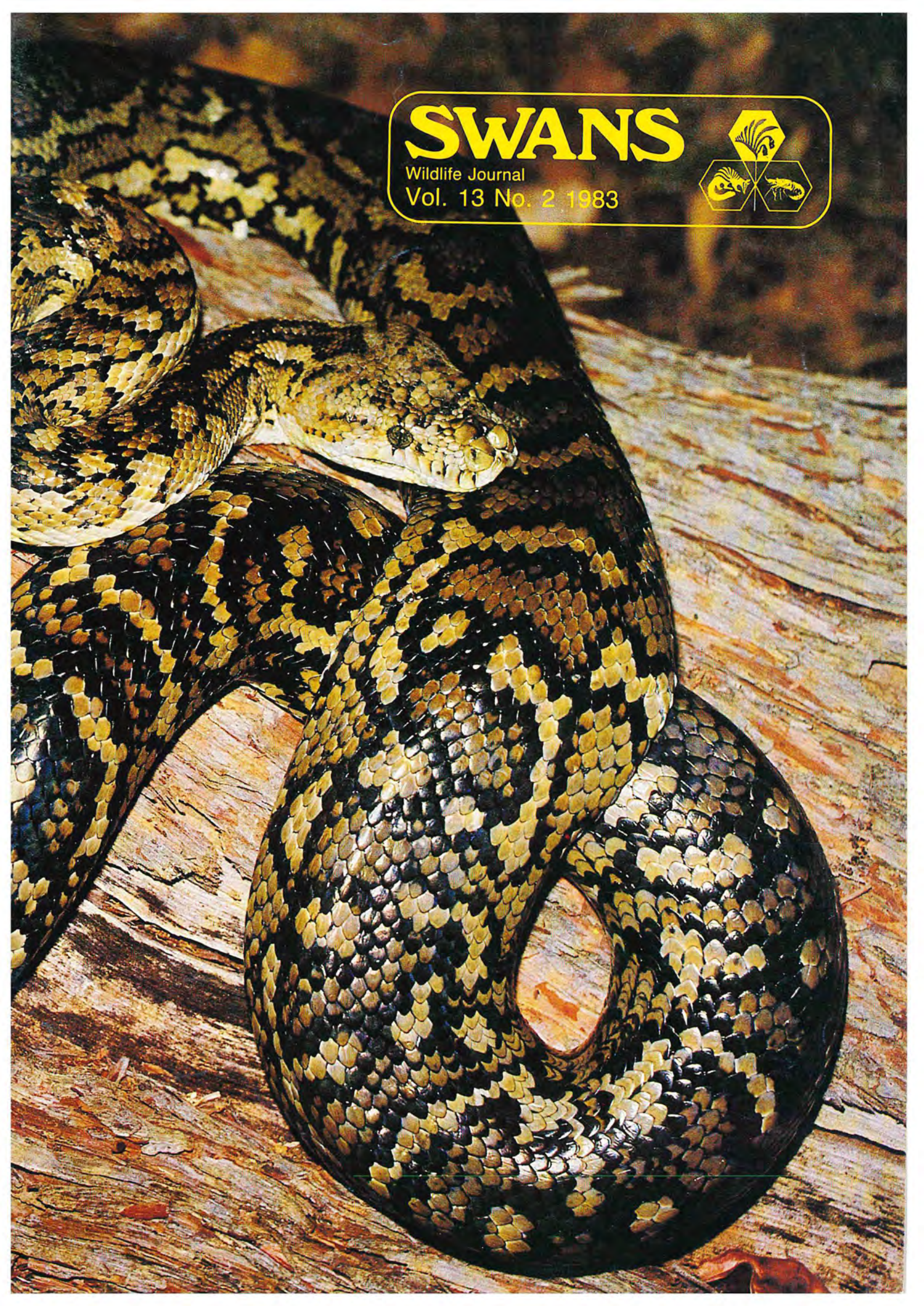


# SWANS

Wildlife Journal

Vol. 13 No. 2 1983





# SWANS

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1983

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*The support of the public is an  
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carried out by this department,  
of departmental policies and  
directions: and for promoting  
a better understanding and  
appreciation of Western  
Australian wildlife and the  
role it plays in maintaining a  
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### COVER PHOTO

A carpet python (*Python spilottus*)  
the largest snake in the Perth  
area. Photo by R. Johnstone.  
See story page 20.

# Noisy Scrub-bird — a Success Story by Clifford Young

Imagine a small two-legged athletic rat to which someone with an odd sense of humour has added feathers, a bird's beak and tail and a stubby set of wings. Now add a voice. Not just any voice mind you, but a voice full of rich and vibrant tones which at times resembles a Reed Warbler or even a European Nightingale yet at close range is powerful enough to deafen the strongest ear. Let the world have fleeting glimpses of this creature between 1842 and 1889 and then, without so much as a wave of a magic wand or a pinch of pixie dust, make it disappear. What you are left with for the next 70 years is all the ingredients for what must rank as one of the world's greatest ornithological mysteries. And the biggest surprise was still to come.

In 1961, 72 years after its disappearance, the elusive Noisy Scrub-bird as it had come to be known, was rediscovered in dense pockets of vegetation at Two Peoples Bay, under the shadow of rugged Mt Gardner, 32 kilometres east of Albany on Western Australia's south coast.

The news, announced to the world on Christmas Day, 1961, caused a sensation amongst ornithologists, and many naturalists immediately set out on the long journey to Two Peoples Bay to try to catch sight of the near flightless bird in its dense cover of dwarf eucalypts,

melaleuca, banksias and sword-rush swamps and to hear the scrub-bird's machine-gun like call of "cheep-cheep-cheep-cheepepeppp".

However, with the discovery a new problem presented itself. The area where the bird was living was precisely the area where the Western Australian Government had proposed establishing a new townsite to be called Casuarina. To the Government's credit, the following deliberations resulted instead in a decision to set the area aside as a Nature Reserve. The resulting Two Peoples Bay Nature Reserve of 4 639 hectares was subsequently gazetted in April, 1966 and vested in the Western Australian Wildlife Authority.

The Reserve derives its name from Two Peoples Bay which was named "Baie des deux Peuples" ("Bay of Two Nations") by Louis de Freycinet in 1803 because it was here he met an American brig, the *Union*, anchored in the bay.

The Noisy Scrub-bird was first discovered in Australia by John Gilbert at Drakesbrook in the Darling Range, Western Australia, in 1842. Gilbert was the field collector for the noted English ornithologist, John Gould, and it was Gould who gave the bird its name after reading Gilbert's descriptions of its remarkable calls. Gilbert noted that the bird had "... extraordinary loud notes, many of which are sweet and melodious" which it uttered while running along the ground. Gilbert went on to add that "... its notes are so exceedingly loud and shrill as to produce a ringing sensation in the ears, precisely the effect produced when a shrill whistle is blown in a small room." Obviously impressed with the bird's vocal ability, Gilbert

Extract courtesy of The West Australian Newspapers Pty Ltd.

THE WEST AUSTRALIAN, MONDAY, DECEMBER 25, 1961

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**'Extinct' Bird  
Seen in S.W.**

In what is described as the most exciting news of the century in Australian ornithology, a bird believed extinct has been seen near Albany.

Albany primary school headmaster and prominent naturalist Harry Webster heard a noisy scrub-bird (*atrichornis clamosus*), pictured, calling in dense scrubland near King George Sound on December 17.

Naturalists had thought it extinct since 1889.

This weekend Mr. Webster returned to the area where he heard the calls and came within 12ft of the bird. He saw it clearly again yesterday.

**Black Patch**

A black patch on its throat identified it as a male bird and its description tallied exactly with the noisy scrub-bird's, he said.

Leading W.A. naturalist Vincent Serventy said the discovery was the most exciting news of the century in Australian ornithology.

The King George Sound area was where the bird was originally found and he had always hoped the species was still alive.

Expeditions to the area since 1889 had failed to find any.

Mr. Webster, who is a member of the W.A. Naturalists' Club and a committee member of the Gould League of Bird Lovers, appealed to ornithologists to stay away from the area. He said care must be taken not to frighten or harm the bird.

**Journalist Plunges**

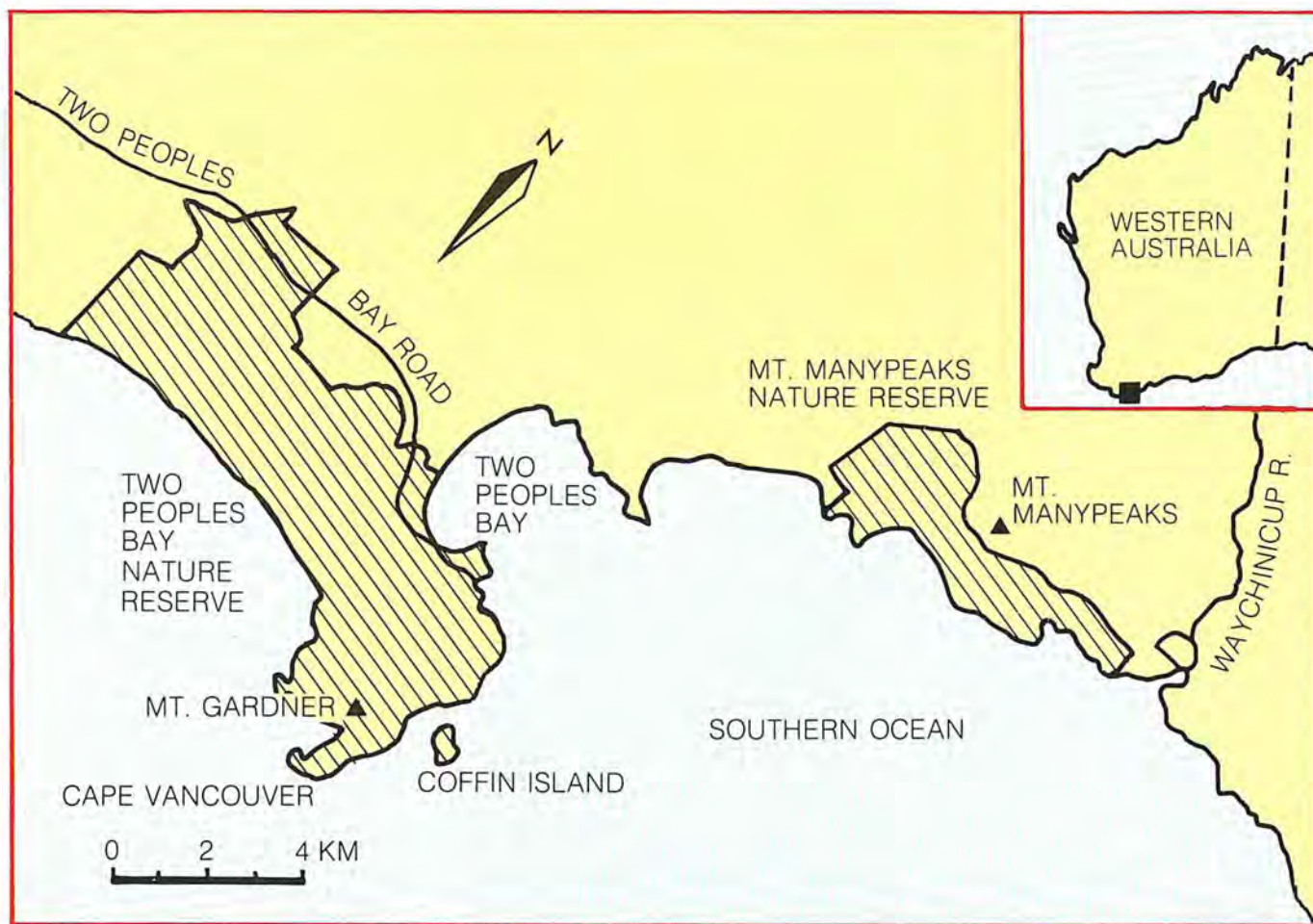
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wrote that he considered it to be "... without exception the loudest of all the songbirds inhabiting Western Australia."

Gilbert also found the bird at King George's Sound and at Augusta, and recently discovered old documents at the British Museum (Natural History) indicate that Gilbert encountered the species as far north as Mt Barker, though in decreasing numbers. Over the next 50 years, a number of specimens were collected, mostly from around King George's Sound, but the final specimen collected was taken at Torbay in early October 1889, by A. J. Campbell. The following month, Campbell also recorded hearing the species calling at Boodjidup Lake near Augusta. However, this was the last such record and, despite intensive searches of likely habitat throughout the South-West, no trace of the species could be found. As the years went by, many naturalists considered the bird extinct making its rediscovery in 1961 even more surprising.

Why did the bird decline over most of its former range yet survive in an isolated pocket at Two Peoples Bay?

We can only guess at the reasons but it would seem fairly clear that it was related to the activities of European man. In addition to introducing such predators as the fox and cat, early settlers drained swamplands and employed frequent burning and clearing techniques for crop cultivation and improving pastures. The subsequent loss of prime habitat for the Scrub-bird, together with an extended period of drought in the 1880s and 1890s probably tipped the scales against the bird's survival throughout almost all of its former range. The Two Peoples Bay population probably survived because the area was rugged and unsuitable for agriculture and relatively immune from being devastated by any single fire. It is thought that because of the area's topography enough habitat would remain after a fire to enable the population to survive. This hypothesis has been reinforced by results obtained through a strict management policy of the reserve since its establishment.

When first rediscovered the Noisy Scrub-bird population at Two Peoples

Bay numbered about 40 breeding pairs. In 1973, a management programme was implemented which prevented burning of the reserve and since this measure was introduced numbers of the birds have almost doubled. At the beginning of this year it was estimated that there were about 72 breeding pairs plus about 20 non-breeding males holding territories. Even this number may have been an underestimate owing to the extreme difficulties encountered in any census of the population. The birds rarely can be seen to be counted and most estimates have relied on the number of males heard singing during the breeding season.

Research work carried out this year has indicated that many more birds than previously thought may be present but owing to the lack of suitable habitat for the population to expand into, these extra birds must live in other birds' territories and do not sing due to pressure from the dominant males. This increase in numbers has led to considerable overcrowding and for many years now the Department of Fisheries and

Wildlife which manages the Reserve for the Western Australian Wildlife Authority, has been examining ways of establishing extra colonies.

Although the short term survival of the species had been safeguarded by the declaration of Two Peoples Bay Nature Reserve combined with subsequent research and management, it was felt that its long term future would depend on the successful establishment of viable colonies in at least several other localities. This view took into account the possibility that fire, disease or some other form of major disaster could reduce the present population within the the Nature Reserve to the point from where it may not recover.

The Department of Fisheries and Wildlife considered this option as early as 1965 when it examined nearby Mount Manypeaks as a possible site for a second colony of Noisy Scrub-birds. Mount Manypeaks fulfilled the basic criteria necessary for the move, namely it possessed suitable habitat for both feeding and nesting, the area was large enough to permit the introduced population to expand and become viable in its own right, it was relatively close to Two Peoples Bay so as to facilitate transport etc, and the land tenure was secure, permission having been given to proclaim it also as a Nature Reserve.

However, for many years there were insufficient birds at Two Peoples Bay to risk transferring any to a new location, and by the time there were sufficient birds, a bushfire had swept through much of the Mount Manypeaks area, destroying a large proportion of the suitable habitat. In the end, any attempt to establish another population of the Noisy Scrub-bird had to be delayed until the beginning of this year.

The project finally got underway in mid-May with the arrival in Western Australia of Don Merton, a fauna conservation officer from New Zealand specialising in endangered bird species. An acknowledged expert in his field, Don Merton was 'loaned' for the duration of the project by the New Zealand Wildlife Service at the request of the Western Australian Wildlife Authority. During his 15 years with the New Zealand Wildlife Service, Don had taken a particular interest in the management of

populations of rare birds and had succeeded in establishing new populations of North and South Island Saddlebacks (a New Zealand endemic wattlebird), Kokako (another Wattlebird), Kakapo (a flightless ground parrot) and the Chatham Island Robin.

Consequently, Don had extensive experience in all the relevant techniques involved in such projects including catching the birds, holding them in captivity, transferring them and, finally, releasing them with the minimum of stress. This knowledge was to prove invaluable in the months ahead.



▲ Graham Folley broadcasts the call of the male Noisy Scrub-bird to try to lure another male into the mist nets (Photo courtesy of West Australian Newspapers Pty Ltd.)

Don Merton's partner in the project was Graham Folley of the Western Australian Department of Fisheries and Wildlife. Graham as Reserve Officer in charge of Two Peoples Bay Nature Reserve, brought an intimate knowledge of the bird's habitat to the project.

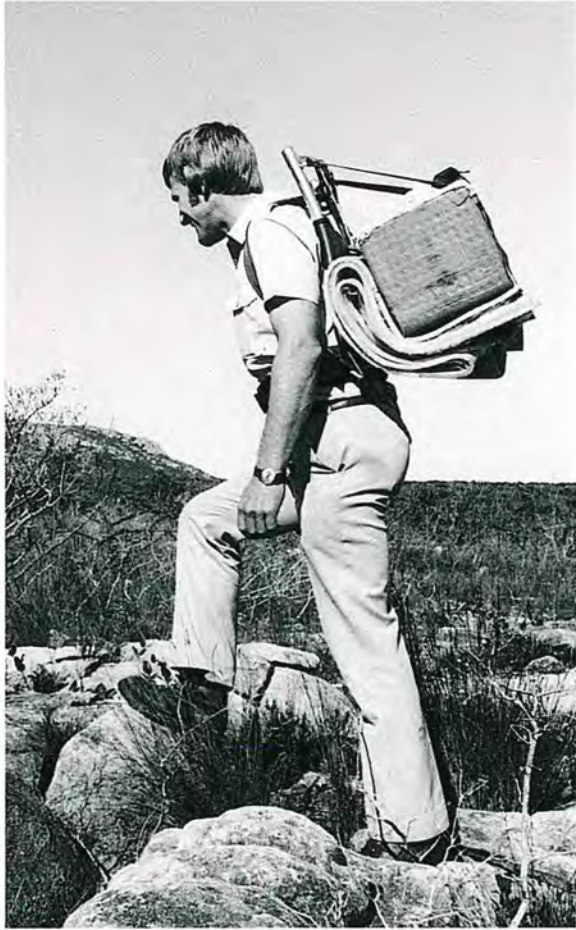
The first part of the translocation project was relatively easy. The 'Don Merton Memorial Aviary', measuring 6m long by 3m wide was constructed on site at Two Peoples Bay and divided into two separate compartments to house captured birds while awaiting transfer to their new home. So far, so good. Then came the hard part, the actual task of finding and capturing enough birds to form the initial nucleus of a new population.

Blithely unaware of the frustrations and difficulties ahead of them, Don and Graham began by setting ground-hugging mist nets across existing clearings throughout the reserve. Almost immediately it became evident that the job ahead was not going to be easy. Examining the ground around the net after a set, Graham could clearly make out the tracks of a Noisy Scrub-bird. Following them he saw the tracks led directly to the net and continued uninterrupted out the opposite side.

Initially Graham thought the bird had wriggled under the net but later it became obvious that the Scrub-bird, with experience born out of years of living and travelling through some of the thickest and most impenetrable scrub imaginable, treated the net with disdain, slipping straight through it as though it was just another thicket.

Once the problem was recognised a smaller diameter mist net was employed and met with almost immediate results. A male Scrub-bird ran full-tilt into one of the nets and became entangled. However, capture was obviously not on its day's itinerary and even as Don and Graham moved in to pick it up, the bird carefully placed its two strong and muscular legs onto the restraining net filaments and ripped them apart. Scrambling free it then continued on its unconcerned way leaving two astonished would-be captors staring after it. Round Two to the Noisy Scrub-bird.

The situation was not improved by the fact that in many weather conditions, for example in wind, rain or bright sunshine, the birds could either detect the nets by sight or would not move around during the day. However, with the introduction of a strong, non-synthetic cotton mist net of small diameter, Round Three went to Don and Graham. A total of eight male Scrub-birds were soon captured in the new mist net with a best effort of three in a single day. A further two males were caught in modified box traps set either along small lines of drift fences or at the entrances (or exits) of natural tunnels through the bush. These tunnels or runs through the scrub were much used by the Scrub-birds but also by other animals including rodents, small reptiles and a variety of other small fauna.



▲ Mist nets were used with some success to capture Noisy Scrub-birds. (Photo G. Folley).

◀ Graham Folley approaches the release area carrying a Noisy Scrub-bird in a specially designed backpack. (Photo courtesy of West Australian Newspapers Pty Ltd.)

▼ Thick scrub lined gullies provide ideal habitat for the Noisy Scrub-bird at Two Peoples Bay (Photo G. Folley).





◀ Several Noisy Scrub-birds were caught in modified traps set at the end of ground runs. (Photo G. Folley).



▶ One of the Mount Manypeaks gullies where the Noisy Scrub-bird was successfully released (Photo G. Folley).

▼ A female Noisy Scrub-bird at its nest (Photo copyright G. Chapman.)





The box traps also caught two female Scrub-birds, an event which proved most fortunate as a lack of females almost proved the stumbling block of the whole project.

Unlike the male Scrub-birds whose locations could usually be determined by their loud calls, the females made little or no sound and usually stayed hidden in dense bush. However, a method had to be found to capture them as without females the resettlement scheme would founder.

Without the fierce territorial drive of the male birds, the females could not be lured into the mist nets by playing the recorded sound of rival birds. Also, for the duration of the project, the females were mostly engaged in nesting activities and were presumably staying close to the vicinity of their nest.

Rather reluctantly, it was decided the only way to capture females in the time available was to try and trap them on the nest. However, as events proved, any fears of subjecting the females to undue trauma during the process proved groundless as the birds showed a remarkable capacity to ignore almost anything happening around them. This led to the construction and use of some quite remarkable contraptions which were fitted to the nests in attempts to trap the birds. That is, of course, after the nests were found. This was no easy task considering the habitat in which the Noisy Scrub-bird chooses to live and the fact that the females seek even thicker scrub in which to site their nests. Most of the nests found were quite close to the ground in thick rushes and near open water. The nests were roughly spherical in shape with a side opening and lined inside with a hard cardboard-like material made of decayed rush. Many of the nests also featured a short runway leading to the side entrance.

After considerable effort, a further two females were caught on the nest, one with a modified box trap placed at the entrance to the nest, and the other with a miniature mist net rigged to flip over the entrance hole when tripped by the female entering the nest.

The birds were temporarily housed in the 'Don Merton Memorial Aviary' before being carefully transported in



▲ Noisy Scrub-birds are voracious insect eaters. (Photo copyright G. Chapman.)

special wickerwork backpacks to the release area below Mount Manypeaks. Graham Folley found the birds travelled better than expected and even fed along the way on a diet of assorted insects and grubs provided for the journey.

And then it was time for what Graham and Don saw as the most crucial part of the whole project. After all the effort of catching the birds, they now had to let them go. After releasing the first two males in a suitably vegetated gully and watching them disappear into the thickets, Graeme suffered his first doubts about the project.

After spending a sleepless night immediately following the release, Graham was back at a point overlooking the release site before dawn the next day. His apprehension quickly turned to elation when, as the sun rose over the horizon, the unmistakable notes of a noisy Scrub-bird resounded down the gully, bouncing off the granite outcrops and echoing across the hillsides. The bird had found the gully to its liking and was proclaiming his new territory. Although Graham did not hear the second Scrub-bird that morning, nor for several mornings following, it too was heard calling from farther up the gully within just a few weeks. The remaining birds followed in quick succession. The Noisy Scrub-bird now had a second home.

Of course the real test of this project is still to come. Although a total of ten birds have now been released at the new site, only four were females, and some of the birds may have been immature. More birds will have to be caught and transported to Mount Manypeaks to build up the colony to at least ten breeding pairs, the minimum number thought to be capable of establishing a new population in its own right. So therefore, what has this project really achieved? The work carried out by Don Merton and Graham Folley demonstrated many practical aspects important to future management of the Noisy Scrub-bird and its habitat. Between them, they established several methods of capturing the birds with the minimum of stress, succeeded in feeding and housing them for varying periods of time, and developed means of transporting and releasing the birds at new sites. That these methods were successful is shown by the birds which have since taken up new territories at Mount Manypeaks and are now filling the area with their calls.

Future work will concentrate on building up the Mount Manypeaks breeding colony and in protecting the bird's habitat. There is still much to be done, but Don and Graham are quietly confident that the Noisy Scrub-bird is one bird, at least, that is on the road back from near extinction.

# York Gum: The Protean Eucalypt

text by *Tim McDonald*



Drawing by *Laura Richards*

York gum does not have the bright flowers, the smooth, light-coloured bark or the clean straight bole that many other eucalypts are admired for. Its special character is its diversity, being 'notoriously variable in habit and bark'<sup>1</sup> as one scientist puts it (Note: protean from *Prōteus* a Greek Sea-God taking various shapes). Although in most areas it is a low-branching, broad-crowned tree of 6 to 12m in height, considerably larger specimens exist in the western part of its range—I have measured one Moora York gum at 23m high. In the drier areas it is a mallee.

Between the extremes of mallee and tall straight tree a multiplicity of shapes can be found. The trunk can be straight or bent into almost serpentine curves. Even a large York gum may have three or four trunks, making its status as either tree or gigantic mallee a moot point. Sometimes a fallen tree continues to send up new shoots at right angles to the now horizontal trunk, creating yet another variation on the York gum theme.

So much character does the York gum possess that a stand of them is reminiscent of people relaxing outdoors. Here is a bunch leaning into a circle to share the whispered gossip, there one clutches at another for support, while others bend down, recline at full length amid branches dropped as casually as unneeded jumpers or energetically stretch their limbs to the sky.

York gum's bark is as variable as the species' growth-habit. The western form has shaggy grey bark on its trunk and lower branches of the type known as 'box' — that is, hard and fibrous with the fibres somewhat interlaced. Thus York gum is actually not a gum at all, as the term is usually reserved for smooth-barked eucalypts. Because, in most cases, this bark-type does not extend to the upper branches which are smooth and of a burnished grey-green colour, York 'gum' is, strictly speaking, a half-box eucalypt. As the tree extends east and north the proportion of rough bark decreases, more or less as its height declines, so that on the fringe of its range York gum becomes a mallee form with smooth green bark.

The tree's specific name, *Eucalyptus loxophleba*, is more accurate. It is derived from the Greek *loxos*, cross-wise or oblique, and *phlebos*, vein, and refers to the pale-green leaves' crooked veins. Another

name for York gum is the Aboriginal 'yandee'.

Despite its parochial common name (a result of being first encountered in abundance at York, the earliest settled wheatbelt town), York gum is one of the most widespread and characteristic trees of the wheatbelt. Its range stretches from north of Shark Bay to the south coast and from the Darling Range to east of Kalgoorlie. Over such a wide area it is found in association with a great many plants. In the Murchison, York gum is often the only eucalypt in a sea of wattles. Further south it is frequently associated with salmon gum, gimlet (*E. salubris*) or jam wattle (*Acacia acuminata*). Where York gum occurs with wandoo, the latter tends to be on the summits and



▲ Light through a canopy of York gum in a woodland to the north of Perth. (Photo C. Young.)

upper slopes of hills, with a sharp boundary where it meets York gum downslope.

York gum normally grows in a woodland formation littered with fallen branches and with a sparse ground layer. The soil may be sand, sandy loams or loams, perhaps granitic or gravelly, and often has a clay sub-soil. Stands of York gum in

the western wheatbelt were described by early writers as Savannah, a formation in which trees are lightly spaced amid grasses or shrubs. The Aborigines used to systematically burn these areas in summer to bring on fresh herbaceous growth to attract kangaroos. The botanist Dr J. S. Beard has speculated that remaining stands of York gum have changed to a denser woodland since this burning ceased.<sup>2</sup>

Because York gum has been used as an indicator of productive soil it has been much cleared to make way for wheat and sheep. Hence undisturbed woodland is rather rare, although the tree itself is still common. It is a difficult tree to eradicate from agricultural land as it is seemingly near-indestructible. Its deep root-system makes it drought and salt resistant and it can tolerate frost (Merredin, at the centre of the York gum's range, averages 31 frosts a year<sup>3</sup>). The same root-system can exasperate farmers and clearing contractors. One man who worked as the latter in the 1950s, when machinery was less efficient, maintained that York gum caused the most problems of any species — to the extent that explosives had to be used to loosen its roots.

I have seen York gums stubbornly persist in growing despite having been knocked over by wind or bulldozer, stripped by cock-eyed bobs of all their branches, sawn off at waist-height or damaged by fire. This is because they are able to sprout new shoots from either dormant buds under the bark of the trunk, known as epicormic shoots, or from a lignotuber.

The timber of York gum does not have the durability of the living tree and consequently is seldom used for fence-posts and strainers. However, the yellow-brown wood is heavy and very hard, more difficult to cut with an axe than even wandoo, and has a closely interlocked grain. Its transverse strength is 14 500 lbs/in<sup>2</sup> and its tensile strength is 13 000 lbs/in<sup>2</sup>; unremarkable figures for a wheatbelt eucalypt. Formerly York gum was used for maul- and mallet-heads, the making of naves and



▲ Undisturbed bushland near Perth late last century featuring a well developed specimen of York gum (Photo courtesy of Batty Library, Ref 8168/1882.)

▼ Mature York gums on a Moora farm. The large tree is 23 metres in height, an impressive size for the species (Photo C. Young.)



felloes — respectively, the hubs and the curved rim segments of wooden wheels — and for wagon-building. It was considered the best timber in Australia for these purposes. Another now obsolete use was in spear-shafts by the Aborigines.

Probably York gum's main economic use today is by beekeepers. The species provides a reasonable flow of medium amber honey between September and December, although its pollen supply is unreliable.

York gum is not a popular tree in cultivation, probably because of its lack of conventional beauty. I have seen only two cultivated trees, both of which were in the grounds of a primary school in South Perth where they stuck out like sore thumbs against a background of Queensland brushboxes. Trees grown in Sydney and Adelaide have also adapted well to cultivation. Overseas, the species has been tried successfully in Israel and Morocco for shade, firewood and soil conservation in areas with an annual rainfall of 200 to 400mm. Limited numbers are now being planted by wheatbelt farmers, as York gum's tolerance to drought and salt and broad, shady crown of foliage make it a useful farm tree.

The species was first described by the English botanist George Bentham. However in 1884 the German botanist Mueller demoted it to a tree-form of *E. foecunda* (the narrow-leaved red mallee), a small mallee-eucalypt with rounded buds and white flowers that superficially resemble York gum's. Later scientists confirmed this opinion until York gum was reinstated as a species in a reorganisation of the *Eucalyptus* genus by Blakely in 1934. Narrow-leaved red mallee is not now considered very similar to York gum, which seems to have no close relatives.

York gum was again under taxonomic review in 1973, when a new subspecies, *E. loxophleba* subsp. *gratae*, was described<sup>5</sup>. The subspecies is found between Dumbleyung and Lake King and derives its name from Lake Grace, where it is common. It differs from



▲ York gum foliage, showing transition of bark types on the upper branches (Photo C. Young.)

▼ York gum woodland, New Norcia. The understorey is introduced Guildford grass (Photo C. Young.)





▲ Lower branches of the York gum feature rough bark, whereas higher in the trees the bark becomes smooth. (Photo C. Young.)



▲ The crooked vein pattern in this leaf is the feature that gives York gum its scientific name. (Photo C. Young.)

▼ York gum woodland, New Norcia. In the foreground is a Jam Wattle (*Acacia acuminata*) which is often associated with York gum. (Photo C. Young.)



the main form of York gum in having larger buds and fruit and thicker, glossier leaves. An earlier described subspecies, *fruticosa*, is now considered synonymous with the common form.

A botanically dissimilar species that is sometimes confused with York gum in the field is red morrel (*E. longicornis*), a common tree of the eastern wheatbelt and the goldfields on heavy soils. It has the same rough-barked trunk and smooth branches as York gum but its buds and fruit are very different. However, one can learn to distinguish the two species at a glance. Red morrel's leaves are narrower and a deeper green than York gum's, its rough bark is darker and finer-textured and the smooth-barked limbs have a reddish hue. Also, red morrel tends to be a taller, thicker-boled tree with a single trunk and an erect habit more reminiscent of salmon gum than York gum.

#### Footnotes

<sup>1</sup> Brooker, M.I.H. 'Four new taxa of *Eucalyptus* from Western Australia', *Nuytsia*. 1:250, 1972.

<sup>2</sup> Beard, J.S. *The vegetation of the Moora and Hill River areas*. Perth, Vegmap Publications, 1979, pp. 11-12.

<sup>3</sup> Chippendale, G. M. *Eucalypts of the Western Australian goldfields (and the adjacent wheatbelt)*. Canberra, AGPS, 1973. p. 87.

<sup>4</sup> Lane-Poole, C. E. *Notes on the forests and forest products and industries* Perth, W.A. Forest Dept, 1920, P. 55.

<sup>5</sup> Brooker, M. I. H. *Op.cit.* pp. 250-53.

# Wildlife of the Pilbara

Photographs copyright A. G. Wells



**Internationally important as one of the world's major sources of iron ore in addition to other minerals, Western Australia's Pilbara region is equally important as a fascinating and unique habitat for wildlife. Its landscape varies between spectacular rust red gorges and spinifex covered valleys and plains to tidal creeks and extensive stands of mangrove. However, most of the area's 300 000 square kilometres, an area larger than the State of Victoria, is considered desert or semi-desert.**

Sometimes referred to as the 'North West', the Pilbara district stretches north from the Tropic of Capricorn to the start of the Eighty-mile Beach and inland to about longitude one hundred and twenty one degrees. Part of the northern sector represents ancient rocks whose age exceeds 3 000 million years making it the oldest crustal block on the Australian continent. A large proportion of the central Pilbara district is known as the Hamersley Range and Plateau and was formed about 2 000 million years ago. It consists of mainly jaspilite and dolomite. These rocks were considered to have been formed by chemical deposition from ancient seas and the high iron content of jaspilite has given rise to deposits of haematite and limonite which are now being worked as iron ore.

Sometime after the iron formations were laid down, they were elevated and folded by earth movements, and then finally eroded to their present form. Short streams which developed in the Hamersley Range have continued to flow down into the Fortescue Valley weathering such impressive gorges into the escarpment as Dale and Wittenoom Gorges. Similar weathering also revealed bands of long blue fibre asbestos at Yampire Gorge which was the site of the Pilbara's first asbestos mine.

Fifty kilometres further south, the plateau reaches its most elevated point at Mt Meharry which, at 1235m, is the highest peak in Western Australia.

Like much of Australia's north, the Pilbara region could be considered a land of great contrasts. Areas which today may be parched by heat and drought may be covered by flood waters overnight and in a few weeks be a stretch of lush green growth. Consequently, wildlife living under such conditions must be so adapted that they can withstand the long dry spells and make the most of times of plenty.

An example of this climatic variation is illustrated by looking at some rainfall and temperature details for Roebourne and Marble Bar, two towns situated within the Pilbara. The average annual rainfall for Roebourne is just over 300mm, but the highest ever recorded in one year is 1 050mm, while only 3mm were recorded in the driest year. Roebourne's heaviest



▲ The orange-yellow fruit of the wild orange (*Capparis spinosa*) contains numerous black seeds embedded in a sweet black pulp.

The Painted Finch (*Emblema pictum*) is a characteristic inhabitant of the Pilbara spinifex habitat. ▶

▼ The Little Red Antechinus (*Antechinus rosamondae*) is a species of marsupial which is native to the Pilbara zone, from Onslow to Port Hedland.







▲ The Water-Holding Frog (*Cyclorana platycephalus*) is specially adapted to survive drought by storing water in its bladder. When drought threatens, the frog burrows underground, only re-emerging when rain falls again.



▶ Another inhabitant of the Pilbara spinifex grasslands is the Striated Grasswren (*Amytornis striatus*.)

▼ A cyclonic depression near Enderby Island off the Pilbara coast. During the summer months cyclones provide much of the area's rainfall.



downpour in a single day was just under 304mm or more than its yearly average. Whereas Roebourne's rainfall is erratic, Marble Bar shows considerable temperature fluctuations, from 50°C in mid-summer to about 1°C in mid-winter. Furthermore, during one particularly hot and dry spell, starting in October 1923, Marble Bar had the dubious

honour of reaching or exceeding the old-time century (100°F) on 160 days in succession.

Because wildlife still manages to live in these hot, arid regions it would be easy to believe that the secret of their survival lies in immunity to high temperatures, but this is not the case. Prolonged exposure to the hot sun would kill most of the birds, reptiles,

mammals and insects found in this region and their ability to survive depends not on their resistance to the heat but on their ability to avoid extreme temperatures.

One of the most common adaptations to combat high daytime temperatures for instance is for animals to be active in the cool of the early morning or late afternoon and at night. This habit aids moisture conservation by ensuring that moisture loss, both by sweating and respiration, is reduced to a minimum. During the heat of the day most animals lie up in the shade of bushes or other vegetation, or in rock crevices or underground burrows.

Some other survival strategies employed by arid zone fauna include opportunistic breeding, special drought resistant eggs or larvae, short life cycles and a variety of physiological adaptations such as the ability to drink highly saline water. An example of the latter adaptation is the Chestnut-eared Finch or Zebra Finch which is capable of drinking water more saline than the sea.

Important trees in the Pilbara are the Mulga (*Acacia aneura*), the Kurrajong (*Brachychiton gregorii*)



▲ This small gecko (*Diplodactylus savagei*) seems to occur only in spinifex clumps in the area of Port Hedland. Feeding mostly on insects by night, it may take prey even larger than itself.

▼ A common bird of the Pilbara, the Grey-headed Honeyeater (*Meliphaga keartlandi*) is feeding on blossoms of Bat-wing Coral Tree, (*Erythrina Vespertilio*).



and the River Gum (*Eucalyptus camaldulensis*) which is one of the most common species lining the district's water courses. The white barked Coolabah (*Eucalyptus microtheca*) is another species commonly found along water courses as are good stands of paper barks or cajeputs (*Melaleuca quinquinerva* and *M. leucadendron*).

At Millstream on the Fortesque River grows the graceful Millstream Palm (*Livistona alfredii*) which is found only in the Pilbara and contrasts with the introduced date and cotton palms possibly brought into the area by camel drivers.

The most conspicuous of the ground plants are the tussocky porcupine grasses (*Triodia* spp. and *Plectrachne* spp.) which are popularly called spinifex, although they should not be confused with the true Spinifex which is found on sand dunes along the west coast. The golden-yellow and silver spinifex plains found throughout the Pilbara are transformed after summer rains when the spiky grass clumps change to a fresh green and, with their tall flower stalks bending in the breeze, resemble a waving wheatfield. Besides providing good pickings for many animals including kangaroos, these grass clumps give shelter to many smaller forms of wildlife. Even though outside conditions may be hot and dry, inside the clumps the air is cooler and more humid, thus helping to conserve body moisture for insects, reptiles, small birds and mammals.

Along with the wildlife, much of the Pilbara's flora has also adapted to the harsh semi-desert conditions. An example is Mulga (*Acacia aneura*), one of the most common shrubs occurring in the district, particularly in the southern half of the Pilbara. Mulga can be seen throughout the Hamersley Range in valleys between Newman and Nanutarra where it forms a tall open shrubland, becoming more spread out as soil moisture decreases. Mulga exhibits extremely variable silver-grey narrow 'leaves' or phylodes which are held erect to the sun in the hottest part of the day, thus reducing the effects of intense sunlight and conserving valuable plant sap. In times of drought it will also shed a large proportion of its 'leaves' so as to limit transpiration. The leaf litter and dead branches which accumulate



▲ A native Kurrijong (*Brachychiton australis*) grows at the base of a folded, banded iron formation in the Hamersley Range.

on the ground below the canopy are continually processed by termites and the essential nutrients are returned to the mulga via the soil. The leaf litter also suppresses other plant growth beneath the mulga therefore reducing the chances of fire damage.

Cork-bark (*Hakea suberea*), and Native Walnut (*Owenia reticulata*) also protect themselves from fire but, unlike mulga, do so by insulating their trunks with thick, corky bark.

European history of the Pilbara dates back to 1699 when William Dampier's *Roebuck* visited the coast, anchoring within what is now known as the Dampier Archipelago. However, rather than encourage further exploration of this 'new' land, Dampier's reports depicting the region as waterless and inhospitable ensured there was no further British exploration until over a century later.

In 1861, an accomplished geographer, surveyor, naturalist and geologist, Francis Gregory, surveyed that part of the country lying inland from the North West coast. In the course of the survey Gregory discovered and named the Ashburton, Fortesque, De Grey and Oakover Rivers. He also reported good grazing lands and in 1863 the first settlers arrived bringing with them their stock, and went on to locate good pastures around the Harding and De Grey Rivers.

Roebourne was proclaimed a town in 1866 and Tien Tsin, later to become Cossack, operated as a busy port which was linked to Roebourne by a

tramline. Once established, the pastoral industry remained a mainstay of the Pilbara region until the early 1960s.

For many years prior to this time, gold, copper, tin and other minerals had been worked in a small way and manganese and asbestos exported in reasonable quantities, but it was not until the removal of embargoes on the export of iron ore in 1960 that a surge in exploration activity began, firmly establishing the Pilbara as one of the richest iron ore areas in the world.

Today, large mining consortiums have invested billions of dollars to establish six major mines, ten new townships, 1 200 kilometres of rail and five separate port facilities. Combined with other components such as the production of salt, commerce, light industry and the development of a natural gas project, these factors have been largely responsible for population growth from 4 000 in 1960 to the present population of about 48 000.

Despite this increased growth and activity, the Pilbara essentially remains a wild land, a land of harsh beauty, immense distances and precarious life, often spectacular and always, uniquely Australian.

Adapted from "The Wild Pilbara Iron Country and its natural wonders" by Bert and Babs Wells and published by the Jaycee's Community Foundation Inc. 1982.

# Snakes of the Perth Metropolitan Area

by G. M. Storr and R. E. Johnstone, Western Australian Museum

Snakes are much-maligned animals. Yet most of the world's 3 000-odd species are harmless; less than 2% are dangerous to man or to his livestock and pets. It is therefore a good idea to learn which snakes are dangerous and which should be spared. But first one must distinguish snakes from other elongate limbless creatures.

The presence of a very long, slender, forked tongue and of large scales extending the full width of the abdomen indicate a snake rather than a legless lizard. The latter have a broad, unforked tongue and at least two longitudinal rows of scales along the abdomen. Most legless lizards also have an ear aperture, a feature found in no snake. The possession of a dry (not slimy) skin and of nostrils (instead of gill-slits) separates sea-snakes from eels.

Twenty-four species of snake have been recorded from the Perth metropolitan area. They belong to four families: the blind-snakes, the pythons, the elapid snakes and the sea-snakes.

Blind-snakes are small, slender, burrowing, non-venomous reptiles, which at first sight could be mistaken for earth-worms. However, there is a small mouth under the snout, and their body is covered with hard, shiny scales. They are called blind-snakes because the tiny eyes are only capable of distinguishing light from dark. This warns them whenever they emerge from the soil in daylight when they could become a meal for a hungry magpie or kookaburra.

Blind-snakes occur throughout the warmer parts of the world. There are three species in the Perth area, namely *Ramphotyphlops australis*, *R. waitii* and *R. pinguis*. The last-named is the largest blind-snake in the world; it attains a length of nearly half a metre and is much stouter than other species.

Pythons are medium-sized to very large snakes that suffocate their prey within coils of their highly muscular body. They are found throughout much of Australia, Africa and southern Asia. In the Americas their place is taken by the closely related boas, whose members include the world's largest snake, the anaconda. In pythons the snout is long and the head much wider than the neck. The scales are relatively much smaller than in other land snakes. Pythons hunt at

night; hence their vertical cat-like pupils. Locally there are only two species: the Carpet Python (*Python spilotos*), which reaches a total length of a little more than two metres, and Children's Python (*Liasis childreni*) which is only half as long. The first is a dark snake with a complex colour pattern, the other a pale snake with irregular dark-brown markings. Both are becoming rare in the metropolitan area.



▲ A blind-snake. (*Ramphotyphlops australis*.)

The elapid snakes comprise a fairly large world-wide family of snakes that include such well-known overseas species as the cobras, mambas and kraits. All of them have venom glands in the mouth which are connected by ducts to the fangs, a pair of enlarged hollow teeth in the front of the upper jaw. The act of biting automatically forces venom from the glands into the fangs and from there into the bloodstream of the snake's prey. The function of venom is precisely the same as the constricting coils of the python's body, that is, to immobilize prey before swallowing it, lest the struggling animal break the teeth or otherwise damage the snake's mouth.

All elapid snakes are thus technically venomous, but only a few are sufficiently large or toxic to be considered dangerous to man. There are five such species in the Perth metropolitan area: the Dugite (*Pseudonaja affinis*), the Gwardar (*Pseudonaja nuchalis*), the Tiger Snake (*Notechis scutatus*), the Mulga

Snake (*Pseudechis australis*) and the Southern Death-adder (*Acanthophis antarcticus*).

Dugites and Gwardars have benefited from the opening up of the country and the introduction of the House Mouse, which is now their favourite food. They are large, slender, small-headed snakes with no narrowing at the neck. All scales under the tail are in two longitudinal rows. Dugites are much the commonest of the dangerous snakes in the Perth area and are found everywhere except in the city and heavily built-up suburbs. They are also plentiful on Rottnest Island. When young the head is blackish and the body pale yellowish brown or greenish brown with a vague, darker, herring-bone pattern. Adult Dugites are a dark greenish grey with all-black scales scattered over the back and tail.

Gwardars are closely related to Dugites but are locally confined to the vicinity of the Swan River upstream from Belmont. They differ from Dugites in having small orange spots on the lower surface and 17 (rather than 19) longitudinal rows of scales at midbody, not counting the large scales along the under side. From the medical view point it is not important to distinguish Gwardars from Dugites, for the same antivenom is used for treating bites of both species.

The Tiger Snake is second in abundance to the Dugite. It is shorter and stouter than the Dugite and is blackish above and yellow below. The scales under the tail are in one row. The Tiger Snake favours swamps and streams where it feeds on frogs, but it is also found in dry areas like Garden and Carnac Islands.

The Mulga Snake is similar in size and build to the Dugite. It differs in having 17 longitudinal rows of scales at midbody and about half of the scales under the tail in one row, the others in two rows. The Mulga Snake has a mottled appearance, owing to the front half of each scale being much paler than the rear half.



▲ A legless lizard (*Pygopus lepidopodus*). Observe the ear aperture and regenerated tail; neither feature is found in snakes.

▼ An adult Dugite (*Pseudonaja affinis*.) This example has fewer than average black scales on the back.





▲ A Black-striped Snake (*Vermicella calonotos*). This beautiful little snake is seldom found outside of the Perth metropolitan area.

Formerly it was fairly common in the Darling Range and adjacent parts of the coastal plain, but since about 1940 it has become scarce and locally extinct.

The Southern Death-adder is our most distinctive snake. It has a deep broad head, narrow neck, very thick body, and short tail terminating in a soft spine. Despite its small size (total length less than 70cm) it is deadly, the main danger coming from accidentally treading on it. As it lies in ambush for its prey, the body blends with the background of dead leaves, sand and gravel. Fortunately it is restricted in the Perth area to a small part of the Darling Range south of Lesmurdie.

▼ A Mulga Snake (*Pseudechis australis*).



The largest of the remaining elapid snakes, the Green Whipsnake (*Demansia reticulata*), the Bardick (*Notechis curtus*) and the Crowned Snake (*Notechis coronatus*), attain a length of 65-80cm. Bites from any of these would at worst hospitalize a person for a day or two.

Locally there are two species belonging to the genus *Rhinoplocephalus*, namely Gould's Snake (*R. gouldii*) and the Black-backed Snake (*R. nigriceps*). They are nocturnal species that grow to 50-60cm long and prey on small skink lizards. They occasionally bite, but with little or no effect.



A Tiger Snake, (*Notechis scutatus*). Local specimens are not as strongly patterned as in the Eastern States, where the black and orange stripes gave the species its English name. ▲

Finally among Perth elapids are five members of the genus *Vermicella*: Jan's Banded Snake (*V. bertholdi*), the Black-naped Snake (*V. bimaculata*), the Black-striped Snake (*V. calonotos*), the Narrow-banded Snake (*V. fasciolata*) and the Southern Shovel-nosed Snake (*V. semifasciata*). They are small, nocturnal, burrowing snakes with a maximum length of 30-45 cm. Most of them are beautifully coloured, and all of them are gentle, reluctant to bite and virtually harmless.

Sea-snakes are common in the warmer waters of the Indian Ocean and west Pacific; only one species reaches the east Pacific, and none occurs in the Atlantic. Nearly all of them feed on fish. They differ from land snakes in having the tail flattened from side-to-side like an oar, and the abdomen keel-shaped rather than flat. These adaptations for swimming render them almost helpless on land.

In Western Australia sea-snakes are not normally present south of Shark Bay. However the northern currents in winter bring down a good number of sea-snakes (and turtles) every year. Six species have been found dead or dying on local beaches after storms: the Yellow-bellied Sea-snake (*Pelamis platura*), the Spotted Sea-snake (*Hydrophis ocellatus*), the Spectacled

▼ A Green Whipsnake, (*Demansia reticulata*) the fastest snake in the Perth area. Note the characteristic comma-like marking around the eye.





▲ Gould's Snake, (*Rhinoplocephalus gouldii*) possibly the commonest snake in the area. The pale spot in front of each eye distinguishes it from other black-headed snakes.



▲ A Bardick, (*Notechis curtus*). A bad-tempered snake but not dangerous.

▼ A Southern Death-adder, (*Acanthophis antarcticus*).



Sea-snake (*H. kingii*), the Bar-bellied Sea-snake (*H. elegans*), the Olive-headed Sea-snake (*H. major*) and Pooles' Sea-snake (*Aipysurus pooleorum*). The Yellow-bellied Sea-snake is believed to be deadly. Little is known about the toxicity of the other species, but they are best treated as if they were dangerous.

Dugites and other snakes are plentiful in the outer, less populated parts of the Perth metropolitan area. The only thing that can be done about this is not to make your house and out-buildings attractive to mice, a favourite food of the larger snakes. Next, one must always be conscious of the possible presence of snakes and so not put a hand or bare leg where a snake could be lurking. If a large snake has to be killed, break its back behind the neck with a weapon sufficiently long for the hands to be out of reach of the lunging snake. Remember that over a distance of nearly a metre, a full-grown Dugite or Tiger Snake can thrust its head forward faster than you can withdraw your hands.

Anyone bitten by a dangerous snake should have a broad bandage wrapped firmly around the bite and as much of the limb as possible on the heart side of the bite. The victim should be taken as soon as possible to hospital. Stimulants must not be given, and the patient must be kept calm; the whole point of first aid is to delay the spread of venom. If the snake was killed, take it to the hospital so that the proper anti-venom can be administered. Snake venoms are highly species-specific, as are the anti-venoms that neutralize them; hence the importance of correct identification in cases of snake bite.

For further information on snake bite consult G. M. Storr's *Dangerous Snakes of Western Australia* which is available from the Western Australian Museum for \$2.50 (postage 60c extra). A condensed form of this booklet is also available as a poster (price \$1.00, postage 60c). The Museum also has in preparation a book on the *Snakes of Western Australia*; this deals with all 98 species known from the State and hopefully will be published in 1984.



# New Reserves Proposed for Dampier Peninsula

Lying between the aridity of the Great Sandy Desert and the sub-tropical North-west Kimberley region, the Dampier Peninsula exhibits a unique blend of habitats and wildlife from both areas together with vegetation formations found nowhere else in the world. Since European settlement, a total of 311 plant, 33 mammal, 214 bird, 69 reptile and 9 amphibian species have been recorded on the Peninsula in a variety of habitats ranging from coastal mangroves and mudflats to sandplains, pindan, jungle-like vine thickets, freshwater swamps and limestone sinkholes. Despite this, only one small portion, the Coulomb Point Nature Reserve, has been reserved for conservation to date, and it includes only some of the rich variety of habitats found on the Peninsula. Consequently, proposals are now before the State Government for a further three reserves to be declared, totalling another 29 117 hectares.

The natural history of the Dampier Peninsula and its environs soon after first European settlement is relatively well known. Extensive collections of vertebrates were made by Dahl from 1895 to 1896 and by Soderberg and Lonnberg from 1910 to 1913. In most cases their specimens were accompanied by environmental descriptions including general accounts of the vegetation.

The earliest recorded observations of the vegetation of the Peninsula were made by William Dampier who anchored in the *Cygnets* near Karrakatta Bay in January 1688. Dampier described the hinterland as an area "... of dry, sandy soil, destitute of water ... yet producing diverse sorts of trees; but the woods are not thick nor the trees very big. Most of the trees ... are about the bigness of our large apple trees and about the same height. There was pretty long grass growing under the trees but it was very thin" (Grant-Richards 1906).

Another party, led by the French naval surveyor, Nicholas Baudin, charted the western coast of the Dampier Peninsula in August 1801 naming a number of prominent features including Cape Bertholet, Carnot Bay, Cape Borda, Cape Leveque and Coulomb Point.

In February 1822, Phillip King in the *Bathurst*, accompanied by the botanical collector, Alan Cunningham, charted the eastern coast of the Peninsula and named Point Cunningham, Goodenough Bay, Foul Point and Disaster Bay. A number of days were spent ashore exploring and collecting plants as the *Bathurst* lay at anchor in Goodenough and Cygnets Bays.

Further observations on the vegetation as seen soon after the wet

season were made by Alexander Forrest in April 1879 during his expedition from the De Grey River to Beagle Bay. Forrest observed that "... The country along the south and east shore of Beagle Bay is very good, and abounds in permanent springs;



▲ *Eucalyptus*—pindan comprising (*E. miniata*) open forest, with scattered (*E. polycarpa*) and (*Acacia tumida*) forming a sub canopy in the proposed Borda Nature Reserve.

nearly every mile surface water is to be found. The country is however rather densely wooded with cajeput, red and white gum, and many species of acacia, as well as the palm tree, also the black wattle which would in course of time be a valuable article for export. The cajeput tree here grows to an immense size, and would when sawn be suitable for building purposes and fencing." The palm Forrest referred to is actually *Pandanus*, and the black wattle is either *Acacia tumida* or *A. eriopoda* (the most common tree wattles of the Peninsula).

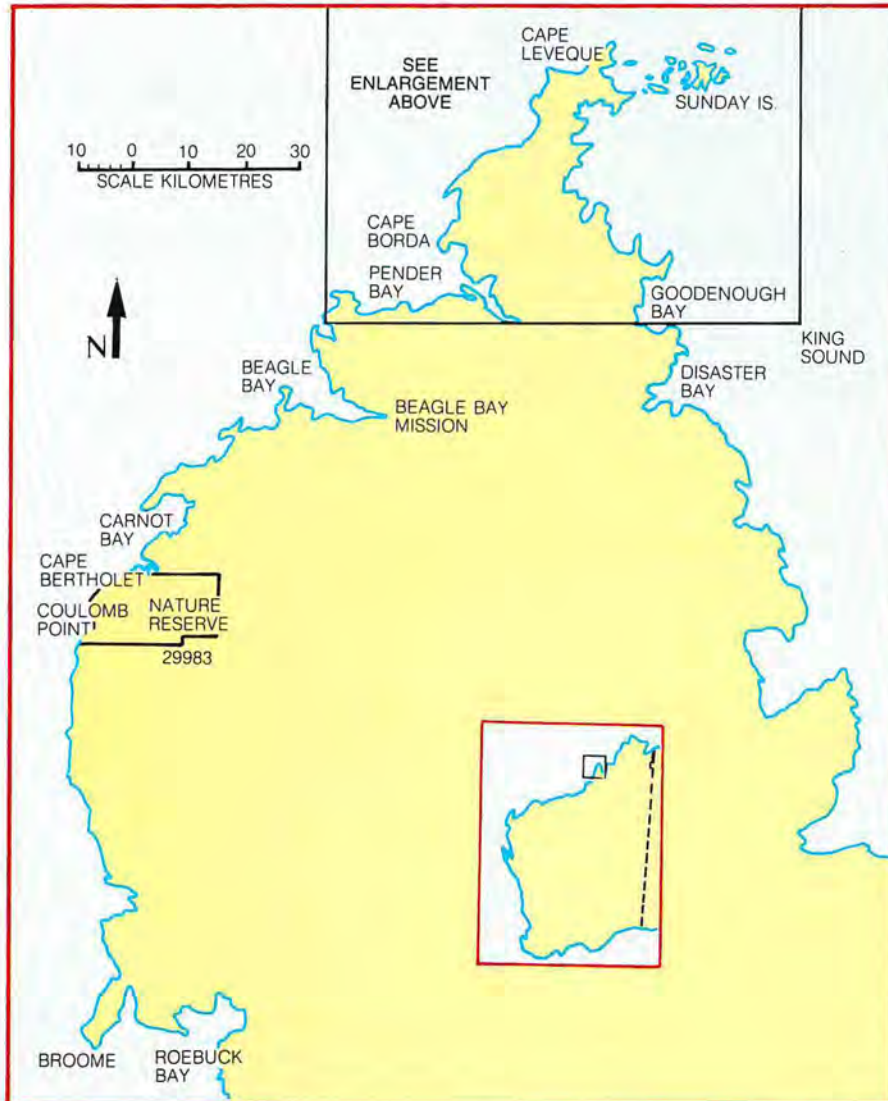
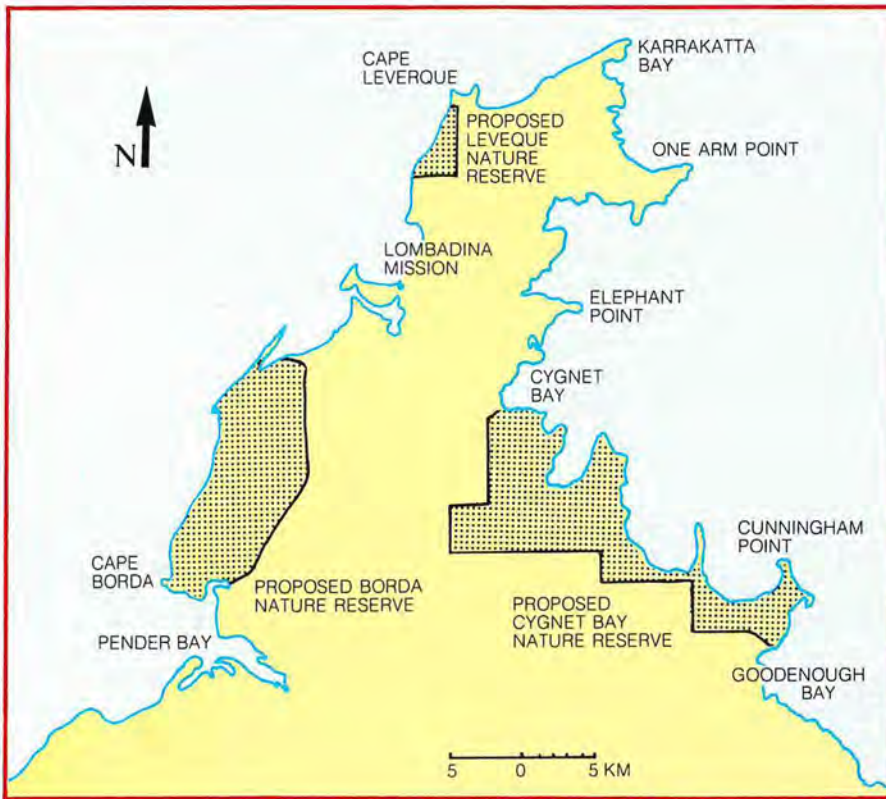
During the same year Julius Brockman made notes on the vegetation of the Peninsula during a

trip from Beagle Bay to the Fitzroy River and observed dense wattle thickets over 'bamboo grass' east from Beagle Bay. Brockman also noted that the country about 30km east of Beagle Bay was very dry, much of it burnt clean. Brockman made particular note of the dense vine thickets found behind the coastal sand dunes on the north end of the Peninsula "... We turned into the beach again at sunset ... and had hard work to force our way through the jungle that skirts the sea hills, having to get out our knives to cut the tangled masses of creeper, often as strong as rope".

In 1906, W. V. Fitzgerald collected plants near Cygnets Bay, Swan Point and Cape Leveque while taking part in the Crossland Expedition. Further collections from the Peninsula were made by C. E. Lane-Poole in October, 1919 during a visit to the area in connection with the issuing of licences to extract tannin from mangrove bark. Early additions to the knowledge of the Peninsula's flora were also made by C. A. Gardner during the Easton Expedition of 1921.

Despite this seeming wealth of information, some of which was very colourful, it should be noted that the descriptions of vegetation structure in the journals and publications of the above investigators were very superficial and restricted to specific localities. In fact, the first detailed account of vegetation structures on the Peninsula was not produced until 1964 (Speck, Wright and Rutherford) and the first detailed vegetation map of this area was compiled as recently as 1979 by J. S. Beard.

It is quite likely that the vegetation of the Dampier Peninsula has changed to some degree since the beginning of this century, particularly when related to densities and



understorey elements, as since about 1890 the Peninsula has been subjected to intensive pastoral management. This has involved intensive grazing, very frequent and widespread burning and some localised clearing – events not conducive to regeneration of tree species and the persistence of shrub layers and leaf litter, but favouring the development of annual and perennial grasslands. However, there is evidence that widespread bushfires pre-dated European settlement. In 1838 Stokes commented that “. . . indeed during the dry season it not infrequently happens that an immense tract of land is desolated by fire, communicated, either by design or carelessness of the natives, to the dry herbage on the surface”.

In fact, grazing and burning are now recognised as important factors in the modification of vegetation structure and floristics and native fauna richness elsewhere in Australia.

A joint field study involving members of the Western Australian Wildlife Research Centre, the Western Australian Herbarium, the W.A. Museum, the Bureau of Mineral Resources and the C.S.I.R.O. in 1977 and 1978 noted that there was hardly a hectare of the Dampier Peninsula which did not include at least one cattle pad while huge areas were at early stages of regeneration after fire. Trampling damage was especially apparent in the species rich communities along watercourses, in ephemeral swamplands, and in the sub-coastal semi-deciduous vine forests – all sites where cattle congregate. The widespread influence of fire on the Coulomb Point Nature Reserve had also sharply reduced mature stands of the *Acacia* dominated ‘pindan’ vegetation for which the reserve was originally proclaimed.

During 1980 and 1981 higher cattle prices induced the mustering and sale of stock. The effect of this reduction in cattle numbers was apparent in June 1981; trampling was a severe problem only near water and in vine forests and other near-coastal communities. Burning, however, was still a major influence on the vegetation; large tracts of blackened country were evident with green foliage being retained only by mature Eucalyptus trees and by scarcely-visible green shoots in the blackened

## Aerial view of part of the proposed Cygnet Bay Nature Reserve



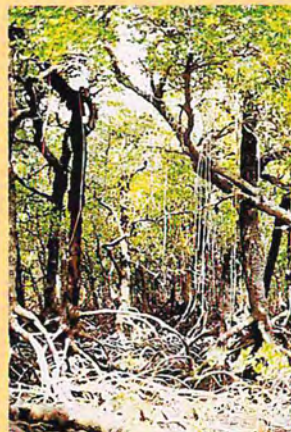
Sandstone scene at the south end of Deepwater Point, showing shrub which is (*Exocarpos latifolius*) over hummock grass (*Triodia pungens*).



*Eucalyptus*—pindan typical of the northern end of the Peninsula.



A narrow fringing of (*Melaleuca acacioides*), forming a low closed forest.



(*Rhizophora stylosa*) as an open forest in the mangroves fringing the bay.



Samphire fringes the coastal mudflats with the landward zone of the mangrove community in the background.



▲ Limestone surface in the proposed Borda Nature Reserve showing a sink hole. The dense grass is (*Spinifex longifolius*).



▲ Freshwater swamp in the Coulomb Point Nature reserve.

▼ *Eucalyptus*—pindan (*E. miniata*) open forest with a flowering (*Acacia tumida*) visible in the sub-canopy. A typical scene in the proposed Borda and Cygnet Bay Nature Reserves.



butts of the tussock grass. At the same time, the country immediately south of Pender Bay was seen burning on a 20 kilometre front for at least five days.

The woodlands to open-forests of *Acacia* and *Eucalyptus* that now dominate the Dampier Peninsula are best described as a tree savannah over annual tussock grassland as the 1977-1978 survey noted substantial shrub strata only in discontinuous and isolated areas that had escaped burning for several years. In general, the Peninsula could be described as a very gently undulating, monotonous and featureless sandplain dominated by the above eucalypt and *Acacia* woodland (pindan) although the coastal and near coastal areas exhibit considerable habitat diversity. Also in general terms, the northern part of the Peninsula is much wetter than the south, to the extent that it supports small pockets of monsoon forests existing at the southern limit of their range in Western Australia.

The Dampier Peninsula has a tropical climate with a distinct wet season from December to March during which almost all the annual rainfall is received and humidity is high. Only two significant seasons occur, separated by brief transitional periods during which daytime temperatures are noticeably higher.

The difference between the wet and dry seasons is dramatic, the landscape taking on a completely different complexion. In 1926 Dahl described the change vividly“ . . . some weeks ago these plains were desert. Dry and fine sand rose in little clouds at every step of the horses, while the wind swept the sand away and played with the dry debris of the withered vegetation. Now it might happen that the grass and rushes rose higher than the saddle as one rode among chains of glittering lagoons, and every step of the horses might flush a profusion of waterfowl . . . almost all of them were species which during the dry season were entirely absent from these parts.”

As Dahl suggested, birdlife is one of the Peninsula's strongpoints. A total of 214 species comprising 143 non-passerine and 71 passerine have been recorded from this area. The richness of the avifauna is mainly due again to the diversity of coastal

habitats whereas the non-coastal fauna is fairly typical of semi-arid Kimberley.

Although acacia-dominated pindan covers about 70% of the Peninsula and contains many flowering trees and shrubs and often a good ground cover of tussock and soft grasses, it has a fairly low number of sedentary bird species such as the Rufous Whistler, Grey Shrike-thrush, Crested Bellbird, Grey-crowned Babbler, Variegated Fairy-wren, Rufous Songlark and Singing Honeyeater. A larger category comprises nomads, breeding and non-breeding visitors and nectivorous birds following the flowering trees and shrubs.

At the more humid northern end of the Peninsula, the pindan occurs as *Eucalyptus miniata*, *E. tectifera* and *E. papuana* forests and woodlands. These cover only 15% of the Peninsula but boast about 30 species including the Rainbow Lorikeet, Varied Lorikeet, Boobook Owl, Blue-winged Kookaburra, Jacky Winter, Hooded Robin, Northern Fantail, Leaden Flycatcher, Australian Sittella, Black-tailed Treecreeper, Striated Pardalote and Gouldian Finch.

In contrast to the above, a total of 161 bird species has been recorded in the remaining 15% of the Peninsula, almost all of which consists of coastal or near-coastal habitat. For example, the large blocks of mangal along the Dampier Peninsula coasts are home to 14 birds most of which are confined to mangroves: Mangrove Heron, Little Bronze Cuckoo, Mangrove Kingfisher, Brown-tailed Flycatcher, Mangrove Robin, Mangrove Golden Whistler, White-breasted Whistler, Grey Fantail, Broad-billed Flycatcher, Shining Flycatcher, Mangrove Flyeater, Dusky Flyeater, Yellow White-eye and Red-headed Honeyeater.

Birds mostly seen in the Peninsula's samphire flats, open grasslands and coastal dunes include Brown Quail, red-breasted Button-quail, Australian Bustard, Oriental Pratincole, Horsfield's Bushlark, Richard's Pipit and Golden-headed Fantail Warbler.

The coastal *Melaleuca* woodlands, Kimberley vine forests, thickets and scrub also harbour a considerable number of species including the Bar-shouldered Dove, Rufous Whistler, Red-winged Parrot, Black-faced

Cuckoo-Shrike, Great Bowerbird, Red-crowned Pigeon, Brown Honeyeater, White-gaped Honeyeater and the Rufous-throated Honeyeater. Other species found in vine forests include the Mangrove Golden Whistler and Little Friarbird.

Watercourses, swamps, tidal mudflats and beaches are important for many species of waders and waterfowl.

Although the Peninsula boasts a rich avifauna, some species which are common in similar habitat on the Yampi Peninsula (to the north-east) and the Fitzroy River (to the south-east) are conspicuous by their absence. These include the Sulphur-crested Cockatoo, Blue-faced Honeyeater, Silver-crowned Friarbird, Crimson Finch and Masked Finch. This is probably due to the limited access to the Peninsula, bounded as it is by King Sound in the north-east and the semi-arid pindan to the south. This same restriction is probably a major reason for the relatively small number of terrestrial mammals encountered on the Peninsular.

Since European settlement, only 33 species of native mammal have been recorded on the Peninsula but a number of these have since become extremely rare or have disappeared altogether. Some of the reasons for this decline may include changes in the environment brought about by the activities of the pastoral industry as well as the introduction of exotic species such as the black rat, cat, feral donkeys and cattle.

Amongst those mammal species which persist on the Dampier Peninsula are the Red Kangaroo, Sandy Wallaby, Northern Nail-tailed Wallaby, Northern Planigale, Western Chestnut Mouse, Little Native Mouse, Black Flying Fox, Red Flying Fox, Echidna, Dingo and about 12 species of insect-eating bats.

As outlined at the beginning of this article there is currently only one conservation reserve on the whole Dampier Peninsula. The Coulomb Point Nature Reserve comes closest to representing the typical habitat of the Peninsula rather than the special by including extensive areas of *Acacia* pindan communities on sandplains and, to a lesser extent, on light alluvial soils, as well as small

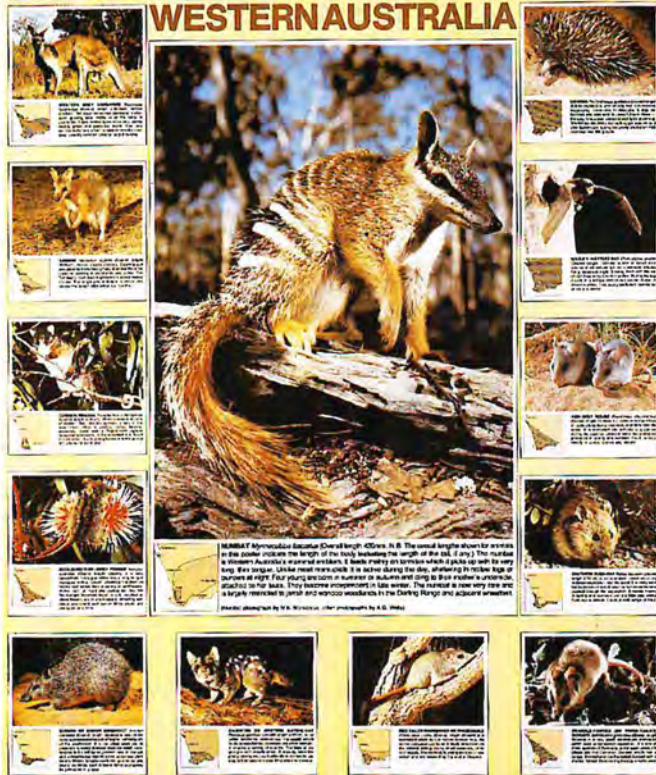
areas of four different coastal environments: samphire and grasslands on supratidal mudflats, estuarine low forests of paperbarks, coastal sand dunes and vine thickets. However, it does not include the eucalypt pindans of the northern end of the Peninsula, nor does it include tidal mudflats or mangroves because the reserve does not extend to low water mark.

Consequently, a further three conservation reserves are proposed on the Dampier Peninsula. These are the Borda Nature Reserve (12 302ha), the Cygnet Bay Nature Reserve (15 805 ha) and the Leveque Nature Reserve (1 010 ha). All should extend to the low tide line. The three proposed nature reserves were selected from the only remaining area of vacant Crown land in well-watered areas of the South-west Kimberley. Together with the Coulomb Point Nature Reserve they total only 3.9% of the Peninsula's land surface yet represent most of its biological richness. If granted, it has also been recommended that the reserves should remain open to Aboriginal usage for traditional purposes such as ceremonial use of sacred sites, and existing access routes to oyster and pearl licence areas should also be guaranteed.

The above story was adapted for SWANS by Clifford Young from Wildlife Research Bulletin Number 11, Wildlife of the Dampier Peninsula, South-West Kimberley, Western Australia, edited by N.L. McKenzie 1983. The Bulletin is available from the Extension and Publicity Office of the Department of Fisheries and Wildlife, 108 Adelaide Tce, Perth.

# New Posters Available

## MAMMALS OF THE SOUTH WEST OF WESTERNAUSTRALIA



WESTERN AUSTRALIAN DEPARTMENT OF FISHERIES AND WILDLIFE

## THE KANGAROO PAWS AND CATSPAWS OF WESTERN AUSTRALIA



WESTERN AUSTRALIAN DEPARTMENT OF FISHERIES AND WILDLIFE

The Extension and Publicity Office of the Western Australian Department of Fisheries and Wildlife has produced two large (600 x 900 mm approximately) new posters depicting wildlife of Western Australia.

The first poster entitled "Mammals of the South West of Western Australia" shows some of the mammals of the area with brief informative notes and distribution maps for each species.

The second poster illustrates all the known species of "Kangaroo Paws and Catpaws of Western Australia, again with distribution maps and accompanying notes.

The posters are the first in a proposed series of fauna and flora posters and may be purchased from the public counter of the Department of Fisheries and Wildlife at 108 Adelaide Terrace, Perth W.A. 6000 or by mailing in a completed Postal Order Form shown on the opposite page, with the correct payment of \$3.00 per poster including postage and packaging, to accompany the order.



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