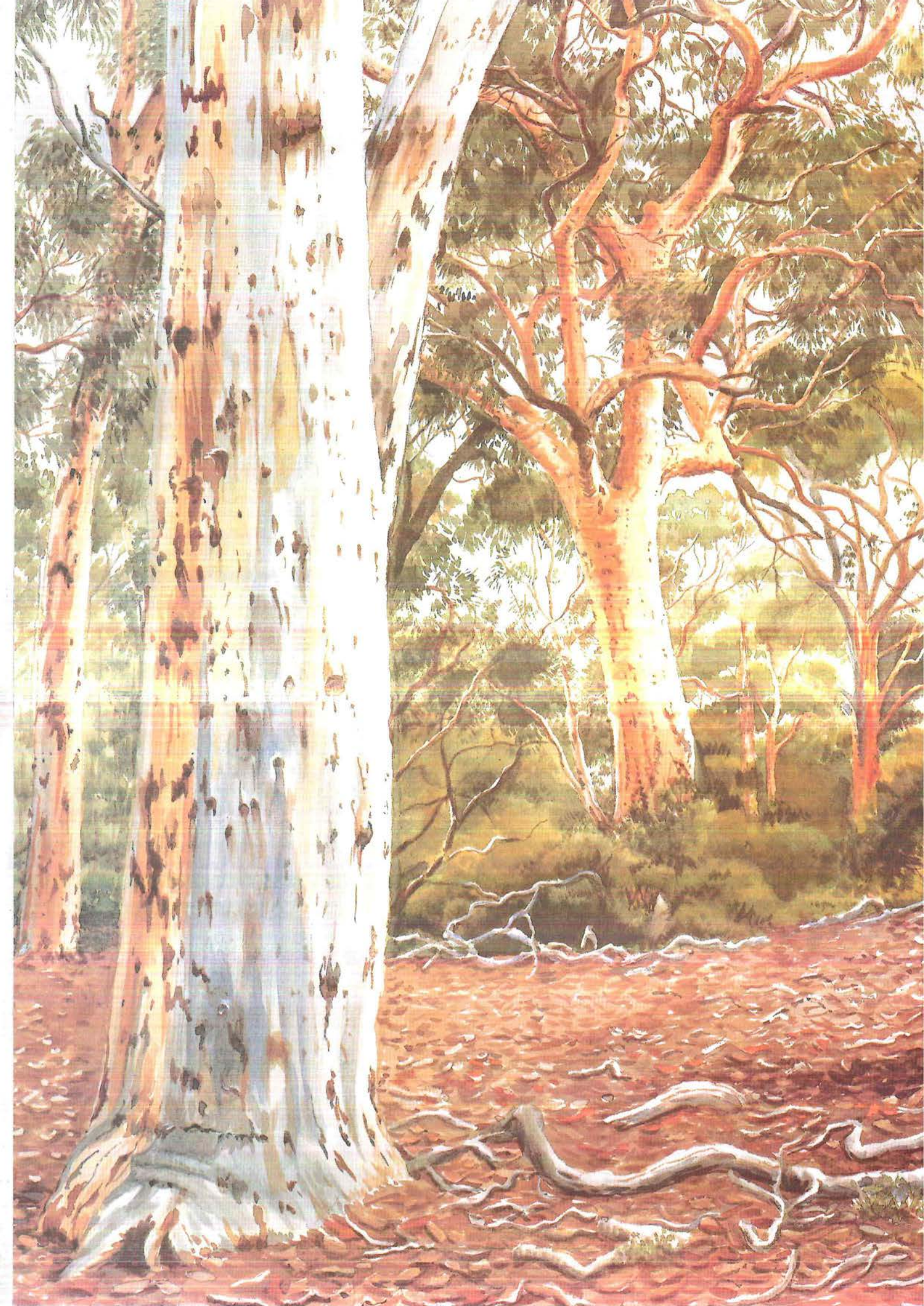
In South Australia, wildlife experts have established a breeding colony of stick-nest rats so that the species can be reintroduced into its former habitat. From this colony, staff from WA's Department of Conservation and

Land Management and the South Australian National Parks and Wildlife Service transferred 40 stick-nest rats onto Salutation Island in Freycinet Harbour, Shark Bay, in July 1990. The island is ecologically similar to the Franklin Islands in South Australia, and is free of predators and introduced fauna.

Two large stick-nests have since been found on Salutation Island, and the prognosis for the successful establishment of the species is good. Radio monitoring of the new colony shows that most of the rats fitted with radio collars have gained weight. At least one of the females has given birth and others appear to be pregnant.

Further monitoring of the population will be carried out in March 1991.

TANYIA MAXTED





Leaf & Branch

Perth's own trees and tall shrubs are hardly known - or grown - by locals. A new book by naturalist Robert Powell aims to change all this. Leaf and Branch, the definitive guide to Perth's trees and tall shrubs, shows us how to understand and appreciate these local characters, how to collect and grow them, and how to study them and help them survive. Robert not only describes each plant in detail, but wants to change our attitude towards them. The first chapter of Leaf and Branch, on the beauty of Perth's trees and tall shrubs, reprinted here in a slightly condensed form, shows a different way of looking at our botanical heritage.

THE way we see trees and shrubs is conditioned by attitudes we learn. Most books on horticulture are illustrated with spectacular displays of brightly coloured flowers, which we have been taught to recognise as beautiful. Most of nature's trees and shrubs, however, have more modest displays. Furthermore, books emphasise particular features of a tree or shrub, and largely ignore what it looks like as a whole. Where they do mention shape they praise regularity and compactness, whereas most natural trees and shrubs are irregular and diffuse.

With such preconceived ideas we see beauty only in a minority of species. But there are other ways of looking at Perth's trees and tall shrubs - and there is beauty in every one!

THE TREE AS A WHOLE

Look at a tree as a whole and examine the space it occupies. It extends upwards and outwards in different directions. Walk around it and it changes shape and structure from every new angle.

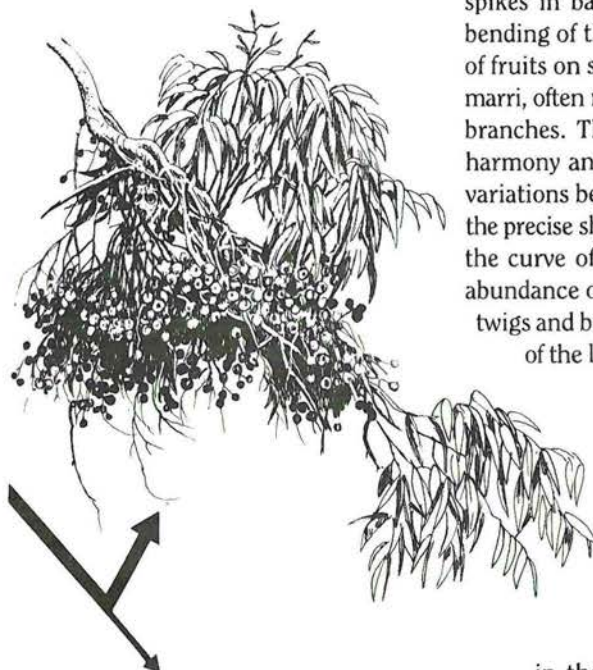
Stand close to the tree and you will appreciate its three dimensions, particularly if the sun is high and parts of the tree are lit up. Stand further away and the tree looks more two-dimensional, especially if the sun is low. If the sun is behind you, the tree looks heavy and solid, with thick, opaque foliage. Look at it against the light at sunrise or sunset, and the tree is a silhouette, delicate and detailed; the foliage is broken into a texture, and twigs normally hidden by foliage are revealed.

The space a tree occupies depends on its shape, and its shape depends on its structure. The *shaft structure* consists of a main trunk with side-branches. Trees with a *splitting structure* have trunks that divide into two or more near-equal stems, which continue to divide fairly equally.

The shaft structure is more typical of trees, the splitting structure of shrubs, but there are many variations and combinations of the two. Often trees have the shaft structure as saplings - which helps them gain height rapidly - but develop the splitting structure with age.

Different species also vary in the degree to which individual trees adhere to the structure typical of the species. The introduced Norfolk Island pine is a

good example of *template growth*: all specimens develop the same structure. At the other extreme is *opportunistic growth*: each specimen grows according to its individual circumstances. Saltwater paperbark, for example, may have one trunk or several, and be upright or sprawling.



PATTERN AND DETAIL

Different tree species have characteristic patterns; for example, the foliage of bullich is arranged in tight clumps, whereas that of flooded gum is much more dispersed. Different sizes of leaf affect the texture of the foliage. Some patterns affect others; terminal flower-spikes in banksias cause branching or bending of the stem, and heavy clusters of fruits on some eucalypts, particularly marri, often result in pendulous or wiggly branches. These patterns give the tree harmony and character. The individual variations between parts of the pattern - the precise shape of each clump of foliage, the curve of each branch - produce an abundance of detail. The tracery of dead twigs and branches echoes the patterns of the live parts and also adds detail.

EFFECTS OF ENVIRONMENT

The appearance of trees is affected by the environment. Jarrah on the coastal plain is vastly different in size, shape and structure from jarrah in the Darling Range. Although the difference may be partly genetic, the environment is the major cause.



Jarrah branch weighed down by fruits. The strong new shoots along the branch will result in a bend, as shown by the arrows. ▲▲

Previous page. Powderbarks in early winter. This species can be found in John Forrest, Walyunga and Avon Valley National Parks. Illustrations - Margaret Pieroni

This picturesquely stunted chenille honey-myrtle is growing in rocky limestone soil, which has not allowed it to develop fully. Although mature, it is only 1½m tall. ▲



A tree will not grow to full size if the soil is too shallow. Thus many trees growing in coastal limestone or granite areas of the Darling Scarp are stunted.

Coastal trees often have a pronounced lean. Sea winds deposit salt on the foliage, particularly on the seaward side. This kills young shoots and stunts growth on that side, causing a lean. Large trees can be affected up to 10 km from the coast. If a number of upper branches are killed by salt, a tree will often shoot from dormant buds lower down to form additional branches. Thus near the coast trees tend to be lower and more branching.

Climate has a more general influence. Even within the metropolitan region there is enough variation in climate to have an effect. Trees grow larger in the south than in the north, where rainfall is slightly less and temperatures and evaporation slightly higher.

Other forms of life have an important influence on trees and shrubs. Fungi in the inner wood of old trees can cause branches to weaken and break. Insects often alter growth patterns. If leaf-eating insects eat a dominant shoot, other shoots will take over, producing either a fork or a slight change in the branch's direction. Wood-boring insect larvae that ringbark a branchlet have a more pronounced effect. Eucalypts recover by means of dormant bud. Species without dormant buds, such as wattles, divert their energy into other branches rather than form new ones.

Insect attack is thought of as ugly, but is it? Trees virtually devoid of insects in their foliage or branches tend to be symmetrical and regular. Those that support insects may well have basic symmetry, but will have subtle, yet pleasing, irregularities. In a natural stand of trees, some specimens will be attacked by insects more than others, resulting in a greater variety of form and detail. Yet they will harmonise and present a pleasing unity.

Insect attack, in moderation, can actually benefit trees: they have evolved to cope with it. Without insect attack a tree can be burdened by dense foliage or excessively large clusters of fruits.

The environment at each locality is often not uniform. A tree near the top of a coastal dune must endure drier soil and stronger salt winds than a neighbour in a nearby swale.

Often the main influence on a tree is exerted by its nearest neighbours. In a forest, competition for light causes trees to grow tall and straight. In a woodland, the dominant trees occur both singly and in irregular groupings, and therefore vary more in shape. Trees on the edge of a tight group develop most of their branches on the side where they have space. Tree seedlings that germinate in the shade of an existing tree will grow out at an angle until they find light, then bend upwards. Many gracefully leaning trees are produced in this way.

If a tree loses one of its larger near neighbours it will respond to the extra light and reduced competition. If it had been forced to grow at an angle its main growth will change to a vertical direction. New shoots are often put out along the trunk, and grow into strong new branches that eventually form most of the canopy.

ACCIDENTS OF NATURE

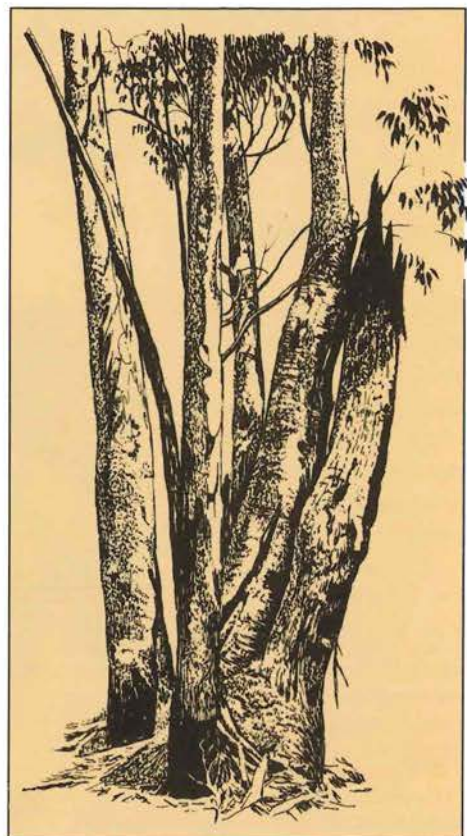
Fire can have a dramatic effect on vegetation. In our hot, dry summers, fires can occur naturally, but have become more frequent, and sometimes more intense, since European settlement. One significant factor has been the introduction of exotic grasses.

Some species of tree or shrub are killed by fire. Of those that survive, some are more resistant than others. Even the most resistant can lose branchlets or whole branches. If fires are frequent and intense, trees may not be able to recover fully between fires; hence there are many stagheaded specimens in metropolitan bush areas.

Trees can also lose branches in strong winds or when other trees fall on them. The scars and irregularities add variety and detail.

This bullich has recovered from a severe fire by shooting from the base and from its lignotuber, below ground. Originally a tree with a single stem (its remains are at the right), it is now a mallee, with many stems.▲▲

Burnt candle banksia and common sheoak, Jandakot. The banksia is shooting near the ends of its branches; its crown will soon recover, and the tree will have changed little in shape or structure. The sheoak, however, is sprouting from the trunk and lower branches. Its crown has largely been destroyed and the regrown tree will be very different from the original.►



UPRIGHT SNOTTYGOBBLE

Persoonia longifolia

The casual observer would not guess that this species and spreading snottygobble are related, so different are they in bark, leaves and general appearance. But their flowers and fruits are very similar.

The leaves too, although very different in shape, do have similarities. In both species they are soft and flexible, and mostly held edge-up (like those of eucalypts). They are also arranged in the same way on the stem, being either alternate or crowded (rather than in whorls or opposite pairs).

Spreading snottygobble captures attention by its colour and growth habit. Upright snottygobble is striking too. Its bark is coarse, flaky and colourful. Peel a bit off, and the inside layers are reddish-purple. The leaves are long and somewhat sickle-shaped, and combine in shaggy clumps.

Upright snottygobble has a much simpler form than its relative. It is an erect small tree or shrub 1-5 m high, with few branches.

OCCURRENCE AND DISTRIBUTION

Like spreading snottygobble, upright snottygobble grows in the jarrah forest; in the Perth area it is confined to the Darling Plateau. It extends from Bickley to Albany.



ECOLOGICAL NOTES

This species too drops its fruits. After several days on the ground, they change from green to yellow-green, which may increase their visibility to animals that eat them. Scattered saplings seen on roadside cuttings in the jarrah forest indicate that the seed is effectively dispersed.

Like the other species, upright snottygobble survives fire. It resprouts afterwards from the twigs or from an underground rootstock.

CULTIVATION

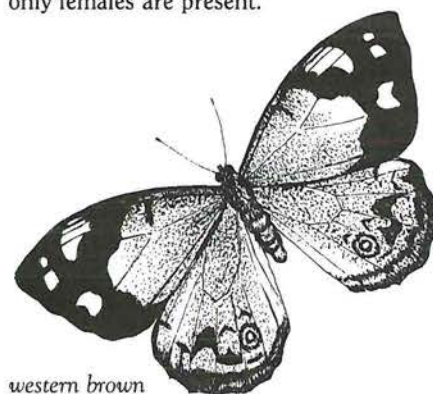
This appealing plant would no doubt be cultivated if only it could be. Seeds have been planted many times, but seldom germinate. They may need to go through the gut of an animal to trigger germination.

COLLECTION AND NAMING

Collected by Robert Brown in 1801 or 1802 from the Albany area. Specific name from the Latin *longus* "long" and *folium* "leaf".

ASSOCIATED FAUNA

Many native bees visit the small yellow flowers in summer, and are probably the main pollinators. Another insect to visit the flowers is the western brown. The sexes of this butterfly have different markings, especially on the forewings; but what is more unusual is that they appear at slightly different times of the year. The first males are seen in October, but it is several weeks before females appear. At the end of the season, in April, only females are present.



western brown

DISTINCTIVE FEATURES

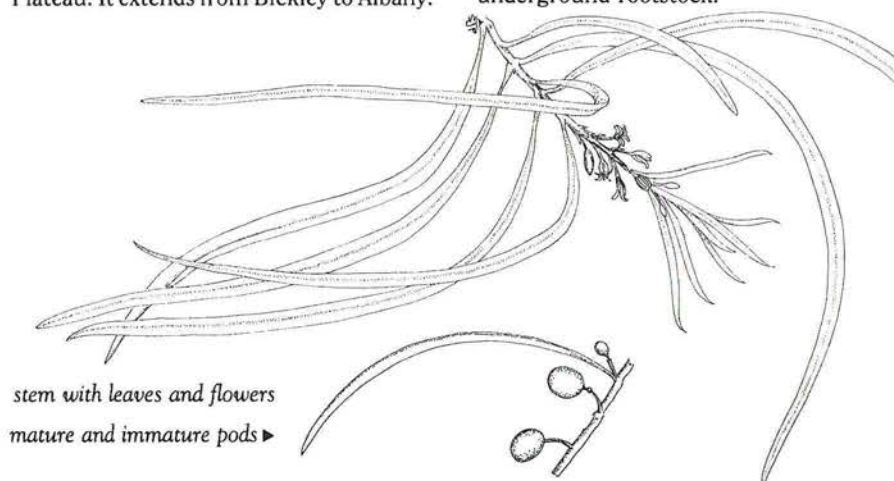
Small upright tree 1-5 m tall, in the jarrah or jarrah-marri forest.

BARK rough, layered and flaky.

LEAVES green, up to 20 cm long, slender, slightly asymmetrical to sickle-shaped.

FLOWERS yellow, produced from late spring to late summer.

FRUITS smooth, green, round, slightly flattened, about 1 cm long.



stem with leaves and flowers
mature and immature pods ▶

OLD TREES AND SHRUBS

Old trees are complex and individual. Their structure and patterns, and their many interesting irregularities, reveal something of their life-stories.

Some eucalypts can live several hundred years, and are an irreplaceable link with the past. Many of the large old trees we see today were alive before the European settlement of Western Australia. In our rapidly changing world, they offer a different perspective of time.

LOCAL TREES AND SHRUBS

Local trees and shrubs - those that belong naturally to the site - have evolved in the local environment, and respond to it in meaningful ways. Because they are used by many associated insects, they develop much irregularity and detail. These aspects of beauty are less characteristic of non-local trees and shrubs, which are in

an alien environment, and generally support fewer insects.

Local plants in combination have a special beauty. In nature, plants that like the same conditions and get on well with one another occur together in a natural community. This interaction makes their appearance harmonious, supplementing the beauty of the individual members. Perth's plant communities are numerous, and the variation between them reflects subtle changes in the environment.

NATURE AS A MODEL

We can use nature as a model for parks and gardens. In many gardens species from quite different origins are often mixed for the sake of variety. The problem with this approach is that such species usually clash visually - and the whole is often unsatisfying. Many eastern states eucalypts have a strongly developed

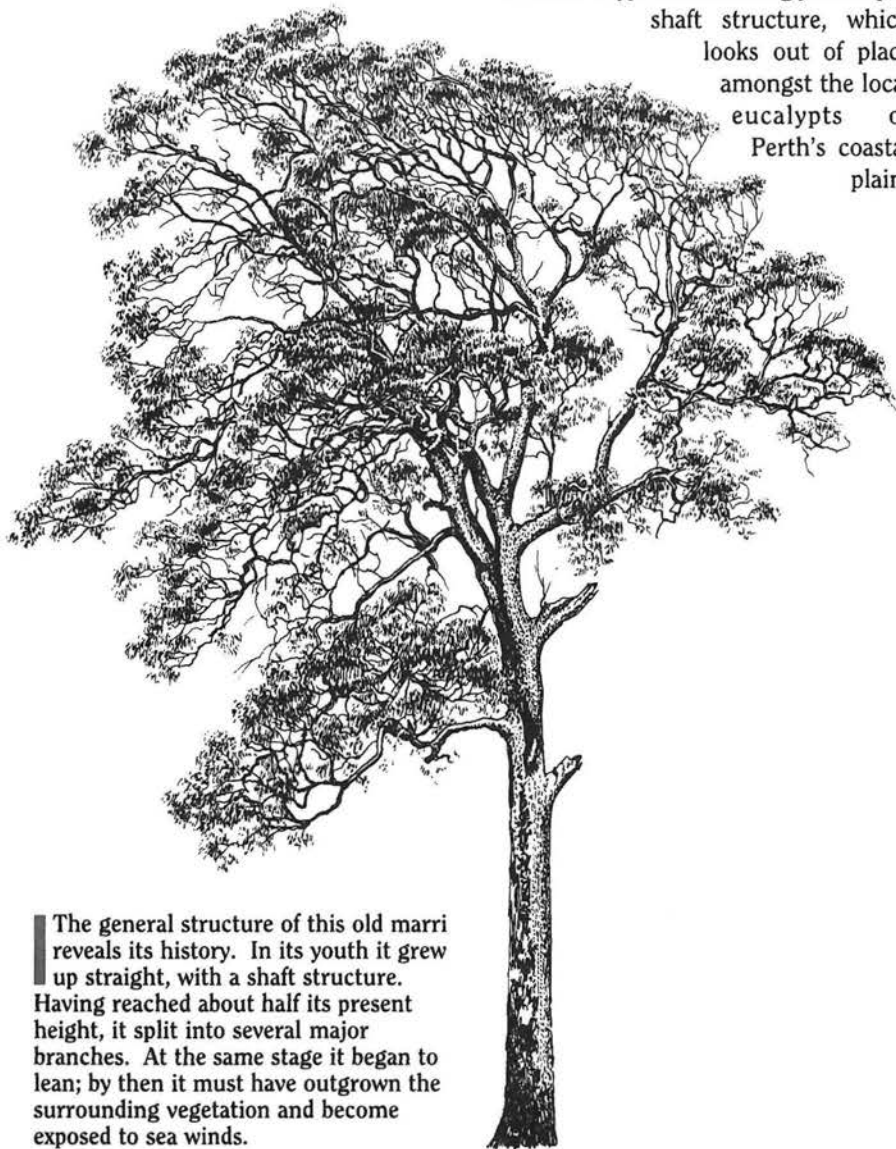
shaft structure, which looks out of place amongst the local eucalypts of Perth's coastal plain.

In a natural remnant of vegetation there will always be both harmony and variety. Even in a stand of trees of the one species, the mixture of ages, the uneven spacing and the insect attack give considerable variation in form and detail; but whether there is one species or many, the plants are members of a natural community and will look well together.

We can retain more trees in our parks and gardens. Where we do plant, we can recreate the harmony of nature by using local species, by imitating nature's irregular groupings and by avoiding the tendency to space trees evenly. Better still, we can let trees and shrubs regenerate naturally and establish their own groupings.

In parks where non-local trees and shrubs are already established, it is still worth while planting groups of local species as reminders of Perth's natural setting.

If we appreciate the beauty of our natural trees and shrubs they will enrich our lives. That appreciation will also help us create a more satisfying and harmonious environment in which to live. □



The general structure of this old marri reveals its history. In its youth it grew up straight, with a shaft structure. Having reached about half its present height, it split into several major branches. At the same stage it began to lean; by then it must have outgrown the surrounding vegetation and become exposed to sea winds.

Leaf & Branch



TREES AND TALL SHRUBS OF PERTH

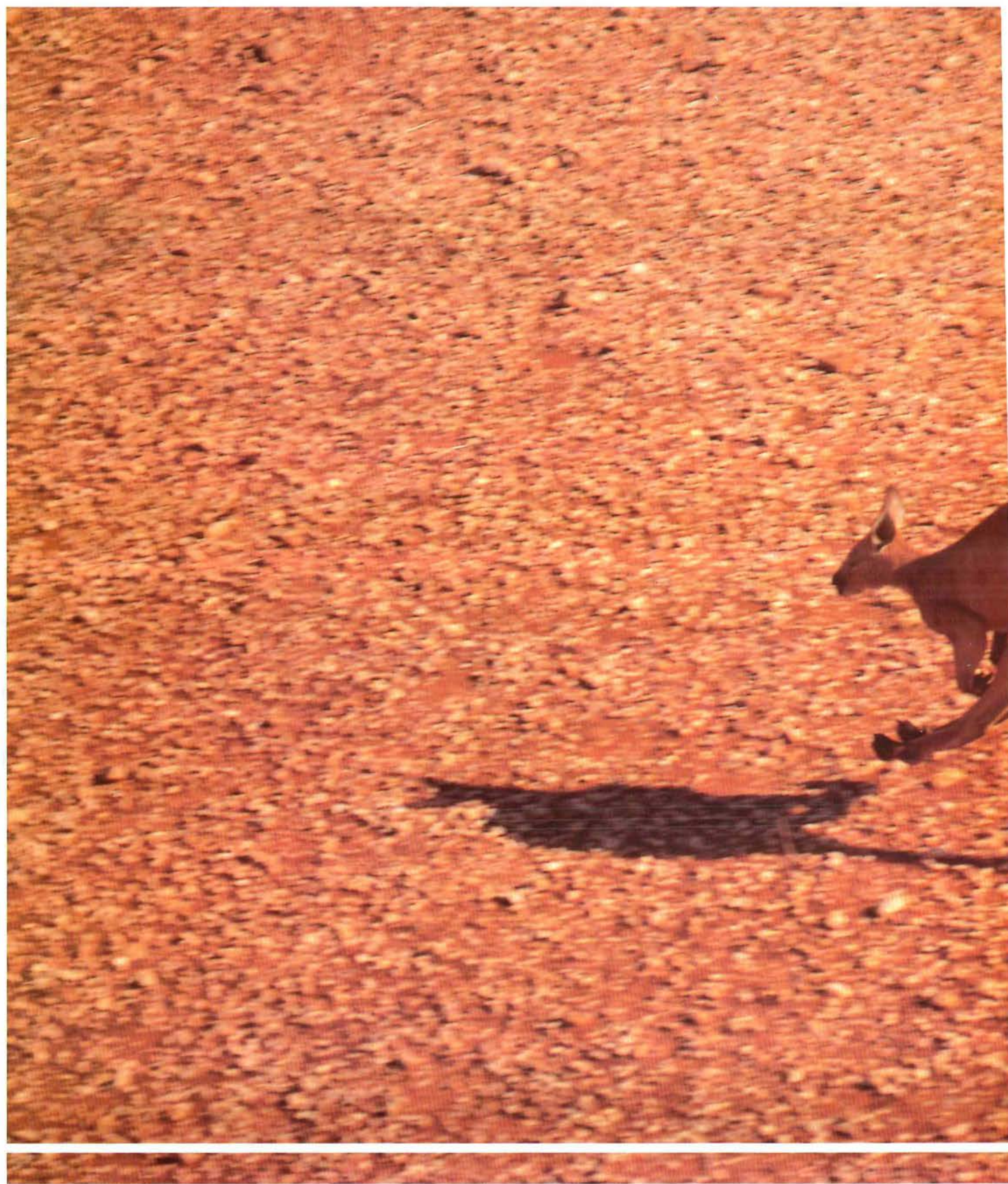
ROBERT POWELL

Illustrated by
Margaret Pieroni
and Susan Patrick

DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

Robert Powell is an expert on local plants, having had a lifelong interest in the local environment. Academic Jane Emberson, botanist Steve Hopper and insect specialist Peter McMillan also made major contributions to *Leaf and Branch*. The book is abundantly illustrated by Margaret Pieroni and Susan Patrick. It is available from CALM offices and all good bookshops and newsagents for \$24.95.

A NIMALS IN



MY



LENS

by
Jiri Lochman

What makes a good
wildlife photograph?

LANDSCOPE has often
been praised for the
quality of its pictures, and
many readers will have
noticed that a few
photographers' names
crop up regularly in each
issue. This is no accident -
the work of this small
band of camera artists is
outstanding.

One of *LANDSCOPE*'s
regular photographers is
Jiri Lochman. This is Jiri's
account of what motivates
him to take wildlife
photographs.



THE Australian bush offers a feast of visual experience. For me, it nurtures a desire to share what I see with others. From this desire it's only a short step to wildlife photography.

The biggest task of any wildlife photographer is to open this sometimes unfamiliar world to those who are interested, and who, for various reasons, may not be able to experience it first hand. Wildlife photography plays a major role in the conservation of endangered species. For example, few people may have seen the giant panda but, thanks to photography, most of us know what it looks like. Without this change of the unknown into the familiar, motivating sufficient interest to save threatened animals would be difficult, if not impossible.

One of the first questions I am usually asked is, what equipment do I use? It may disappoint the technically minded to find I don't use any overly sophisticated gadgetry, and I am invariably behind the camera when it is triggered. Most of my wildlife pictures are taken with 35 mm Nikon gear. My favourite lens is the 105 mm micro Nikkor, which allows me to photograph a wide range of subjects, from insects to landscapes.

Of course, an indispensable part of photography is light. The ability to read light, the way it changes through the day, and how it lights a subject from different angles is what makes a photographer. I prefer available light to artificial illumination, but not at the price of dragging nocturnal animals out of their burrows. Since Australia abounds with nocturnal creatures, I use flash of some sort in roughly one third of all wildlife pictures I take. However, even under poor lighting conditions, I would often risk losing a shot completely rather than restricting myself to flash photography.

I rely more on my knowledge of animals and their behaviour than on my equipment. The more I learn about wildlife - not in a purely scholarly sense - the more rewarding every new encounter is. By trial and error I have found it results in a higher success rate if I allow animals to approach me of their own accord, rather than trying to outmanoeuvre them. I learnt long ago that there are no quick results in wildlife photography. If it's instant results you're after, you would be

better off doing something else. By my whole approach, I strive to capture animals in their environment, recording the way they live without disturbing them.

There is a fundamental irony in trying to promote the cause of wildlife by producing pictures of stressed-looking creatures that were handled, cornered or otherwise restrained. I became a wildlife photographer because of my love of nature, and over the years I have developed my own code of ethics. It is that *none of my pictures is more important than the well-being of the subjects I photograph*. The tangible results of this philosophy are images of lively looking animals going unrestricted about their business. Luckily,

what is best for the animal usually proves best for photography - at least the photography that I and most of my clients prefer.

In this small cross-section of my work, I have attempted to give an insight into how and, perhaps more importantly, why I took the particular photograph. If, as is often the case, I spend a long time on a shot, I can become quite attached to the subject. I observe and get to know its character. Sometimes I might even give it a nickname. □





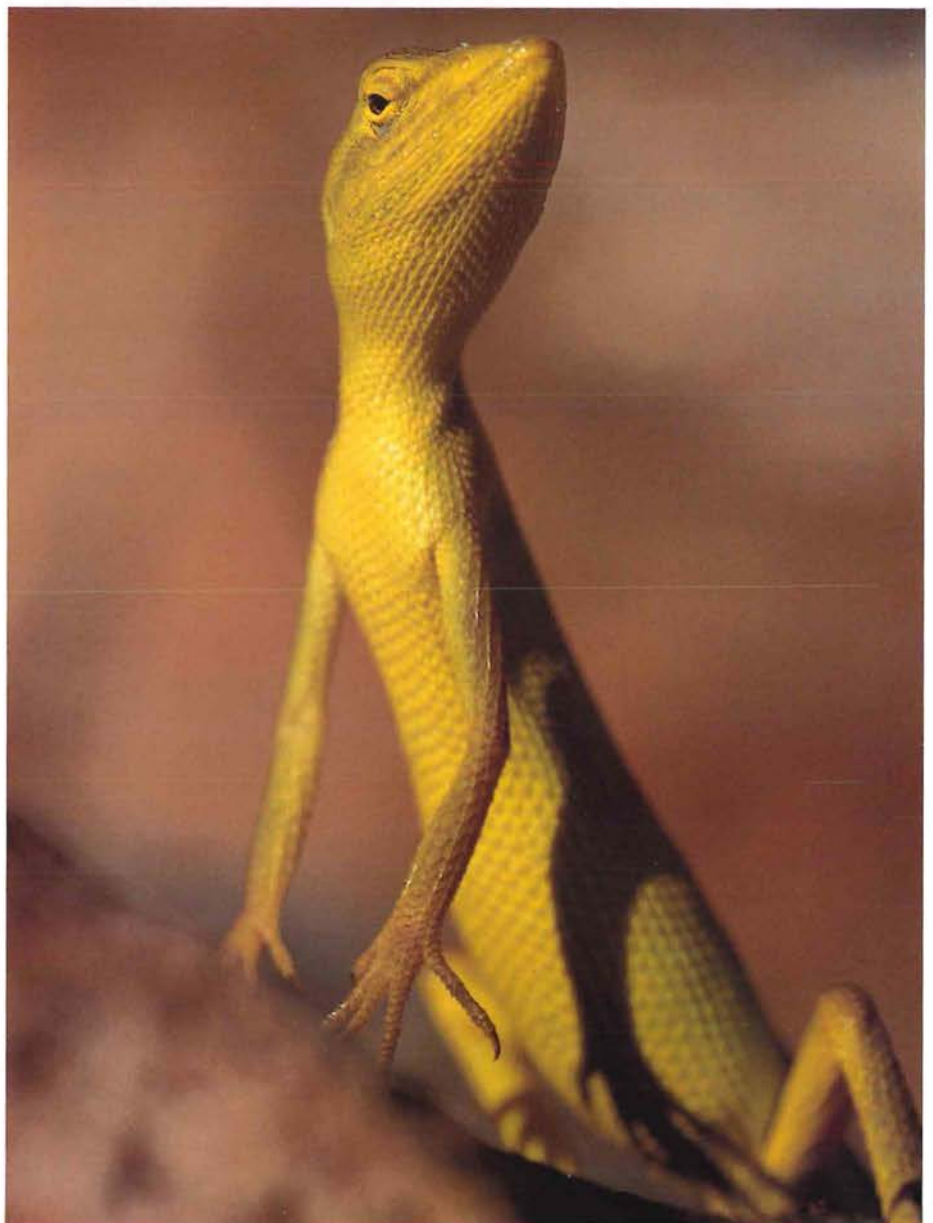
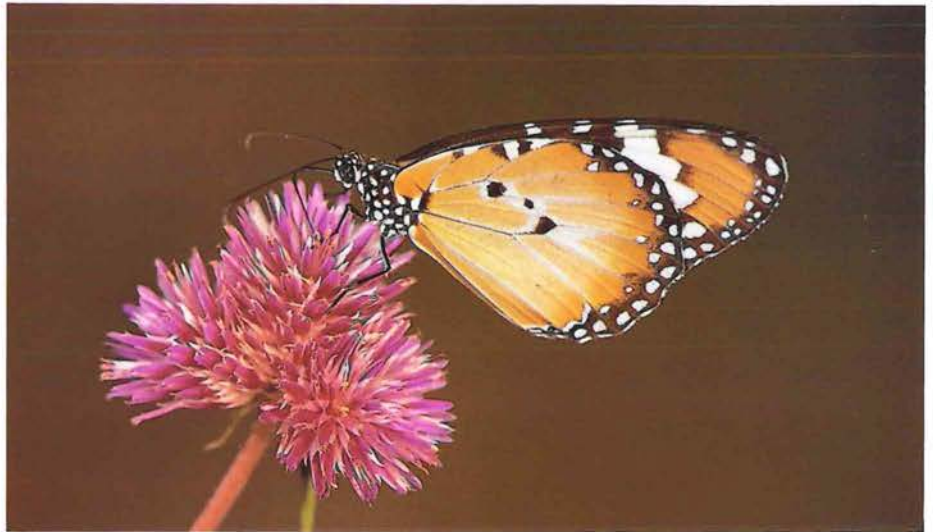
The angle of illumination is of utmost importance not only for determining the exposure, but also for the final effect. The little egret that caught a shrimp in a stream running through the tidal mud is photographed into the sun. To get this image I used a 600 mm telephoto lens and Fujichrome 50 film.◀

I try to capture animals in the most intimate moments of their lives. Here, the slender tree frog - nicknamed in this picture the 'wobbly frog' - had difficulty getting onto a twig. Since most Australian frogs are active at night, I had to use a pair of flashes coupled with a 105 mm micro-lens; the film was Kodachrome 64.◀▼

Insect photography is a hobby within my profession. It has two advantages, especially for leisure-time photographers. It offers inexhaustible variations, and it can be performed almost everywhere, for example in your back yard or in city parks from which most other wildlife long ago disappeared.

In the first example, a spider-hunter wasp feeds from a foxglove. This picture was taken on Kodachrome 64 film with a 105 mm micro-lens with extension tubes and a pair of small flashes. The picture of the lesser wanderer probing a bachelor's button was taken with available light, a 200 mm micro-lens and extension tubes.▲▲

Anyone who has observed a splendid dragon lizard will testify to the peculiar positions in which it can suddenly stop. This magnificent dragon (*Diporiphora superba*) stopped only for a couple of seconds, just long enough for me to take this frame. Fujichrome 50 film and a 200 mm micro-lens were used with available light.▶





Naturalist photographers tend to place value on photographs according to the rarity of the subject. Personally, I think rarity on its own does not make a picture, and would rather look at a well-executed photograph of a common creature than a poor picture of an endangered one. This picture of a feeding western grey kangaroo was taken with the last light of the day. For this reason I chose Ektachrome 100-plus film coupled with a 200 mm lens. ▲

All but two native Australian small-to-medium-size mammals are nocturnal. To capture this golden-backed tree-rat I used Kodachrome 64 film and a 200 mm lens accompanied by a single flash mounted off the camera. ▲▲

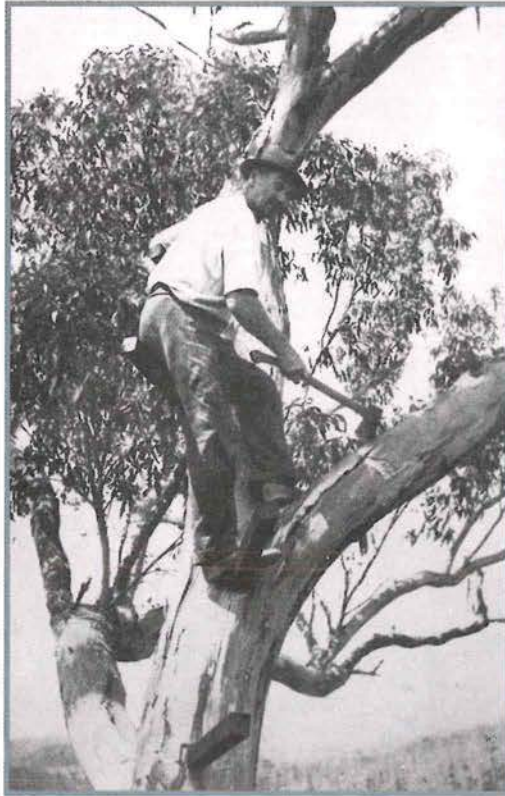


Some venomous snakes are the most secretive of all our native fauna. I have often heard wildlife photographers saying it is impossible to photograph snakes without catching them. I don't agree. The secret is to see the snake before it sees you. The bardick in this picture was photographed, without ever being handled, on Kodachrome 64 film with a 105 mm micro-lens and a pair of flashes. ◀◀

Every wildlife photographer strives to have pictures of lively looking animals. This is particularly difficult to achieve with the echidna, since its minute eyes, usually held close to the ground, are either not seen in pictures or look flat, as if the animal was blind. To avoid that, I followed this echidna without disturbing it until it began crossing a fallen log. To add a spark into its eyes I used a fill-in flash with a 200 mm lens on Kodachrome 64 film. ◀

JIRI LOCHMAN IS A PROFESSIONAL PHOTOGRAPHER. HE CAN BE CONTACTED ON (09) 342 8812.

A ROOM AT THE TOP



by Roger Underwood

Since the early 1970s, fire detection in our forests has been carried out by light aircraft using 'high tech' systems - but it wasn't always so.

For a 30-year period in Western Australia's history, a select band of men and women earned their living spotting bushfires from tiny cabins bolted into the tops of karri trees. CALM's Roger Underwood tells of the foresters who conceived and built the world-famous lookout trees of the karri country.

ALTHOUGH the great lookouts of the karri forest are famous throughout the world, they certainly weren't the first lookouts to be built on trees. According to forestry legend, the first tree lookouts were constructed in Europe for military reasons. In Western Australia, the first treetop lookout was built in a tuart tree in Kings Park, but its purpose was not to spot bushfires. In the days before telegraph and telephone, the Kings Park tree was used to spot ships coming into Fremantle, and the job of the spotter was to make sure that news of this significant event was passed on as quickly as possible to the colonists in the fledgling settlement of Perth, who were always hungry for news of the outside world.

Soon after the turn of the century, when bushfire spotting became an imperative for early foresters and settlers, the first tree lookouts were constructed in the tuart forest at Ludlow and on powderbark ridges in the Dryandra State Forest. One of the latter (the Lol Grey Tree) still exists, and was recently restored by volunteer enthusiasts.

But if you mention tree lookout towers to Western Australians, they will immediately conjure up an image of the Gloucester Tree near Pemberton, the Diamond Tree near Manjimup or the Boorara Tree near Northcliffe. These are the world-famous lookouts of the karri country.

LOOKING FOR FIRE

Fire is a good servant, but it makes a bad enemy. Fire provides warmth and cooks our food; it tempers metals and allows us to make tools and machines; it can be used to clear the bush for crops or pasture, and to regenerate forests. But in the wrong place, fire can kill, destroy, maim or disfigure.

The Aboriginal people of Western Australia used fire to fashion the environment to their advantage. To the first settlers and to early Western Australian foresters, however, fire was basically seen as an enemy. The strategy was one of 'find and destroy'.

But finding a forest fire is not as easy as it sounds, especially if you want to have a good chance to put it out while it is still small. Firefighters have the best chance of success if they can get to a fire in its early stages. 'A little fire is quickly



Wildfire in the Walpole-Nornalup National Park.

Photo - Gerard Van Didden ▲

The aftermath of a fierce forest fire.

Photo - Wade Hughes / Lochman Transparencies ►

Previous page: Dick Sprogue lopping off the crown of a tree selected as a fire-observation tower.

Photo - Published in *Walkabout*, July 1948, photographer unknown. All reasonable steps have been taken to trace the copyright owner.



trodden out,' as Shakespeare says, 'which, being suffer'd, rivers cannot quench.' This is why bushfire lookout systems have been designed to spot the first telltale wisp of smoke above the tree tops.

When foresters first began to install a network of fire lookouts across the forests of the South West, they began in the northern jarrah forest, in the hills east of Perth. Here they found a series of outstanding peaks from which there was a commanding view over the forest. There was no need to climb trees, or construct tall towers. All that was needed was a short wooden structure to support a cabin from which the lookoutman or woman could survey the countryside. Lookouts quickly sprang up on Mt Gungin, Mt Dale, Mt Solus, Mt Wells and many others across the northern jarrah forest.

Down in the karri country, things were a bit different. There were no dominating hills, and karri trees are more than twice as tall as northern jarrah. Besides, climbing karri trees, whose huge trunks soared up to 40 metres before the

first branches, was a rather different kettle of fish to climbing tuarts or powderbark wandoo trees. It was a problem that defied solution for many years.

But the bigger the problem, the better the people who tackle and eventually solve it. Four outstanding men emerged in the karri country in the 1930s, and it was thanks to their vision, skill and courage that the karri lookout trees came about. The men were Dick Sprogue, Jack Watson, Don Stewart and George Reynolds.

DICK SPROGUE

Sprogue was an immigrant timber worker, famous as an axeman and a dare-devil. He was the first to scale to the top of a living karri, which he did by driving in a series of short, pointed wooden stakes to form a crude ladderway straight up the side of the trunk. Once up in the crown he would hoist up his axe and set about lopping off the top of the tree. The purpose of this was often to make the tree easier to fell, or to try to ensure that

when it did fall it did not damage some valued asset in the forest such as a bridge or railway line. Another purpose, perhaps, was to provide an outlet for Sprogue's unique fearlessness and axemanship. Maybe he was also something of a showman ... all the photographs of his exploits show a throng of bushmen watching on!

Sprogue not only showed that it was possible to get to the top of the giant karri trees; he also reported on the stupendous view from up there. The word didn't take long to reach the ears of foresters Watson and Stewart.

JACK WATSON AND DON STEWART

Sometime in the mid-1930s, presumably after a chat with Dick Sprogue and probably after a trip up one of his pegged trees, Jack Watson (a field forester) and Don Stewart (a professional forester not long out of university) conceived the idea of the karri tree lookouts. They put the idea to the test immediately. As a pilot project, a tall marri tree on a ridge west of Manjimup was pegged and a 'crow's nest' built in the branches. According to Stewart, 'the view exceeded all expectations'. The search for tall karri trees as a basis for a lookout network began.

But pegging trees is a long and arduous process. Many days' work could come to naught if the tree was pegged by the Dick Sprogue method, scaled, and then found to be unsatisfactory. So Watson came up with the idea of climbing-irons and ropes. With sharp spikes strapped to the instep

of his boots and ropes around his waist and the tree trunk, Watson was able to 'walk' up the tallest tree and then scramble about in the branches checking its suitability for a lookout. Stewart also mastered this remarkable feat and, between the two of them, dozens of trees were scaled. Eventually those to be converted into lookouts were selected.

GEORGE REYNOLDS

After Watson and Stewart had selected the trees, it became George Reynolds' job to build the lookouts. Reynolds was a forestry worker and an experienced bushman. Like Sprogue, he was a fearless and highly skilled axeman. In a manner far removed from that of the safety-conscious foresters of today, Reynolds could be found swinging his axe high in the top of the karri trees. He disdained the use of safety belts, and his songs and

The modern lookout tower of the Dryandra State Forest, in Western Australia's Wheatbelt.

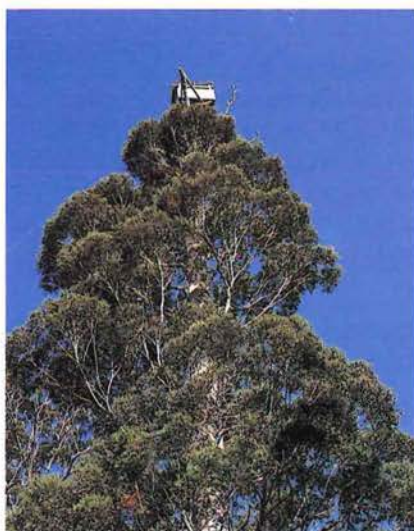
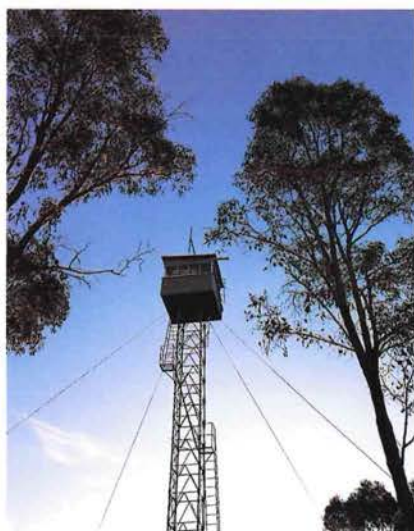
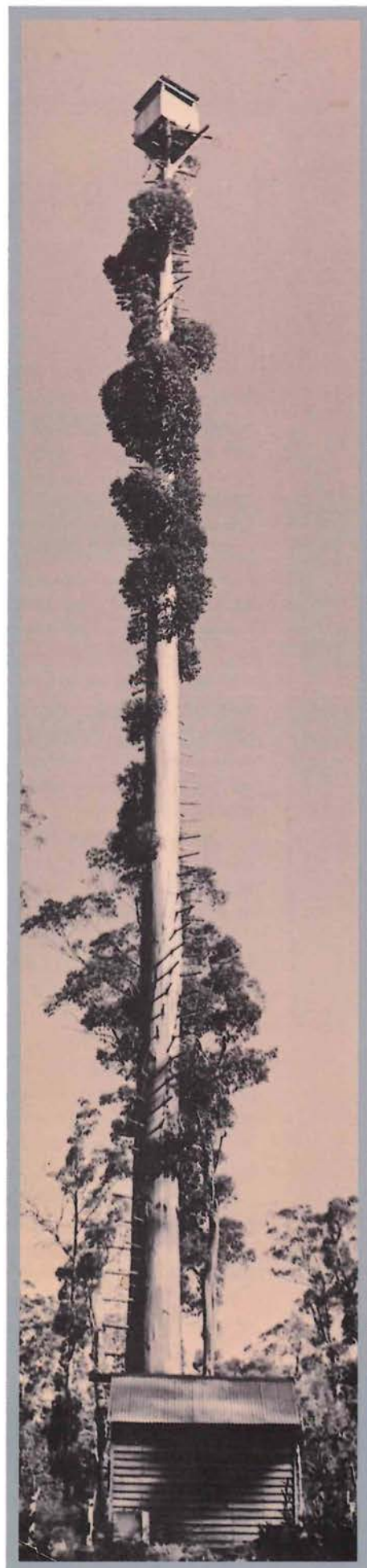
Photo - Marie Lochman ▼

The Boorara Tree lookout was constructed in 1952 and is now a tourist attraction.

Photo - Jiri Lochman ▼

The famous Gloucester Tree, photographed in the early 1950s, is still visited by some 200 000 people each year.

Photo - CALM ►



• TREE-TOP VISITORS •

By J. E. Watson

F. DINNEEN'S story last Saturday of the parakeets heralding the flowering of the karri awakens a memory. Some years ago two foresters traversing the karri country seeking likely heights for the construction of forest fire look-out towers arrived in the East Brook area, close to Pemberton. In the early days of saw-milling, it had been too difficult for bullock teams to haul logs from here, so the virgin karri rose majestically from 10 feet high bracken and hazel to reach leafy arms 200 feet up and more towards blue skies.

It was a place of natural loveliness and peace where stirring leaves only murmured, so far aloft were they, and bird talk was not of earth but made ethereal music.

Searching for a tree that might answer all their requirements they at last found one specimen, more magnificent than its fellows, rising from its native earth, as only karri can - a clean bole to 113 feet, 26 feet in girth, perhaps 250 feet high.

Using a tree-climbing technique he had mastered, one of the foresters commenced the ascent of this tree in order to make observations from its crown and so determine whether or not the site was suitable for the construction of a look-out tower.

As the climber proceeded higher and higher, the tremendous physical effort needed brought out beads of perspiration. This moisture attracted bees, which settled on his arms but did not sting, being intent on other business.

The climber was now well amongst the foliage and here were the parakeets, as the tree was in full flower. Their low

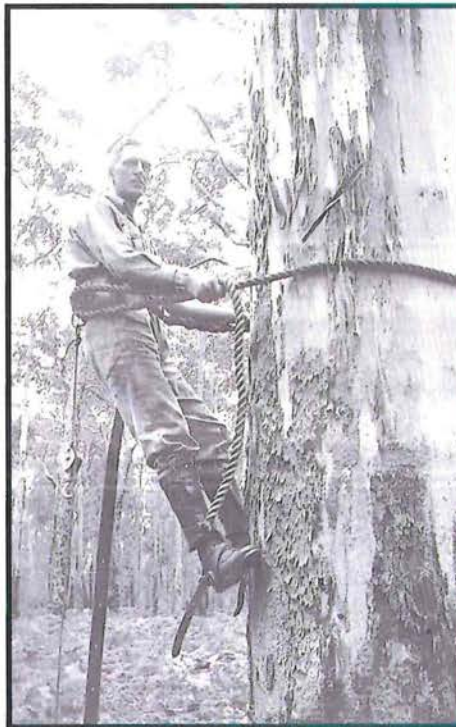
chatter, almost inaudible from the ground, was incessant, with an occasional louder note from the odd twenty-eight parrot.

At 190 feet the climber stopped and made the observations necessary for fire detection. Here, with parakeets within a few feet of him, he noticed that this bird,

perhaps because of the shape of its beak, almost invariably appeared to use its weight to bend the fragile blossoms over so that both they and the parakeet were hanging upside down as it sought the nectar from each flower.

Bees in myriads competed with parakeets and the bull-ant crawled his restless way even at this great height, while scratch marks on the limbs indicated that an opossum had passed that way.

Today this noble tree, shorn of its leafy crown, supports in its huge lopped-off branches a look-out cabin 200 feet from the ground, but its neighbours still have for visitors in the flowering season the parakeets and the bees, while bull-ants and opossums pursue their way up and down smooth karri trunks.



Jack Watson was more than a brave and innovative man - like all foresters, he loved the bush, as this story published in the *West Australian*, c. 1949, shows. Photo - CALM

Reproduced courtesy of the *West Australian*



humorous comments would ring out through the forest as he worked.

Reynolds would construct a lookout as follows. Firstly, he would study the configuration of the branches way above and, working backwards, he would calculate where to install the first peg at ground level. Next, using a two-inch augur he would start hand-drilling holes deep into the tree, and into each hole he would hammer a wooden peg. Clambering up onto the peg, he would drill the next hole and bang in another peg, and so on up the tree. Each peg would be offset so as to make a spiral ladderway up and around the tree's bole. Once the branches were reached, Reynolds would call for his razor-sharp Plumb axe, and prune off the great limbs. Once, during the construction of the Gloucester Tree, a falling limb swept out 15 metres of pegs on the tree bole. Unperturbed, Reynolds camped in the tree crown for several hours while an assistant repegged the damaged section.

The ladderway completed, Reynolds and his mate would rig up a flying fox to hoist up timbers, bolts, roofing iron, nails and windows and build the cabin, bolting the whole structure firmly into the topmost forks.

Between 1939 and 1952, eight karri tree lookouts were constructed: Big Tree, Gardner Tree One, Gardner Tree Two, Diamond Tree, Pemberton Tree,

Gloucester Tree, Beard Tree and Boorara Tree. Eventually the Big Tree, Gardner One and Pemberton Tree were abandoned. The others operated each summer, providing a unique bushfire spotting service for the karri country, until the advent of spotter aircraft in the early 1970s.

THE TREES TODAY

Of the eight original karri tree towers, only three survive - the Gloucester Tree, Boorara Tree and Diamond Tree. Maintenance work has been recommended for the Diamond and Boorara Trees, to preserve as long as possible these features of the forest. Of the three, however, only the Gloucester Tree is still safe to climb.

The Beard Tree became so rotten and dangerous it had to be felled. The Pemberton Tree was also dangerous (it stood at the back door of the old forestry office in Pemberton), and after several efforts to maintain it, it too had to be felled. The Big Tree, by tragic irony, was burnt down in a bushfire some years after it had been abandoned. The Gardner One and Gardner Two Trees both still stand, but the tops were snapped off during severe storms.

The Gloucester Tree was a tourist attraction from the start. Originally called East Tree, it was renamed after a visit to the construction site by the then Governor

Sunrise over the karri forest, taken from the Mt Frankland lookout.

Photo - Jiri Lochman ▲

General of Australia, the Duke of Gloucester. It is still climbed each year by hundreds of intrepid forest visitors. Just as importantly, the tree is still used for fire spotting, as a back-up to the aircraft under certain weather conditions.

There is, however, a brand new lookout tree in the karri country. During 1988, CALM constructed the Bicentennial Tree in the Warren National Park, just south of Pemberton. This superb lookout was constructed using a technique quite different from that of George Reynolds. Instead of lopping off the tree's crown, the cabin has been built into the branches in such a way as to minimise damage to the tree. It is expected that this will prolong the life of the lookout indefinitely, thus providing a fire detection platform in one of our most famous karri forest parks, and a special point of interest for forest visitors. ▣

Roger Underwood worked as a forester in the karri forest for many years, including a stint as a lookoutman on the Gardner Tree.

LANDSCOPE PHOTO COMPETITION

AS you can see from the photographs on this and the next two pages, judging of the *LANDSCOPE* Photographic Competition 1990 (sponsored by Konica cameras and film) was difficult because of the overall high quality of the photographs and the wide range of subject matter.

Some entrants had chosen unusual subjects, while others had chosen more ordinary subjects but dealt with them in an unusual manner.

Wildlife Section winner Frank Young, of Gooseberry Hill, submitted a close-up shot of eucalyptus leaves in autumn sunlight showing the delicate subtlety of shape and form, and a richness of colour.

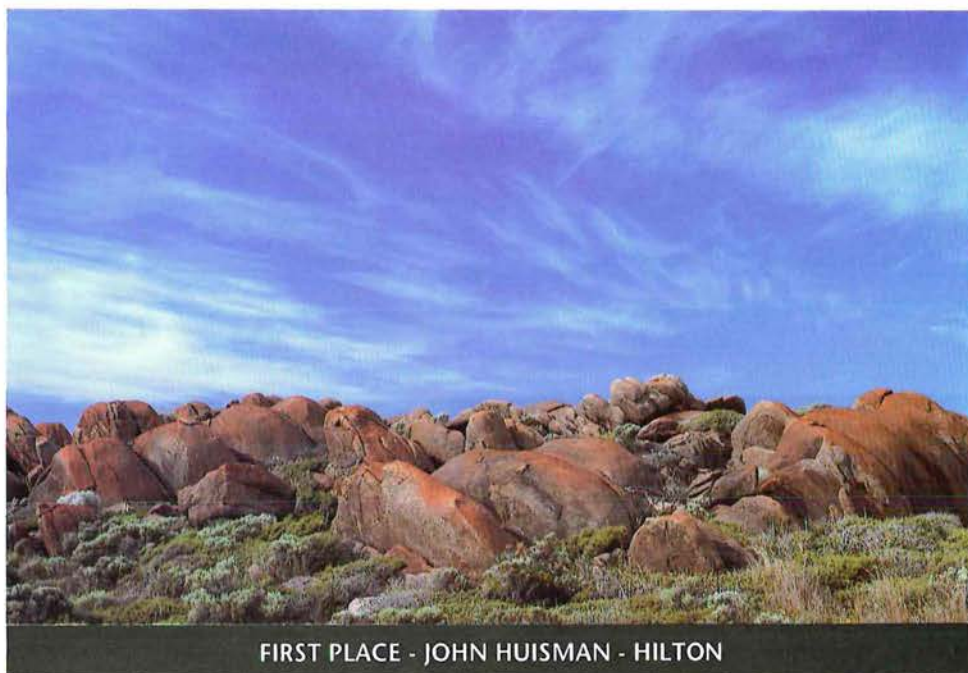
The runner-up in that section, Geoff Rogerson of Denmark, captioned his photograph "Early Birds II"

John Huisman of Hilton, winner of the Landscape Section, chose rock outcrops near Augusta as his subject. What appealed to the judges was the solid and rounded permanence of the old rock formations balanced with the wispy, delicate, ephemeral nature of the clouds.

Runner-up Noel Ryan, of Bicton, chose the rich browns, ochres and reds of Mount Augusta for the subject of his shot.

The winners in each section will receive a Konica A4, the world's smallest fully automatic 35mm compact camera, and the runners-up will receive Konica MT-100 fully automatic 35mm compact cameras. In addition, the winning photographs, together with the other runner-up entries shown here, will be enlarged and put on display at the R&I Bank, Barrack Street, Perth between 4 and 8 February.

The panel of judges comprised David Tanner (Pictorial Editor from *The West Australian*), David Mack (State Manager of Konica), Ron Kawalilak (Managing Editor, *LANDSCOPE*), and Stacey Strickland (graphic designer, *LANDSCOPE*). □



FIRST PLACE - JOHN HUISMAN - HILTON



STEVE BLOWERS - HILLARYS



FRED HORT - SWAN VIEW



NIGEL TIMPERLEY - EDGEWATER



JOHN QUILTY - WARNBRO

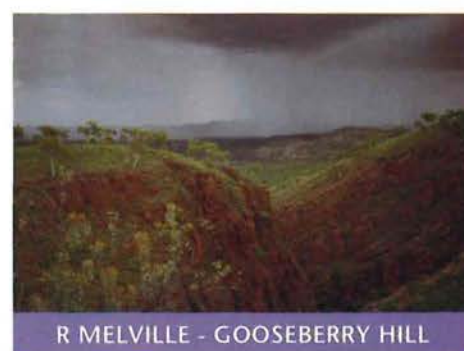
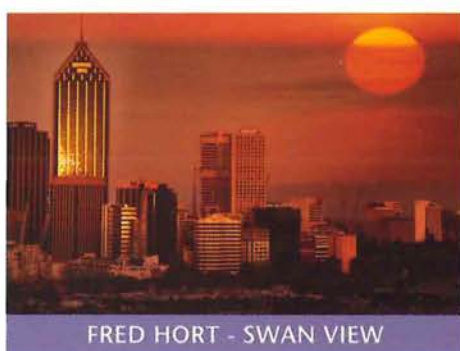
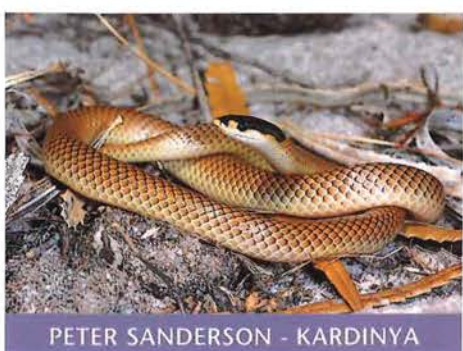
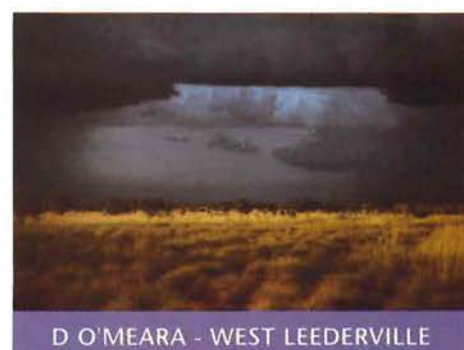
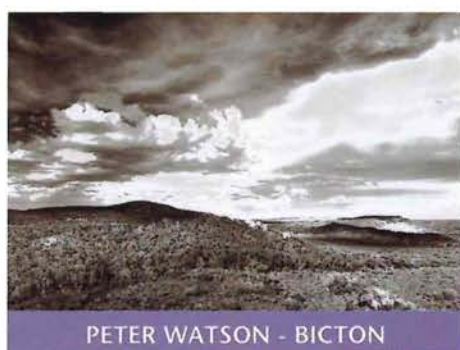
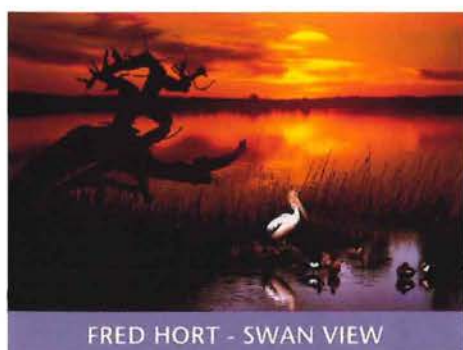
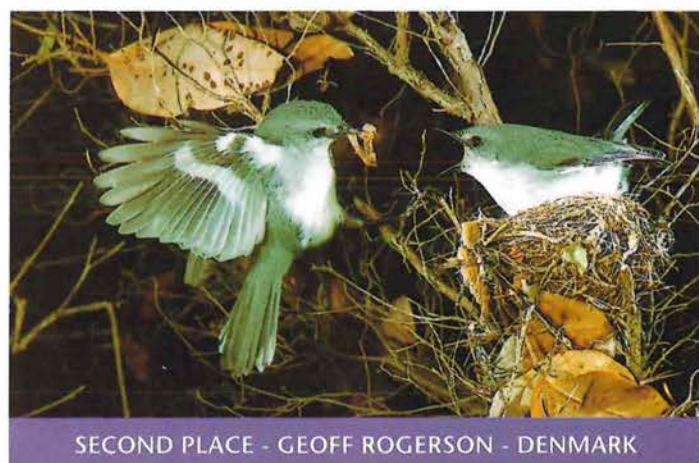
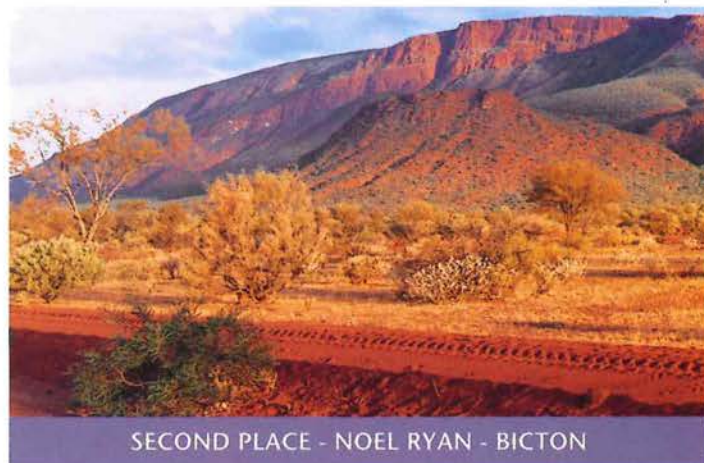


PAUL BLAKE - NEDLANDS



LESLEY ROBERTS - LEDA

LANDSCOPE PHOTO COMPETITION



LANDSCOPE PHOTO COMPETITION



H FERMANER - HAMILTON HILL



FRED HORT - SWAN VIEW



D O'MEARA - WEST LEEDERVILLE



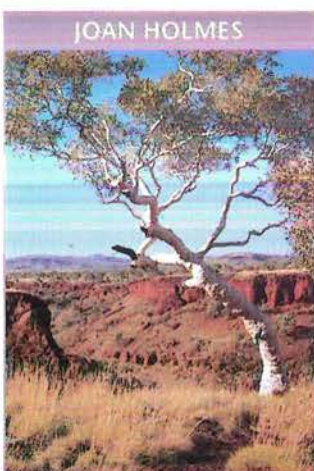
NOEL RYAN - BICTON



D O'MEARA - WEST LEEDERVILLE

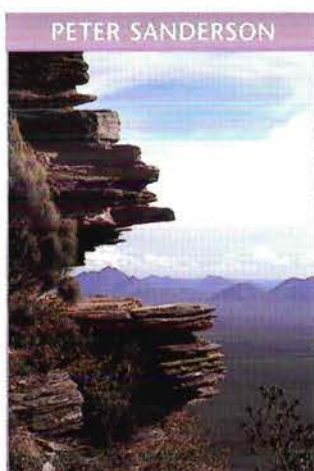


F YOUNG - GOOSEBERRY HILL



JOAN HOLMES

NEWMAN



PETER SANDERSON

KARDINYA



NIGEL TIMPERLEY

EDGEWATER



JON PRIDHAM

SOUTHLAKE



REX COTCHIN

WEST LEEDERVILLE



CHRIS BURTON

MT HAWTHORN



GEOFF ROGERSON

DENMARK



BARBARA MADDEN

ALBANY

E · U · C · A · L · Y · P · T



E · M · I · G · R · A · N · T · S

Until the 1970s, seed from Goldfields eucalypts enjoyed a warm welcome in arid climes throughout the world.

IAN KEALLEY

unearthed the story of how they were collected and exported.

THE baked land around Kalgoorlie is dampened each year by a mere 250 mm of rainfall - not much more than a few thimblefuls of moisture. Yet 65 endemic eucalypt species survive there, clinging to the arid landscape in a range of landforms and habitats. Nowhere else in the world do woodlands exist in such low rainfall.

A marked lack of thirst is not the only characteristic that endears Goldfields eucalypts to the inhabitants of arid countries. The trees are used for ornamental planting, timber production, rehabilitation and reafforestation. This range of qualities generated national as well as international demand for Goldfields seed.

It certainly helps to explain the enthusiasm with which certain dry countries received seed from Goldfields



eucalypts for more than thirty years after the Second World War. These genetically diverse species produced hundreds of kilograms of seed, exported to grow into millions of trees which are now thriving in the low rainfall areas of other countries. The seed made a success of afforestation projects in countries like Portugal, Morocco, Israel, South Africa, Pakistan and Argentina.

Those plantings have continued to prosper over the years. In some places, the local people even think the eucalypts are native to their own lands. Such is the trees' success that their adopted countries

can grow and collect their own seed, and there is no longer a large overseas demand for the original Goldfields stock. Seed is still collected around Kalgoorlie, and some still goes overseas for afforestation projects, but the quantities are much smaller.

AS OLD AS FORESTRY

Collecting seed is as old as forestry itself. Forestry staff of the Department of Conservation and Land Management (CALM) consider it to be just part of the job, and until recently most were unaware of the history of seed collection in the Goldfields and of the seed's final destination.

It took an unusual request from the Premier's office in May 1989 for staff at CALM's Kalgoorlie office to become aware of this history. The Premier was to give a speech in Israel marking the anniversary of a major reafforestation exercise using many Australian eucalypts, mainly species from the Goldfields, and needed details to prepare the speech. CALM officers began delving into the old Forests Department archives to find out how much seed of what species was collected by the Forests Department in Kalgoorlie from 1950 to 1970, for export to Israel, Morocco and other countries.

Archives in Kalgoorlie show that by 1930 there was increasing interest in the eucalypts of the arid interior, promoted by the Forests Department and the Forests and Timber Bureau in Canberra. In the 1940s a forestry nursery was established in Kalgoorlie. After the war, between 1945 and 1957, the Forests Department exported a remarkable 112 kg of bulk seed and 1205 packets of seed from 80 eucalypt species to 48 countries. During this time, seed collection requirements



Photo - previous page.
Lemon-flowered gum (*Eucalyptus woodwardii*). A widely planted ornamental with a restricted natural range near Karonie (140km east of Kalgoorlie).
Photo - Jiri Lochman

The spectacular coral gum (*Eucalyptus torquata*), which occurs on hills from Coolgardie to Norseman.
Photo - Kerry Cook ▲ ▲

Seed extracted and sieved from rib-fruited mallee (*Eucalyptus corrugata*), collected near Koolyanobbing.
Photo - Ian Kealley ◀



Gimlet (*Eucalyptus salubris*) woodland with saltbush (*Atriplex* sp.) understorey near Lake Cowan, south of Kambalda.
Photo - Ian Kealley ◀

Early clearfelling on the Goldfields woodlines providing fuel and mining timber to Kalgoorlie-Boulder.
Photo - courtesy Battye Library ▼▼

were steadily increasing. From 1950 to 1968, the Kalgoorlie office supplied a huge 725 kg of seed, most of which filled orders from the Forests Research Station at Rabat in Morocco.

The United Nations Food and Agricultural Organisation (UNFAO) conducted a forestry tour through the Goldfields in 1953 which resulted in a large increase in demand for seed from Mediterranean countries. In some years, up to 20 kg of seed from one species was supplied. Supply peaked in 1956 with 76 kg collected, and again in 1967 when 59 kg was collected. Collection slowed in the 1970s, and it was only in 1983 and 1984, when foresters collected 56 kg to satisfy seed store orders, that it rose again.

GATHERING STOCK

Today CALM Goldfields staff still collect seed to satisfy orders received at the Department's seed store. They also ensure that commercial collectors are operating correctly. Seed is collected as the opportunity arises, whenever there are sufficient quantities of ripe capsules. Capsules are removed or pruned from branches in a way that minimises damage to parent trees, and are then spread onto calico sheets to dry.

When the capsules have opened, seed is separated by shaking and sieving. The seed is then stored under controlled conditions in the seed store. Once it has been tested to determine the number of live seeds per gram, the seed is sold - to be used in nurseries, or in direct seeding for reafforestation and rehabilitation throughout the world.



SEEDS LIKE DUST

As eucalypts have fine seed - yielding up to 1000 seeds per gram - collecting was not an easy task. Seed had to be extracted from capsules collected from trees by hand - some from firewood cutting areas, others from trees deemed suitable that were subsequently felled or pruned.

The seed within each capsule is like dust, so to get half a kilogram of seed was quite an effort. Foresters used to try to get as much seed as possible from areas where the timber cutters were operating, so as not to destroy standing trees in the bush.

There was a particularly high demand for seed from species such as salmon gum (*Eucalyptus salmonophloia*), Dundas mahogany (*E. brockwayii*) and coral gum (*E. torquata*). Of these, Dundas mahogany, a beautiful quick-growing tree with excellent timber, which is restricted to an area within a 25-kilometre radius of Norseman, was the most popular. Other species high in demand included gimlet

(*E. salubris*), Strickland's gum (*E. stricklandii*), and to a lesser extent Dundas blackbutt (*E. dundasii*), merritt (*E. flocktoniae*) and lemon-flowered gum (*E. woodwardii*).

One of the people involved in the original project, retired forester Bill Brennan, has seen the success of the Goldfields eucalypt seed at first hand. Bill began his career as an assistant forester in Kalgoorlie in 1949, and handled much of the seed before the beginning of its journey. He, and sometimes another worker, would go out collecting seed in the bush, often combining this work with inspections of timber-cutting operations. While recently travelling on holiday overseas, Bill Brennan was able to observe the results of the program: the mature eucalypt trees grown on foreign soil from WA seed. When he visited Morocco, for example, he saw plantings of Dundas mahogany that have grown well and were a feature in the catchment areas of dams.

"The plantings overseas were very successful," he said. "I've been through Spain, Portugal and Italy, and our trees are all over the place. In Spain, river red gum (*E. camaldulensis*) is so widely planted that the locals believe that it's a Spanish tree."

No emigration project can be more successful than that.◻

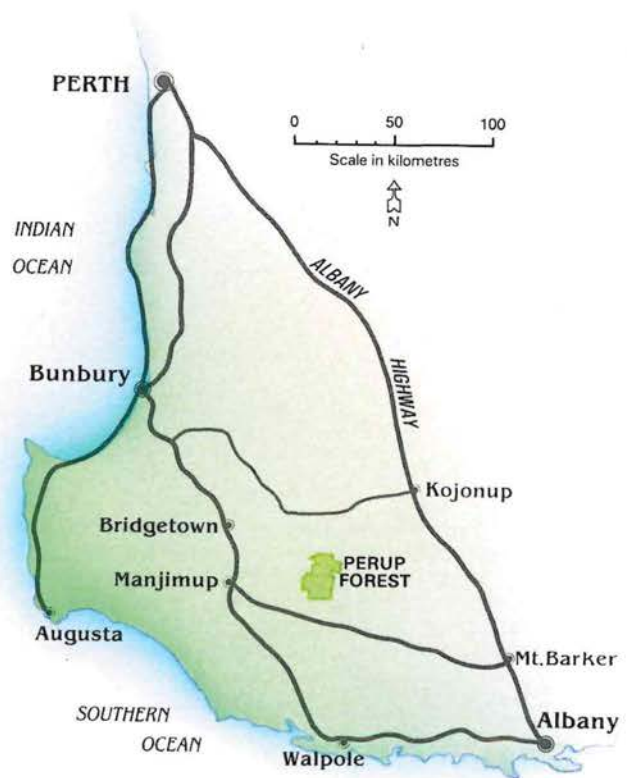
Ian Kealley, CALM Goldfields Regional Manager, has a strong interest in eucalypts of the WA interior. He can be contacted at Kalgoorlie on (090) 212 677.

A Wild Weekend

by Carolyn Thomson

As well as boasting fine jarrah forest and wandoo woodland, the Perup forest east of Manjimup contains more native mammals than any similar-sized area in the South West. Animals of six threatened species live in the forest, including one of the largest populations of woylies. Perup's exceptional value will soon be officially recognised: it is about to be declared a nature reserve. But Perup has something else that makes it special. Here, research scientists run regular weekend courses that are taking conservation to the people.





THE Perup Forest lies 50 kilometres from Manjimup between the headwaters of the Perup and Tone Rivers, tributaries of the Warren River. It is situated in undulating country, with broad, flat valleys and low ridges. The rainfall is low and streams and swamps in the area are seasonal.

Like most of the South West jarrah forests, the Perup forest has been harvested for commercial timber. The area was first harvested during the early 1940s; logging and regeneration continued up until 1976. At that time 40 000 hectares of jarrah forest and wandoo woodland were set aside to study and manage forest animals.

Part of the area was once a cleared farm surrounded by State forest, a fact put to good use when the farm was abandoned in 1972. At that time the Forests Department was starting work on fauna, so the area was acquired for research into the effect of fire on forest animals. Much of the early research on the numbat was done here, and it was as a result of other research at Perup that the fox was first implicated in the disappearance of a number of mammals from many areas of the South West.

The area also has many rich fauna populations, including six threatened animal species: the numbat, woylie, tammar wallaby, western ringtail possum, southern brown bandicoot, and the chuditch, or native cat. These populations are regularly monitored to ensure they are maintained at a satisfactory level. Many species have been recorded in the area: birds (more than 120), some mammals (21) and frogs (6). Reptiles, notably the deadly tiger snake, are also visibly abundant.

As CALM staff began spending more and more time in the area, they decided to establish a research centre at Perup. The old farmhouse was ideal for this purpose, and the researchers began renovating the building to make it suitable for a study centre. Over time, additions were made and it is now an excellent facility capable of accommodating sizable groups.

The centre even has its own resident fauna - bandicoots live under the house and a brushtail possum lives in the old wood stove. If the lid of the stove isn't properly secured, scientists using the house can find that the animal has had an overnight party with their food.

A male splendid fairy-wren in full breeding plumage.
Photo - Jiri Lochman ▲

The jarrah forest is one of the last strongholds of the chuditch.
Photo - Michael Morcombe ◀

FACE TO FACE WITH WILDLIFE

Researchers Per Christensen and Graeme Liddelow had long been running a course for staff of CALM, and earlier for the Forests Department, to illustrate the Department's research methods. They were asked to include the course on the University of Western Australia's Extension Program. Per and Graeme readily agreed and now, four times a year, a varied group of people make the long journey from Perth to Perup.

The course, called 'A Wild Weekend with CALM', aims to bring people face to face with wildlife they wouldn't otherwise see, and teach them about research into the forest and its inhabitants. Proceeds from the course help to maintain the Perup Forest Ecology Centre, as it is now called.



Each night, course participants are taken 'spotlighting' for nocturnal animals. Possums, including the threatened ringtail, are abundant; so are kangaroos, bandicoots and nocturnal birds like the tawny frogmouth. At some times of the year many possums have young and, as the vehicle moves off, the youngsters can often be seen clambering onto their mother's back. Spotlighting is the main source of data for animals like the ringtail possum, which is difficult to trap. It is also a good way to learn how to recognise the various species and their habits.

The woylie, or brush-tailed bettong, occurs throughout most of the forest area. Its population is still substantial at Perup, despite predation by the fox. Because the woylie is nocturnal, a trapline has to be set up by Graeme Liddelow the night before. While he and Per take each animal from the trap the following morning, they show how to collect data about the woylies and how to tag them.

Another highlight of the weekend course is a visit to the melaleuca thickets, home of tammar wallabies. The tammar needs dense low scrub for daytime shelter and open grassy areas for feeding. It does not leave the scrub until after dark.

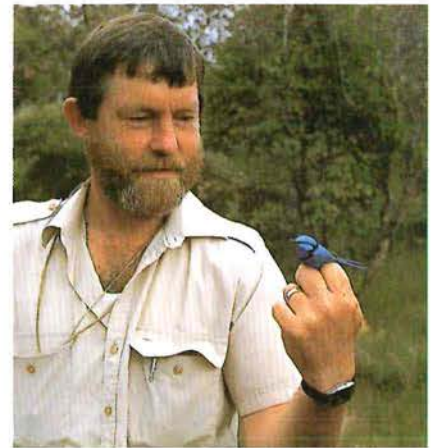
Students are also shown research techniques used to document the birds that frequent Perup. Birds are caught in

mist-nets. Researchers then record the species of each bird, take their measurements and band them. These techniques yield valuable information about bird movements after forest disturbances such as fire or, in other areas, logging.

On the morning of the final day Per Christensen gives a presentation about fire ecology and research being done on the effects of fire. As well as being able to predict the effects of prescribed fire on plants and animals, the information gleaned from the research has allowed CALM scientists to formulate fire management plans which benefit the species of the area. They have found, for instance, that hot autumn burns are needed to regenerate the melaleuca or heartleaf thickets needed by the tammar for cover, knowledge that has changed the fire management of the area.

The Perup course and the researchers who run it are doing something positive about conservation. The data collected by participants contributes to the long-term study of animals and plant populations of the area.

This spring a new course specialising in the flora of WA's southern forests was added to the University Extension program. It was an instant success and is destined to become an annual event. A



Students on the Perup course go spotlighting for animals such as this ringtail possum and her youngster.
Photo - Michael Morcombe ◀

CALM researcher Graeme Liddelow with one of the birds caught in a mist-net.
Photo - Carolyn Thomson ▲▲

The jarrah forest of Perup is a haven for six threatened mammal species.
Photo - Jiri Lochman ▲

course specialising in birds is planned for the autumn program. CALM is also looking at other ways of extending the program. □

Carolyn Thomson is a communications officer with CALM's Public Affairs Branch. She can be contacted on (09) 389 8644.



turning the tide



*Eight bottlenose dolphins
are once again enjoying
freedom, after becoming
trapped in a shallow lake
near Mandurah.*



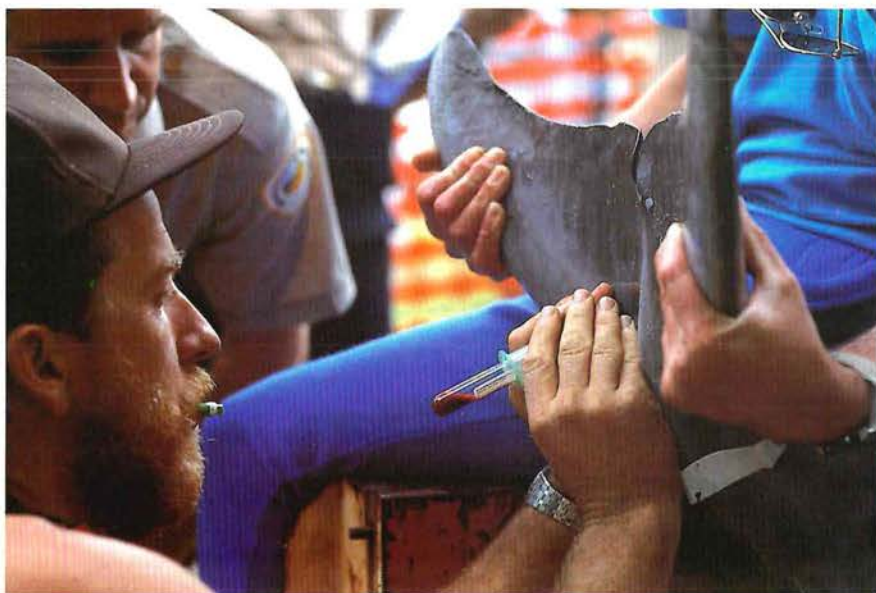
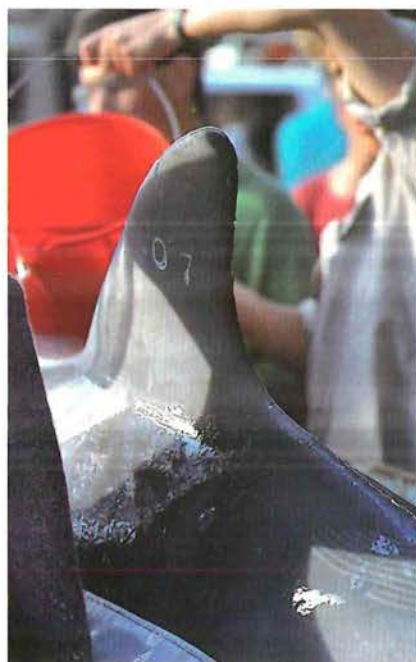


THE dolphins, from a pod that inhabits Peel Inlet, had swum up the Serpentine River into Lake Goegrup. They probably became trapped when the tide receded, after they entered the lake on a high tide while chasing fish.

Canoeists in the area alerted the Department of Conservation and Land Management (CALM) during the Queen's Birthday long weekend. Wildlife Officer Lyle Gilbert found eight dolphins swimming strongly in a pocket of deeper water, but the rest of the lake was so shallow that they were unable to leave it without help. Two more had already died after becoming trapped in the lake and the same fate was likely to befall the eight still alive.

The next day, rescuers swung into action. At about 11 am a human chain of CALM staff and Greenpeace volunteers herded the dolphins into a shallow part of the lake, where they were easily captured by hand. Each dolphin was temporarily tagged, numbered, measured and sexed. They were all adult males, ranging from four to eight years of age.

The dolphins were next transferred to vehicles in specially made slings and taken to a control point, where veterinarian Nick Gales checked their condition and took blood samples. The samples were later analysed to see if the animals were dehydrated or had abnormal levels of hormones or enzymes in their



The dolphins were loaded onto a truck and given a thorough medical check before their release.

Photo - Robert Garvey ▲▲

Children had a chance to participate in active conservation, while CALM officers made sure they weren't injured.

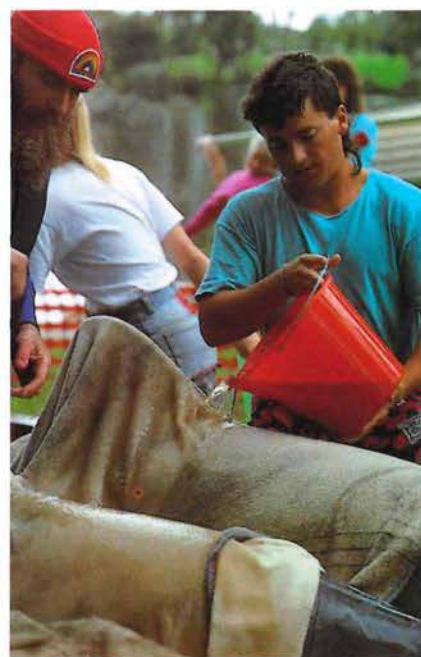
Photo - Robert Garvey ◀▲

The dolphins were freeze-branded (a painless process) to make them easy to identify in the wild.

Photo - Robert Garvey ▲

CALM's consultant vet takes a blood sample from a major vein in the tail.

Photo - Robert Garvey ◀



blood due to stress. The Goegrup dolphins were later found to be in good health and showed only moderate stress.

CALM wildlife officers also freeze-branded the animals by immersing a brand in liquid nitrogen and holding it against the dolphins' skin - a painless process. The marks should remain for over 20 years, making it possible to identify any animals that are resighted or restranded, giving valuable information on how long they survive and whether they are behaving in a normal way.

After being branded, the dolphins were moved overland and, by 6 pm that evening, had been released into the Mandurah Estuary. They were in good condition and seemed to have handled their ordeal well, swimming off strongly. The dolphins appeared to rejoice at their new-found freedom, leaping and frolicking playfully as they moved down the estuary. Rescuers were optimistic that they would survive.

The next day, three more dolphins were found trapped along nearby rivers, probably as a result of the same high tide. One animal along the Murray River was caught and released into the estuary by wildlife officers.

Well-meaning onlookers carried the other two dolphins in the Serpentine River across a sandbar to freedom. However, damage can be done if members of the public take action without CALM supervision. Handling a dolphin the wrong



way can cause it distress, and even damage the tissue or internal organs. During supervised rescues, great care is taken to carry the animals gently in a sling, clear of any snags, as they could become vulnerable to infection if the skin is broken.

And many people don't realise that dolphins, which can weigh up to 180 kilograms, are powerful animals - the rescuers themselves could have been hit by the animal's tail, or bitten.

However, all turned out well, and the original pod of eight dolphins, now highly visible with their new brands, have since been seen feeding and frolicking in the Murray River and Peel Inlet. □

CALM staff and volunteers held the rescued dolphins in the water so as to release the whole pod at once.

Photo - Jiri Lochman ▲◀

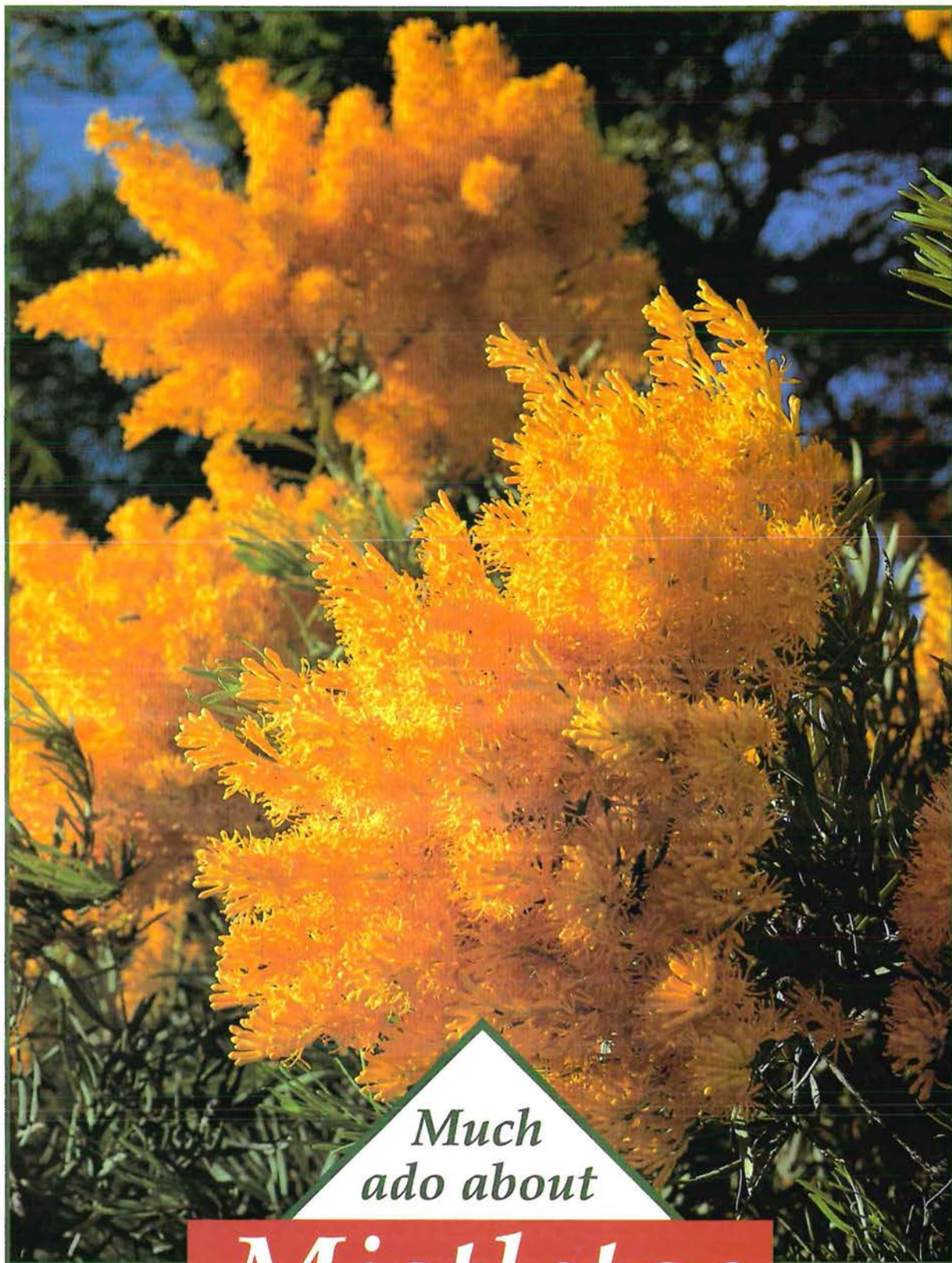
Volunteers helped to keep the animals wet and comfortable.

Photo - Robert Garvey ▲▲

There were smiles all round as the pod swam free in the Mandurah estuary.

Photo - Robert Garvey ▲





*Much
ado about*

Mistletoe

by Tony Start

***What do mistletoes
mean to you?***

*To many gardeners they are
parasitic pests. To romantics, being
caught under the mistletoe is an excuse*

*for a kiss. And to kids in
the know, a fruiting mistletoe
is a source of good tucker. To
naturalists, however, they have many
other fascinating facets.*



AROUND Christmas time, the bushland and even some of the paddocks of south-western Australia glow with the brilliant orange flowers that smother our Christmas trees. There are no other trees quite like them, so it may come as a surprise to discover that they, like mistletoes, are members of the family Loranthaceae.

The flower structure proves the relationship, but there are other similarities. For example, the Western Australian Christmas tree is semi-parasitic, like all mistletoes. Yet Christmas trees differ from true mistletoes: they tap into the roots of their host plants (grasses, shrubs and trees), whereas mistletoes are stem parasites, growing on the branches of their hosts.

Botanists also recognise another family of mistletoe, the Viscaceae. This is the family to which the British mistletoe (the one to be caught under) belongs. There are a few representatives of that family in this State, but they are generally uncommon and not particularly attractive. In Western Australia, most mistletoes belong to the family Loranthaceae.

Like other plants, mistletoe starts life as a seed. However, a mistletoe seed (unlike that of the Christmas tree) has a problem that few other seeds face: it has to be 'planted' on a branch in the canopy

of a suitable host, often at the top of a tall tree. To attain this it needs air transport and suction pads. Its answer? Birds - and glue.

Each flower has an ovary containing one ovule. The fertilised ovule develops into a seed coated with a mucilaginous pulp. The inner layers of the pulp are sticky and resist digestion, but the outer layers contain sweet sugars that are palatable to its avian carriers and easily digested. The glue-coated seed is enveloped in a thin skin which is usually brightly coloured, commonly red or pink, to attract the attention of birds.

THE MISTLETOE BIRD

Most parts of the world have birds that specialise on a diet of mistletoe berries. In Australia ours is, appropriately enough, called the mistletoe bird. It is a tiny black and white bird. Males have a brilliant crimson breast; females are a little more subdued. It is the only Australian member of a family that is much better represented in South East Asia; its relatives there are known as flower peckers, though at least one of them feeds on mistletoe berries.

Mistletoe birds are common, particularly around fruiting mistletoes. Although small and unobtrusive, they draw attention to themselves with short,

A female mistletoe bird feeds berries to her young in the nest.

Photo - Babs and Bert Wells ▲

Opposite page: Western Australian Christmas trees light up the bushland in early summer.

Photo - Bert Wells

sharp calls. What's more, they are tame and easy to watch as they feed.

When a mistletoe bird squeezes a ripe berry in its bill the skin splits, popping out the sugar-coated seed. The bird swallows the seed, but leaves the empty skin on the plant. The nutritious part of the pulp is rapidly digested, but the sticky inner layer remains intact, ready to glue the seed to a branch when it passes through the bird. A bird will often sit lengthways on a branch to excrete and even wipe its bottom on it. While the bird is merely seeing to its comfort needs, the action attaches the seed to a branch.

A seed, once divested of its outer covering, germinates almost immediately. The first visible development is a lengthening of the radical (the incipient 'root'), seen as a red or green projection that curves towards whatever the seed is stuck to.



A careful search of the host's branches near a fruiting mistletoe will usually reveal germinating seeds, but you can watch this stage by bringing home some ripe mistletoe berries and squeezing the seeds onto the window sill. Children are happy to suck the sweet outer pulp off them first, revealing the sticky inner layer which can't be licked off.

There is no guarantee that the mistletoe bird will 'plant' the seed on the right-sized branch of an acceptable host. If the host is incompatible, the seed will not tap in. If the branch is of the right species but too large, its bark may be too thick for the root to penetrate; if the twig is too small, it may not be able to support the young mistletoe. Many seeds are thus doomed to failure.

If the host plant is suitable, the root will pierce the bark and start to form a woody structure called the haustorium. This attaches the maturing plant to its host, and forms an interface between the tissues of the two plants. A shoot develops, and a new mistletoe is on its way.

In due course, the plant will produce flowers. Mistletoes flower profusely and the flowers of many species are bright



red to attract birds. Honeyeaters are particularly partial to mistletoe flowers. They pollinate the plant while probing for nectar, and the cycle starts again.

CLINGING TO A HOST

Mistletoes grow on a bewildering array of hosts. Some species grow on tall trees, some on shrubs; some tropical species even confine themselves to mangroves. It is not uncommon to find one species of mistletoe growing on another!

Individual species vary in their fidelity to particular hosts. Some Western Australian species grow on shrubs, and are particularly vulnerable to fire, so cannot afford to be fussy about their choice of host.

The mistletoe *Lysiana casuarinae*, for example, is common along a 200-metre stretch of road in Hamersley Range National Park. The country is dominated by spinifex. Old charred stumps show that it is burnt from time to time. The mistletoe grows on nine host species from five families, including various acacias, cassias, a *Gossypium* (related to hibiscus) and even a perennial mulla-



The bright colour of *Lysiana casuarinae* seeds attracts mistletoe birds.

Photo - Tony Start ◀◀

The brilliantly coloured, male mistletoe birds help at the nest.

Photo - Bert Wells ◀

Stripped of their outer coating, and stuck to a branch, mistletoe seeds germinate rapidly.

Photo - Bert Wells ▲

mulla (*Ptilotus rotundifolius*)! Few of the hosts are taller than two metres; some, like the *Ptilotus*, are no more than 50 centimetres high.

In fire-prone communities, most plants have survival strategies. Some resprout from root stock, some store seed in the soil, and so on. However, mistletoes growing on plants that are burnt must recolonise from unburnt areas. Mistletoe birds must carry the seeds from unburnt vegetation and deposit them on the branches of regenerating host shrubs. In these conditions, it is in a mistletoe's interests to use as many host species as possible.

On the other hand, some mistletoes are quite fastidious. Those that grow in the crowns of tall trees escape all but the worst wildfires; and like those that grow on hosts living in communities that seldom burn, such as mangroves, they can afford to specialise.

In these circumstances, there are a few choosy mistletoes specific to one host species, and the distribution of the mistletoe is confined to that of its host. More commonly, mistletoes are confined to members of a genus or a family, allowing for some flexibility in the range of vegetation that they can exploit.

Amyema miquelii is a good example. It forms large, pendulous masses up to



two metres or more, and grows on many eucalypt species. At some times of the year the leaves turn a beautiful coppery colour, making the plant visible from afar. At other times the leaves are as green as the host's.

It occurs across most of the State, from the deep South West to the Kimberley. But none of its host eucalypts has such a wide distribution, so it uses different hosts. Near Perth it is common on marri; in the Wheatbelt, on wandoo; on the desert fringes, on Kingsmill's mallee; and in the Pilbara on snappy gums. Sometimes it can be found on two or more hosts in one area, but it usually grows on just one of the available eucalypts at any one site.

OTHER ASPECTS OF MISTLETOES

We tend to think that mistletoes, because they are parasites, must be bad. There is little basis for this notion, at least in Western Australia. We have already seen that the mistletoe bird depends on them (and vice versa). They are also a source of food for many honeyeaters. But what of their hosts and other organisms?

Mistletoes depend on their hosts for water and mineral supplies taken up from the soil through the host's roots. But the benefits are not all one way. There is evidence that mistletoes transfer some of the products of photosynthesis to their hosts.

If a host plant is severely stressed, as in drought, it can rid itself of mistletoes simply by dropping the branches on which the parasites live. One sometimes sees a plant that is almost subsumed by mistletoes, but this is rare. It may be that the plant was already weak, especially if its neighbour is little affected.

Cases of mistletoes taking over a host plant are rare in nature. Injurious levels of infestation are almost always associated with artificially modified environments. For example, infestations can sometimes be seen beside roads, where the only remaining hosts are confined to narrow corridors on the road verges. Even here, it is rare to find more than a few of the potential hosts with excessive parasitic loads.

Colonisation by Europeans has affected mistletoes in many ways. Some of these, such as the direct consequences

of clearing, are obvious. Others are more subtle and poorly understood. For example, since Aboriginal people abandoned traditional burning practices in the deserts, the areas burnt in summer fires have increased manyfold (see *LANDSCOPE*, Autumn 1990). This must have some effect on the populations of those species that have to recolonise after fire. Does this in turn affect the animals associated with the mistletoes? Is there a flow-on to other species with which they are associated?

European colonisation has not been all bad for the mistletoes. *Amyema preissii*, for example, grows from the North West Cape to the South West, but appears to be uncommon on indigenous hosts in most parts of the metropolitan area. However, some of the acacias from the eastern States planted in gardens have proved to be excellent hosts for this mistletoe.

As a result, the mistletoe bird is probably much more common in our suburbs than it would otherwise have been. It also means that the same garden plant can provide us with a spectacular show of yellow flowers in winter and spring, and a magnificent display of red mistletoe flowers in summer.

TANGLED WEB

Mistletoes associate with organisms other than hosts. Birds are one example, and there are many other ecological

interactions that we know little about. For example, mistletoes provide a feeding ground for the larval stages of many insects, including some of Australia's most brilliantly coloured butterflies. Again, some mistletoes with green flowers are apparently pollinated by wasps. What other ecological interactions depend on these insects? As yet we don't know.

Mistletoe biology is fascinating. These parasites tap their hosts for some of their needs, yet they are in turn providers; thus they form an exquisitely adapted strand in the complex web of nature. What's more, they can give great pleasure, not only because of their often brilliant flowers, or the birds and insects that live with them, but also because they help us towards a deeper appreciation of nature as we discover the strategies they have devised for life amid the tree tops. □

Tony Start is a Principal Research Scientist at CALM's Wildlife Research Centre at Woodvale. He can be contacted on (09) 405 5100.

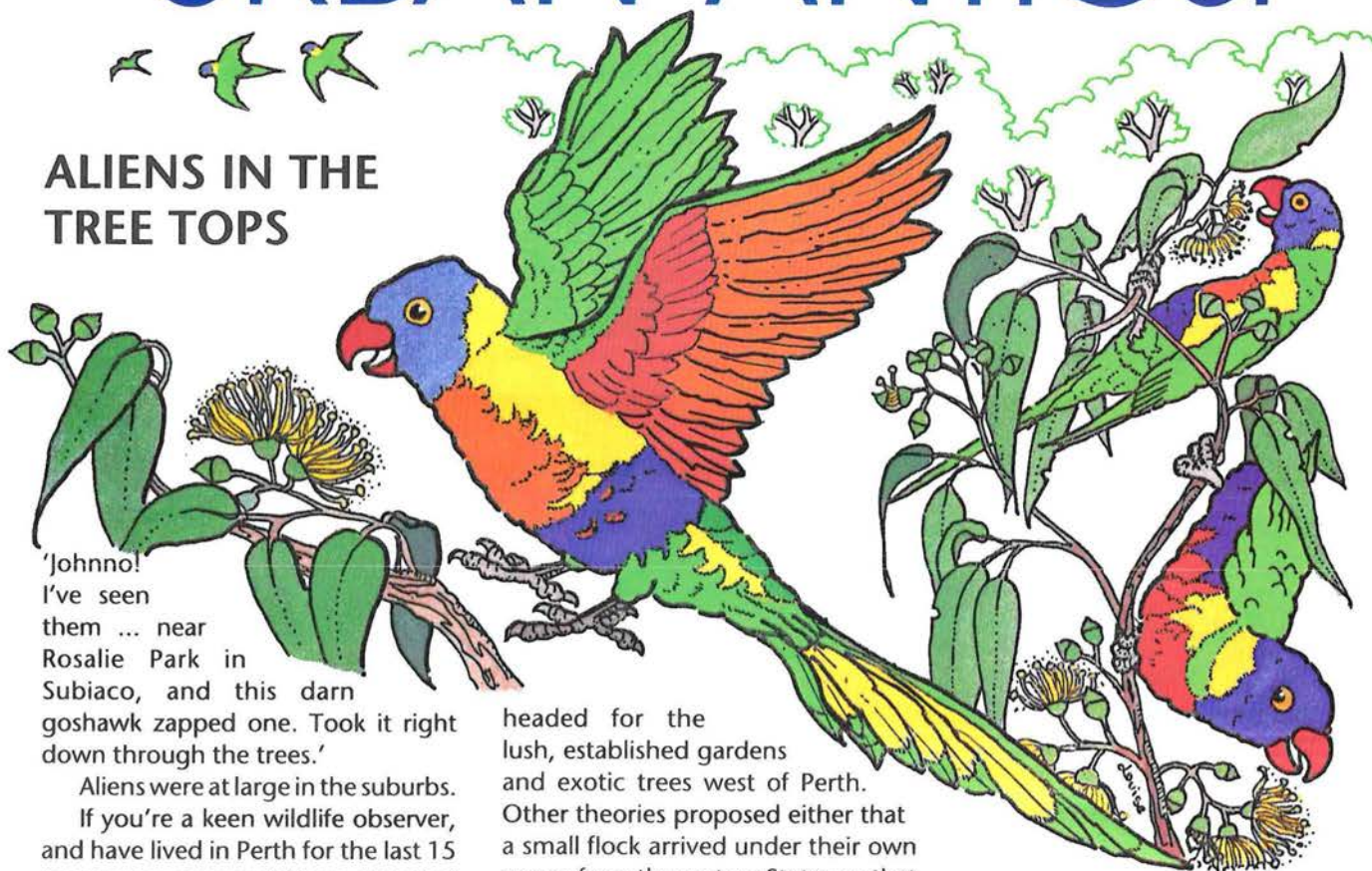
Facing page: The brightly coloured flowers of *Lysiana casuarinae* attract pollinating birds.
Photo - Tony Start ◀◀

The larvae of many insects feed on mistletoe leaves.
Photo - Tony Start ▼



URBAN ANTICS!

ALIENS IN THE TREE TOPS



'Johnno! I've seen them ... near Rosalie Park in Subiaco, and this darn goshawk zapped one. Took it right down through the trees.'

Aliens were at large in the suburbs. If you're a keen wildlife observer, and have lived in Perth for the last 15 years or so, you would have detected the arrival of an alien species - the rainbow lorikeet.

The rainbow lorikeet (*Trichoglossus haematodus*), or Blue Mountain parrot, was traditionally an inhabitant of the wooded and coastal areas of eastern Australia. The striking plumage of bluish-purple, red-orange and dark green, leaves no doubt as to its identification. It flies very high, congregating in small hurtling flocks, attracting attention with thin piercing shrieks. The swiftly beating wings and quick body movements are emphasised by tapering swept wings and a pointed tail.

In *The Noah's Ark Syndrome*, author C.F.H. Jenkins states that in 1960 aviaries of rare parrots were established on Rottnest Island, with the purpose of future release and eventual establishment. Scientists and conservationists vigorously opposed the scheme and it was ultimately abandoned, but not before some unofficial releases. Dorothy Payne, editor of the *Western Australian Avicultural Magazine*, thinks that a storm up-ended the aviaries and the lorikeets

headed for the lush, established gardens and exotic trees west of Perth. Other theories proposed either that a small flock arrived under their own power from the eastern States, or that a local aviary escape occurred.

By whatever means they arrived in Perth, they were certainly here by 1962 when well-known naturalist Vincent Serventy saw a single specimen, and later a pair, feeding on tuart blossoms. Through the 1970s, the birds maintained low numbers in Nedlands, Claremont, Shenton Park, and occasionally Supreme Court Gardens in Perth. But by 1980, numbers had increased slightly and the range extended through Kings Park into Subiaco and Floreat.

About this time I thought of the possible repercussions of introducing new species, remembering what the starling, sparrow, fox and rabbit have done. Was this gregarious, aggressive outsider preparing to push out and eventually replace the local, easy-going twenty-eight parrot?

To date this hasn't happened, although in the last five years rainbow lorikeet numbers have increased markedly, and they are now reported north to Kingsley, west to Cottesloe and City Beach, east to Bayswater and Belmont and south to Murdoch.

The twenty-eights appear to be doing all right. This spring, large numbers were seen feeding in their preferred areas, on the ground and in medium-height, flowering trees. The lorikeets still prefer the high, exotic tree tops, but I must admit they are not as aloof as in the past, sometimes feeding on my two-metre tall bottle-brush trees.

Let's hope that the two species will tolerate each other.

JOHN HUNTER

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**Twice the size of Ayer's Rock ... Mt Augustus,
in the national park to which it gives its name,
is one of WA's natural wonders.**

Photo - Robert Garvey