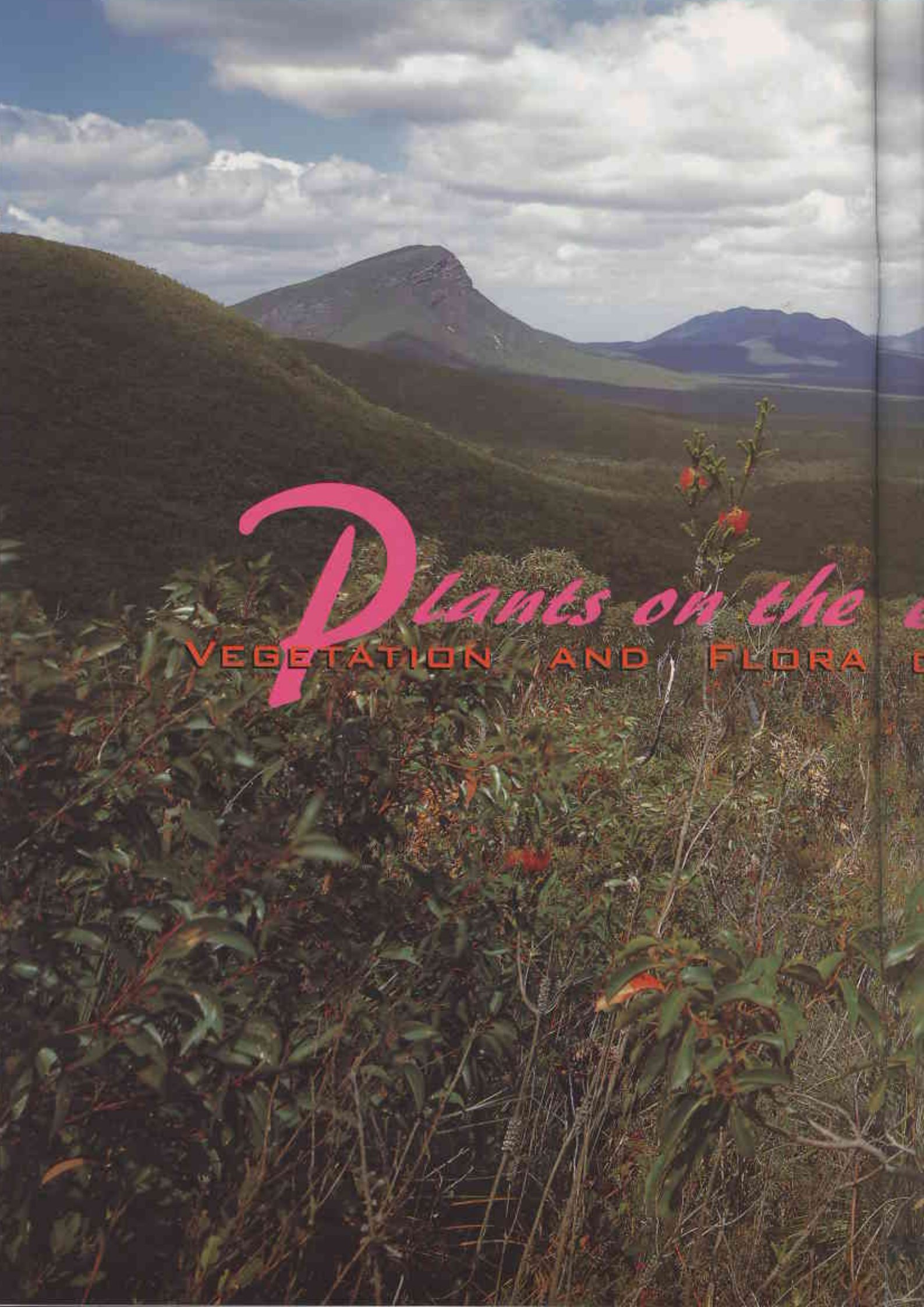
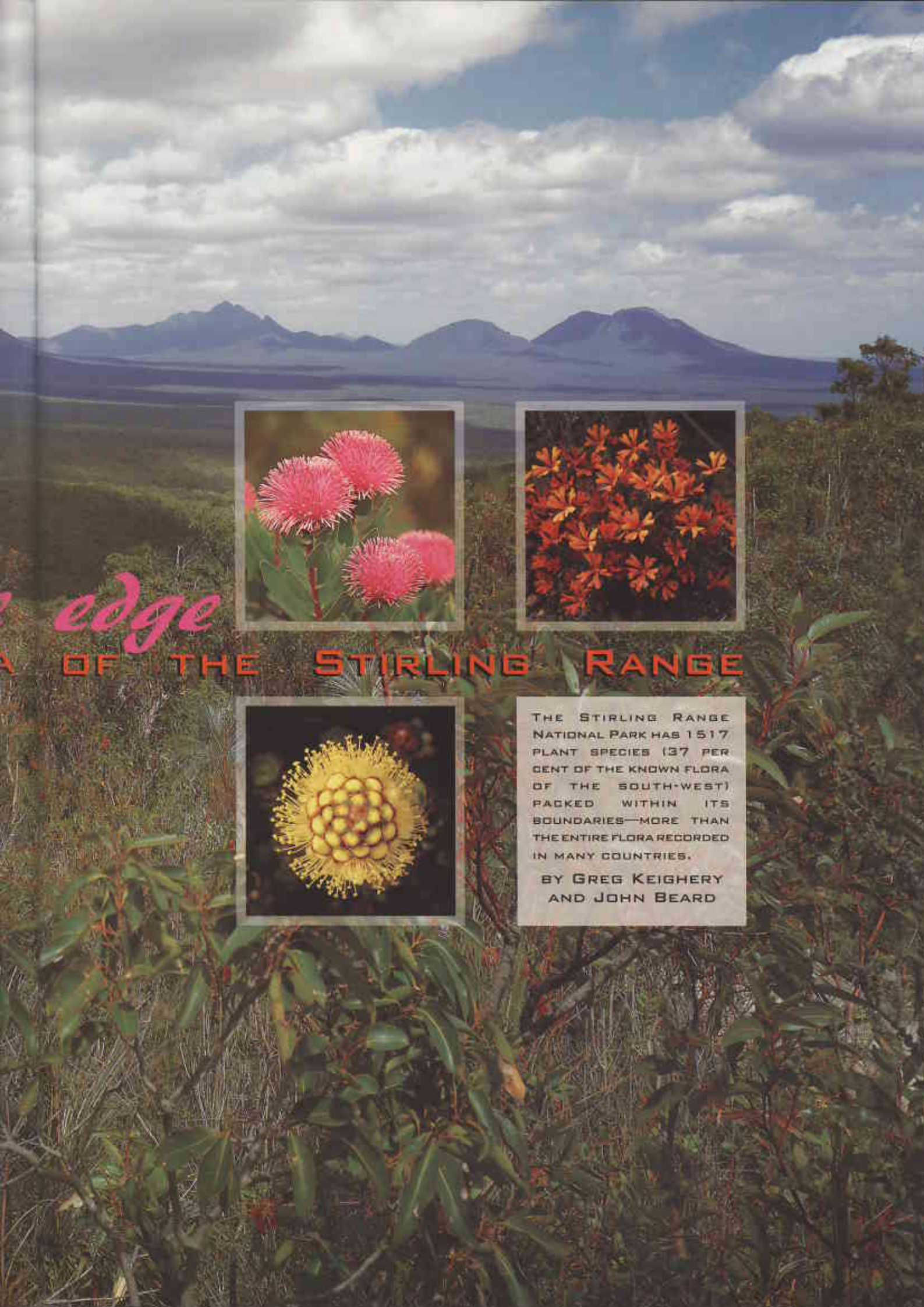

Plants on the
VEGETATION AND FLORA



edge
OF THE STIRLING RANGE

The Stirling Range National Park has 1517 plant species (37 per cent of the known flora of the south-west) packed within its boundaries—more than the entire flora recorded in many countries.

by Greg Keighery and John Beard

Because of the Stirling Range National Park's location, geology and topography—it encloses the only major mountain range of southern Western Australia—it has a rich and varied mantle of plant communities. The high peaks encourage high rainfall, enabling woodlands, swamps and thicket to grow where one would normally expect mallee shrublands and heath. Many of the species that make up these vegetation types are themselves at the inland margins of their known ranges.

Plant species that need the same conditions are often found together. A particular type of habitat (for example, a salt lake shore) will have a particular association of plants, or plant community.

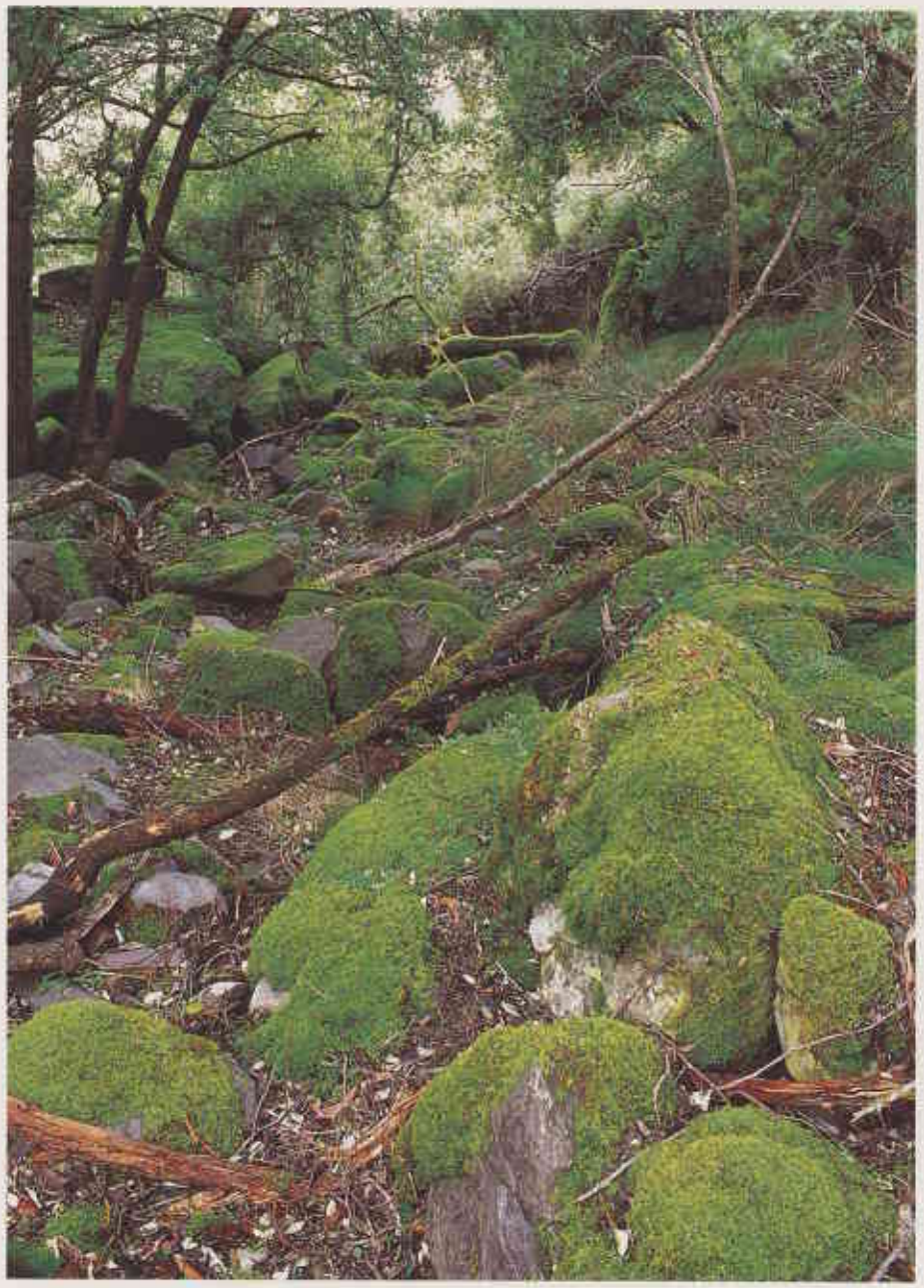
These plant communities are influenced and largely controlled by the topography, which also defines the depth and nature of the soils.

Plant communities are usually described according to the height and density of their tallest species. Five major plant communities can be distinguished within the Stirling Range National Park. They are thicket (shrubs of more than two metres with touching canopies), mallee-heath (shrubby vegetation containing many multi-stemmed eucalypts), mallee (shrubby vegetation comprised mostly of multi-stemmed eucalypts), woodland (isolated trees), freshwater wetland and salt lake communities. Thicket vegetation occurs on shallow soils on the peaks, whereas mallee heath is found on the slopes and plains, with woodlands in the valleys. Drainage from the slopes forms either fresh water swamps or salt lakes. Within these major vegetation types are numerous minor communities, including a few granite rock associations. These communities merge into each other.

THICKET

In spring, the thicket is a mass of flowering shrubs. The brilliant pink of Stirling Range pixie mop (*Isopogon latifolius*) contrasts with the reds of the *Nemcia* species, the yellow of *Dryandra* and the white of the giant candles (*Andersonia axilliflora*). This mass flowering is later than that on the lowlands, and can be seen to best advantage in October, especially on a misty day when the clouds around the mountains enclose the visitor into this world of colour without the vista of the surrounding farmland.

Thicket contains most of the species unique to the range. It is usually dominated by mountain kunzea (*Kunzea montana*), *Dryandra* species, Stirling Range woollybush (*Adenanthos filifolius*), *Nemcia* species, Stirling Range banksia (*Banksia solandri)* and feather-leaved banksia (*B. brownii*). Thicket grows on the upper levels of all the major peaks.



Previous page
The Stirling Range National Park seen from the lower slopes of Bluff Knoll.
Photo - Alex Bond
Insets (clockwise from top left):
Stirling Range pixie mop.
Photo - Tony Tapper;
Stirling Range buttercup.
Photo - Greg Keighery;
Mountain kunzea.
Photo - Jiri Lochman

Left: This damp, rocky area towards the top of Mt Toolbrunup is a good spot for mosses and delicate orchids.
Photo - Alex Bond

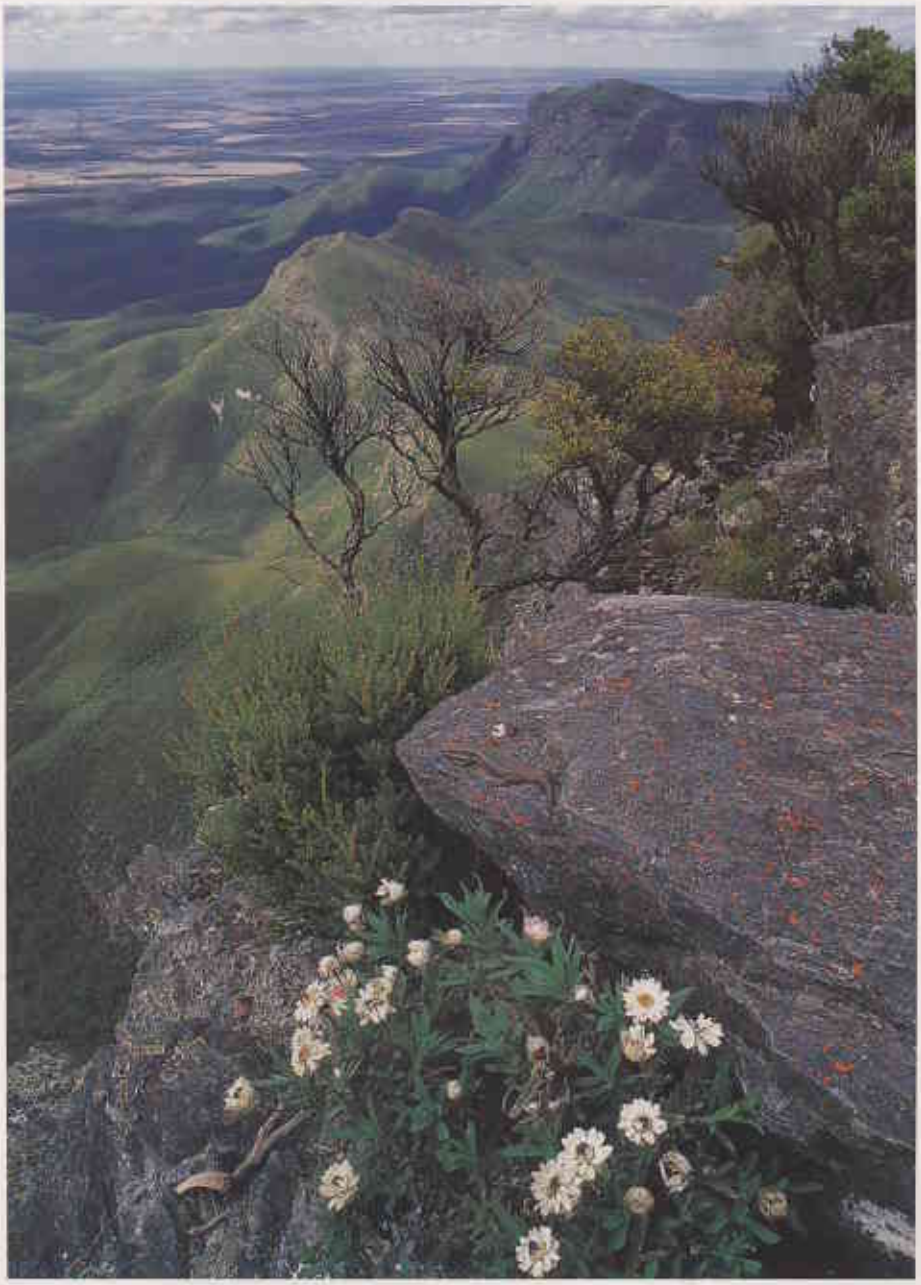
Most of the principal species are killed by fire and then resprout from seed, so the height and structure varies according to the time since the last fire occurred. However, it becomes taller (to a maximum of three metres) and denser over time. Because this community has a large number of plants from the Proteaceae (Banksia family) it is the vegetation type most severely affected by dieback disease.

The composition of the thicket flora varies greatly from the drier, western part of the range to the wetter, eastern peaks. Mallees can normally be found scattered through this vegetation type, but only on Mondurup Peak do they almost dominate the other thicket species. The range of thicket flora is best seen at Red Gum Hill, Mondurup, Talyuberlup, Mount Hassell and Bluff Knoll.

MALLEE HEATH

This plant community merges into the thicket community, and has populations of many species confined to the range, especially those growing at low altitudes along creeklines. It too is spectacular in spring (late September to October), and is best viewed along the Stirling Range Drive or on the path up Toolbrunup.

Mallee heath is the most common community of the Stirling Range. It is highly variable in species composition and can be subdivided into many distinct types. Mallee jarrah (*Eucalyptus marginata*) hugs the mountain tops and slopes. Mallee marri (*E. calophylla*) is rare, but on the lower slopes Albany blackbutt (*E. staeri*) or spearwood mallee (*E. doratoxylon*) may replace jarrah as the common mallee.



Above: Pincushion hakea flowers in winter, and is used as a major food source by honeyeaters at this lean time of year.
Photo - Jiri Lochman

Right: Gnarled mountain kunzea and white everlastings on the Bluff Knoll summit. A King's skink suns itself on the lichen-covered rocks.
Photo - Alex Bond

Most of the plains at the base of the range are covered by blue mallee (*E. tetragona*) heath. Areas within this major community may be locally dominated by apple mallee (*E. buprestium*) or mixed combinations of slender mallee (*E. decurva*), red heart (*E. decipiens*), ridge-fruited mallee (*E. angulosa*) or mountain yate (*E. talyuberlup*), depending on how sandy the soil is. This region has its best floral display in September, and is especially good for orchids. An extensive area can be inspected around the carpark north of the southern park entrance on Chester Pass Road.

MALLEE

There is little true mallee (shrubland in which mallees are the principal plants) in the Stirling Range. True mallee occurs north of the range (now mainly cleared for agriculture), while mallee heath predominates on the Stirling Range formation and Plantagenet soils.

Within the park, true mallee grows on the sand dunes around Lake Quarderwarderup and its adjacent salt lakes. Major species are ridge-fruited mallee, red heart, and blue mallee associated with southern plains banksia (*B. media*), pincushion hakea (*Hakea laurina*), Roe's callitris (*Callitris roei*) and chittick (*Lambertia inermis*). Many of the Wheatbelt species occurring in the Stirling Range are found in this area at the southern margins of their ranges.

WOODLANDS

Low woodland (trees 5–10 metres high) merges with the woodland communities downslope and the mallee heath communities upslope. Almost all

Top: Salt-tolerant paperbarks and noon-flower grow in small granite rock communities near the salt lakes in the park.
Photo- Jiri Lochman

Middle: A mallee form of bullich, usually a tall tree of the karri forest, grows on the high peaks of the Stirling Range, where clouds lift the available rainfall.
Photo - Jiri Lochman

Left: Dense marri grows along creeklines at the base of the larger peaks, often with a dense understorey of karri hazel.
Photo - Alex Bond

Top: Stirling Range smokebush is abundant in thicket vegetation about 4–10 years after fire, with sweet, chocolate-scented blue flowers.
Photo - Greg Keighery

Above: One of the 10 species of upside down pea confined to the Stirling Range.
Photo - Greg Keighery

Top: Corky honey-myrtle, a mallee-heath species, produces its flowers in old wood.
Photo - Tony Tapper

Above: False mountain bell is more closely related to the boronias than the darwinias. It is found throughout the range.
Photo - Greg Keighery

Above: Mallee heath below Mt Trio, including bell-fruited mallee and a species of poison pea found in the Stirling Range.
Photo - Alex Bond

the low woodland in the park is jarrah-marri. This is the common woodland of the deep valleys of the tall peaks (on Bluff Knoll there is an excellent example on the track about 200 metres from the car park). In September, the understorey of small mountain bell (*Darwinia lejostyla*), endemic paper heath (*Sphenotoma* species) and *Nemcia* species scents the air with honey and colours the landscape in pink, white and red.

Less common is low banksia woodland (usually *B. attenuata*) found on deep sandy soils around the Gold Holes, near Red Gum Springs, in association with dense stands of scarlet banksia (*B. coccinea*), and along Stirling Range Drive. Also uncommon are bullich (*E. megacarpa)* and karri-oak (*Allocasuarina decussata*) woodlands on the upper valleys of the eastern peaks. Both of these communities can be seen along the upper sections of the Bluff Knoll path.

Red heart can form a low woodland on sandier soils, especially in the western half of the park (for example, at the entrance on Red Gum Springs Road) with a dense understorey of chittick. Granite rocks have a low woodland of rock sheoak (*A. huegeliana*) around their base. These are rarely seen in the range but are rich in orchids and everlastings. A good example occurs along Papa Colla Creek, which crosses Chester Pass Road.

The woodland communities in the park are formed by (in order of abundance): jarrah, marri, wandoo (*E. wandoo*), flat-topped yate (*E. occidentalis*), flooded gum (*E. rudis*), yate (*E. cornuta*) and, rarely, mountain yate with Veronica's wattle (*Acacia veronicae*).

Jarrah-marri woodlands are normally found on sandy or lateritic soils, with marri predominating on heavier soils. Flat-topped yate favours swampy, heavy grey soils. Yate occurs along creek lines (for example those at Red Gum Springs and Gold Holes). Mountain yate and Veronica's wattle form a woodland around the Talyuberlup picnic site, and in gullies on Toolbrunup and Mount Hassell.

While woodlands generally grade upslope into low woodlands, there are patches of jarrah-marri woodland high in the mountains, especially on the slopes of the Bluff Knoll Plateau. The woodlands vary in density from near forest along creeklines, to very open wandoo woodland near Bluff Knoll. Heights are also variable: wandoo trees reach 18 metres in the Magog picnic site and 26 metres at White Gum Flats. Understories vary according to soil type and position in the landscape.

OTHER COMMUNITIES

The only large, essentially unwooded, freshwater swamp in the park is Pillenorup Swamp. Like other swamps, it has an outer zone of flat-topped yate woodland over red heart, then saltwater paperbark merging to scattered paperbarks over sedges, and finally, in the centre, to pure jointed rush (*Baumea articulata)* sedgeland.

Samphire communities of stem-succulent shrubs fringe some of the salt lakes and may cover the lake bed. The samphires themselves are species of *Halosarcia* and *Sarcocornia*, usually associated with the succulent rounded noon-flower (*Disphyma clavellatum*) and the large tussock-forming saw sedge (*Gahnia trifida*). Scattered saltwater paperbark trees *(Melaleuca cuticularis*) may be present.

Within the major plant communities are many minor but distinctive communities. On the peaks are rock screes, the major habitat of the endemic mountain paper heath (*Sphenotoma drummondii*) and herbfields with low, cushion-like shrubs on open rock slabs and cliffs—the habitat of Keighery's triggerplant (*Stylidium keigheryi*), rock triggerplant (*Stylidium* aff. *glaucum*) and Bluff Knoll schoenus (*Schoenus* sp. nov.).

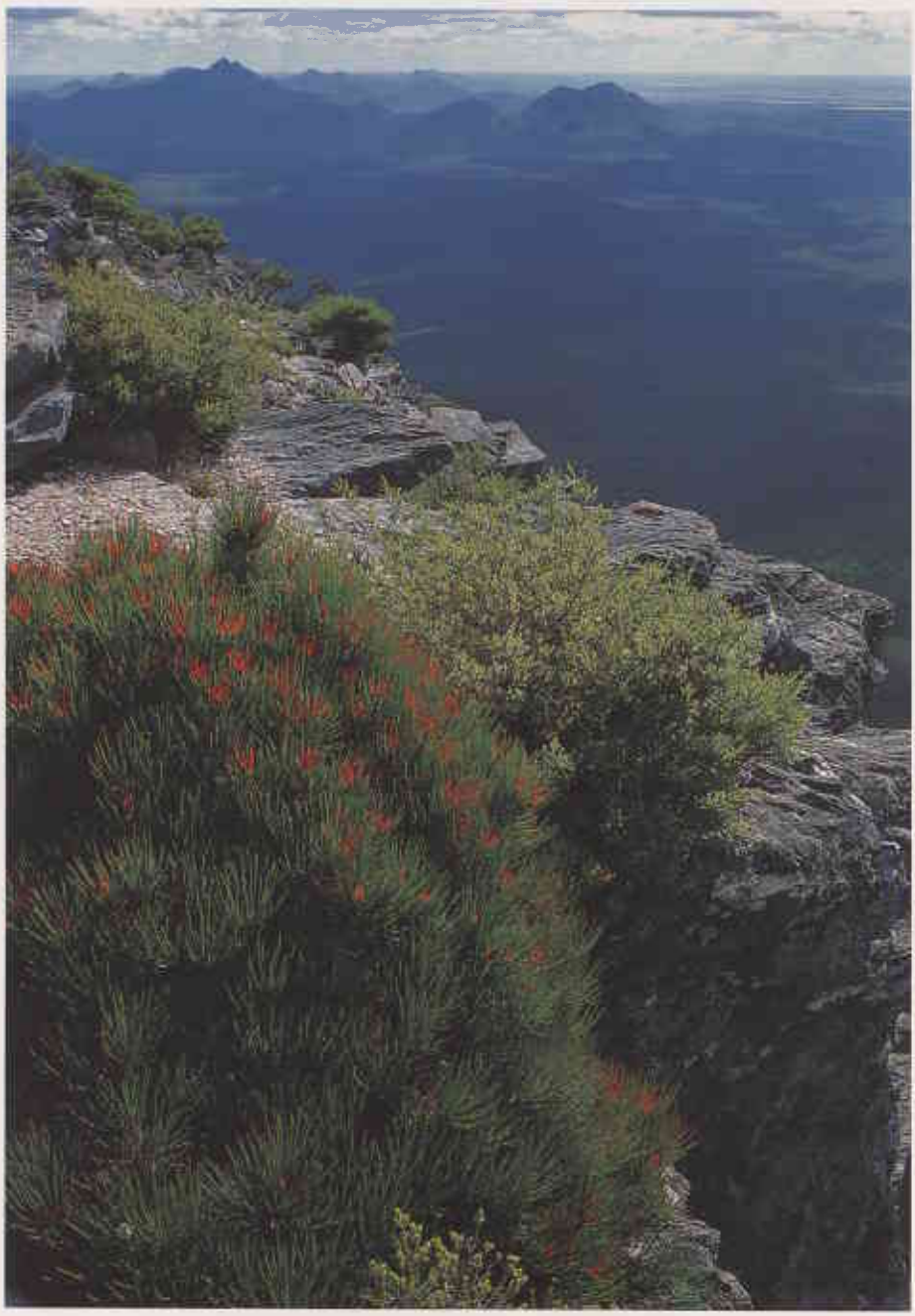
The rarest habitat is the peaty bogs inhabited by mountain xyris (*Xyris* sp. nov.) on Coyanarup.

In the lowland areas are freshwater claypans (with numerous species confined to them), granite rock herbfields (near Quarderwarderup Lake), permanent and temporary creeklines, sand dunes and breakaways. Many of these small communities have a distinctive flora and add greatly to the park's floral diversity.

REASONS FOR THE RICHNESS

The two major factors that determine this richness are the park's location and its varied topography.

The park lies at the edge of the Wheatbelt, but is close enough to the coast to allow the mountains to moderate the climate. This allows numerous species to occur beyond the lowland limits of their ranges (143 species are at their inland limits). The topography creates numerous habitats, each with its distinctive plant communities and associated species, 82 of which are confined to the park. These communities are normally heaths and mallee heaths, which have 60 to 120 species per 100 square metres, packing in a higher density of species than open woodlands or mallee communities.



COMPOSITION OF THE FLORA

A total of 90 families, 384 genera and 1 517 species and subspecies have been recorded from within the boundaries of the park. The flora and its composition are detailed in the separately available Appendix to *Mountains of Mystery: A Natural History of the Stirling Range*. A synopsis attached to the list gives brief details about the flora endemic to the park. Species related to the endemic species are mostly from the wetter regions of the south-west. Species found at the limits of their range are also catalogued in this Appendix, as are the largest families and genera of flowering plants present in the park.

Another special feature of the park's flora is the number of hybrids recorded. Plants which result from cross pollination of two different species or recognisably different forms, known as hybrids, are relatively numerous in the range. Hybrid orchids, *Nemcia* peas, eucalypts and mountain bells are particularly numerous. This can be explained partially by the large number of closely related species growing near each other. However, studies have shown that the karri forest is also rich in hybrids, but often in different groups of the same families (e.g. Myrtaceae: *Agonis*, *Eucalyptus* and *Kunzea*; and Orchidaceae).

Hybrids appear to be much less common in WA's northern and eastern heathlands. Perhaps the milder climate, longer growing season and, hence, broader areas of overlap between vegetation communities enhance their survival in the Stirling Range and wetter karri forest.

Ninety-three species of weed have been recorded from within the boundaries of the park. Most are restricted to disturbed sites such as picnic areas and road verges. A long-term concern is the gradual encroachment of weeds

Left: Stirling Range bottlebrush, seen here on Bluff Knoll, only grows in the eastern peaks of the park.
Photo - Alex Bond

(mainly cape weed, grasses, legumes and bridal creeper) around the park edges, along road verges and up creeklines. The national park rangers have eradicated potentially serious infestations of taylorrina and watsonia, but will require community assistance to locate, map, remove and monitor the other potential pests.

THE FUTURE

Most of the wonderful plants confined to the national park have relatives that normally occur in the wetter regions of south-western Australia. One hundred and forty three species grow at their inland limits. Any long-term change in the climate towards a much lower rainfall could cause the local extinction of such species, especially if the long-term fire regime also changes.

The thicket and its associated endemic species are closely linked to fire, so we must ensure that fire aids their survival. Too frequent or widespread fires (causing whole species to be present as juveniles) will threaten one of the reasons why many people visit the range—the flowers themselves—meaning that fire management is an important consideration in the park.

Many Stirling Range species are pollinated by vertebrates, especially the two great groups of endemic plants, darwinias and nemcias. Others are pollinated by insects, especially solitary native bees (see 'The Real Bees of Western Australia', *LANDSCOPE*, Summer 1993-94). Control of dieback may be essential to the survival of these pollinators, as the wind-pollinated blackboys tend to take over dieback infected areas at the expense of animal-pollinated species. Loss of food resources for the pollinators may eventually doom the plants, as they will not be adequately pollinated to ensure enough seed is set. Dieback disease can thus have long-term consequences, apart from directly killing the susceptible plant species. About a quarter of the park (30 000 hectares), has now been closed both to visitors and managers to minimise the risk of further spread of the disease.

The Stirling Range National Park is one of the botanical treasures of the world, enclosing a rich and varied flora. We need to manage this resource to ensure it remains for future Australians and the world.

Top: Prickly dryandra is a bird-pollinated species. Unfortunately, it is very susceptible to dieback disease.
Photo - M & I Morcombe

Above: Phillip's myrtle is another species confined to the thicket vegetation in the range.
Photo - Greg Keighery

Right: The yellow form of the Cranbrook bell, one of the nine species of mountain bell confined to the park. It occurs only on the Hamilla Hills.
Photo - Greg Keighery

Greg Keighery, a CALM botanist, has studied flora extensively in the Stirling Range National Park. John Beard is a former Director of both Kings Park and Sydney's Royal Botanic Gardens. This article is based on a chapter from *Mountains of Mystery: A Natural History of the Stirling Range*, available from CALM offices or from bookstores for $19.95. A separate appendix, *Mountains of Mystery: Flora List for the Stirling Range National Park*, is available for $4.95.

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Yellow-billed spoonbills have visited Star Swamp for the last three years. They sift small crustaceans from the shallow water. The story of this suburban wetland is told on page 45.

About a quarter of Stirling Range National Park has been closed to protect its unique flora from dieback desease. Turn to page 10 to discover these plants on the edge.

LANDSCOPE

VOLUME TEN NO. 1 SPRING ISSUE 1994

A marine park is proposed to adjoin the Prince Regent Nature Reserve. The Complex Coast (page 49) discusses the need for integrated management of land and sea around our coast.

Found all over Australia, short-beaked echidnas are one of two Australian egg-laying mammals. They still occur around Perth. See page 18.

The orange-bellied frog is part of the South West's fine-scale richness and variety. Find out more about these fascinating creatures on page 35.

FEATURES

REGULARS

SPECIALS

COVER

The coral gardens in the sheltered lagoons of the Rowley Shoals contain dozens of different varieties of staghorn coral and are inhabited by a huge range of colourful reef fish. See 'Coral for Keeps' on page 28.

The illustration is by Philippa Nikulinsky.

Managing Editor: Ron Kawalilak
Editor: David Gough
Contributing Editors: Verna Costello, Kate Hooper, Carolyn Thomson
Scientific and technical advice: Andrew Burbidge, Tony Start
Design and production: Maria Duthie, Stacey Strickland
Finished art: Gooitzen van der Meer
Illustration: Gooitzen van der Meer
Cartography: Land Information Branch CALM, Promaco Geodraft
Marketing: Estelle de San Miguel ☎ (09) 334 0296 Fax: 334 0489
Subscription enquiries: ☎ (09) 334 0481
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