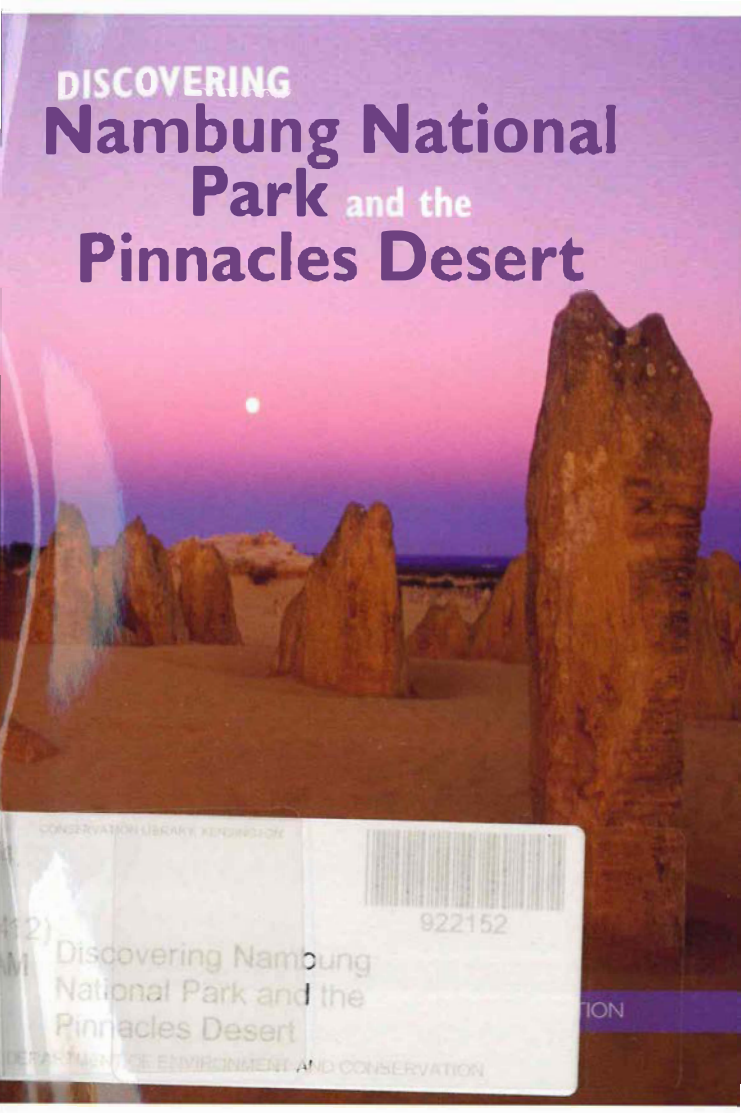
DISCOVERING Nambung National Park and the Pinnacles Desert



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by
George Watson, Keith Hockey, Derren Foster
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Department of
Environment and Conservation

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Photo – Jeremy Flynn/DEC

Above: Part of the Lake Thetis loop trail.
Opposite: Pinnacles Desert.

Photo – George Watson/DEC

INTRODUCTION

Nambung National Park features beautiful beaches, coastal dune systems, low heathland rich in flowering plants and mystical geological formations including stromatolites, cliffs and caves. The vegetation bursts into flower from August to October, creating a memorable spectacle for visitors. In the midst of this diversity is the Pinnacles Desert, an iconic Australian landscape. Here, thousands of limestone pillars rise from the shifting yellow sands, resembling a landscape from a science fiction movie. Offshore, the Jurien Bay Marine Park protects a stunning temperate marine environment and surrounds island nature reserves that provide breeding and rest areas for seabirds and the endangered Australian sea lion.

The park is a comfortable day trip from Perth. This book is your guide to some of the plants and animals commonly seen in the park. It also includes information on the area's history, walk trails and the wealth of information you can discover at the Pinnacles Desert Discovery centre.

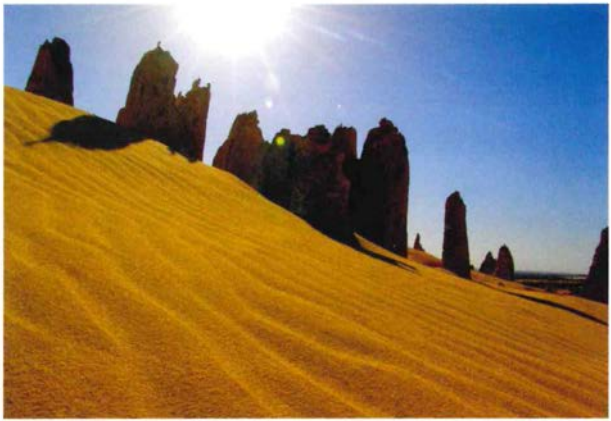
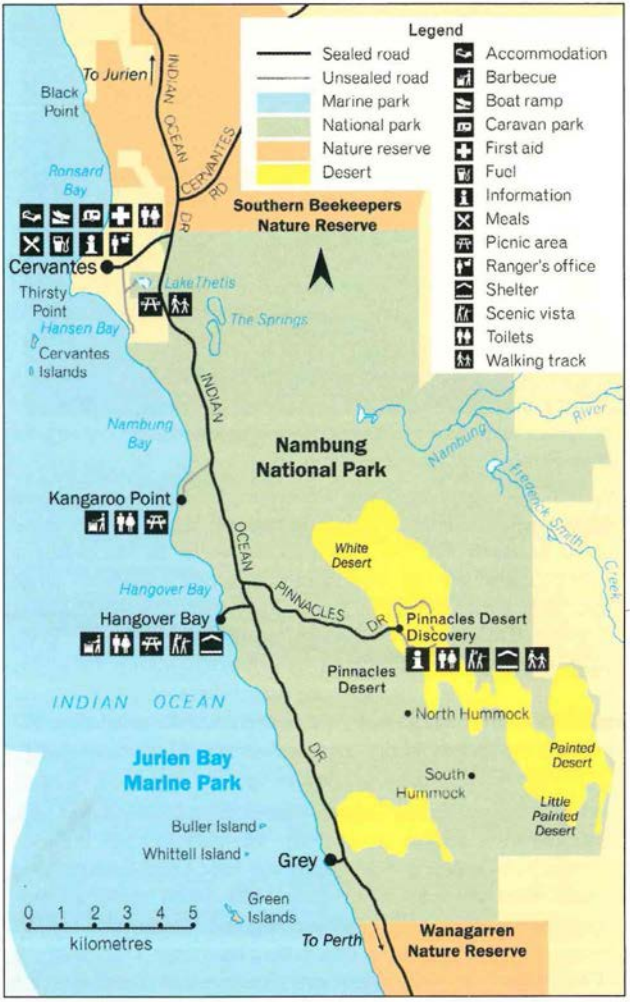


Photo – Samille Mitchell/DEC

Above: Pinnacles Desert.


Legend
Sealed road
Unsealed road
Marine park
National park
Nature reserve
Desert
Accommodation
Barbecue
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South Hummock
Little Painted Desert
Buller Island
Whittell Island
Grey
Green Islands
0 1 2 3 4 5
kilometres
To Perth
Wanagarren Nature Reserve

HISTORY

The south-west of Western Australia was occupied by a number of tribal groups collectively known as Nyoongars, and the Nambung area was frequented by the Yued people. It was common for people further inland to visit the coastal sandplain for a time each summer. In particular, the lakes and swamps which occur in lines through the interdunal valleys of the limestone belt attracted Aboriginal people because of the abundant freshwater tortoises, fish, waterbirds and shellfish. Aboriginal artefacts at least 6,000 years old have been found in the park.

The first known European recording of the Nambung area dates back to 1658, when the North and South Hummocks first appeared on Dutch maps. The Hummocks were also mentioned in navigator Philip Parker King's journal in about 1820.

In 1839, George Grey (later Governor of South Australia) was shipwrecked in Gantheaume Bay (at Kalbarri) about 480 kilometres north of Perth. On his walk back to Perth he discovered a watercourse in the Nambung area and named it Frederick Smith River after a member of his group who perished nearby. Explorer Augustus Gregory passed through the area in 1848 and, during 1874-75, the region was surveyed by JS Brooking, who renamed the Frederick Smith River the Nambung River. Nambung is an Aboriginal word that means crooked or winding and it was from this river that the park was named.

From 1889 the Old North Road Stock Route ran between Dongara and Perth, passing through an area now included in the national park. Until 1894 the stock route offered a safe path to travel between districts, with watering holes along the way. The Nambung area gained more attention in the early 1900s when phosphate was discovered in the caves of the Nambung River valley. Local farmers mined the phosphate on an intermittent basis from 1906. Evidence of the mining still exists. A temporary reserve was placed over the

In the early 1960s, Nambung was still isolated and off the beaten track.

Nambung River valley, to protect the caves, in 1927. However, the pinnacles may not have been discovered by Europeans until 1934, when they were first mentioned in a Geological Survey report.

During World War II the stock route was a major movement corridor for the army. After the war, sections of the stock route were still in use by apiarists, hunters, fishermen and holiday makers, until a network of better roads was developed to service farms and coastal towns.

The Pinnacles Desert remained relatively unknown until the late 1960s, when the Department of Lands and Surveys agreed to add the area to the already existing national park, which had been established in 1956. Today the park is visited by approximately 250,000 visitors, from all over the world, each year.

FORMATION OF THE PINNACLES

In the heart of Nambung National Park, thousands of huge limestone pillars rise out of a stark landscape of yellow sand to form the Pinnacles Desert. In places they reach up to 3.5 metres tall. Some are jagged, sharp-edged columns, rising to a point; others resemble tombstones. What exactly are the pinnacles and what natural processes have created these odd and spectacular structures?

Material for the limestone of the pinnacles came from sea shells broken down into lime-rich sands. The sand was brought ashore by waves and then carried inland by the wind to form dunes. Three old systems of sand dunes run parallel to the Western Australian coast, marking ancient shorelines.

The oldest of these, the Spearwood dune system, is characterised by yellow or brownish sands. In winter, rain, which is slightly acidic, dissolved small amounts of calcium carbonate as it percolated down through the sand. When the dunes dried out in summer, the calcium carbonate was precipitated as a cement around grains of sand in the lower levels of the dunes, binding them together and eventually producing a hard limestone rock, known as Tamala limestone.

At the same time, vegetation that became established on the surface aided this process. Plant roots stabilised the surface, and encouraged a more acidic layer of soil and humus (containing decayed plant and animal matter) to develop over the remaining sand. The acidic soil accelerated the leaching process, and a hard layer of calcrete formed over the softer limestone below. Cracks which formed in the calcrete layer were exploited by plant roots. It is considered that these plant roots protected and strengthened the forming pinnacles, with subsurface erosion continuing until only the most resilient columns remained. The pinnacles, then, are the remnants of the formerly thick bed of limestone which has largely been eroded. As bush fires denuded the vegetation binding the sand, south-westerly winds carried away the loose particles and left limestone pillars.

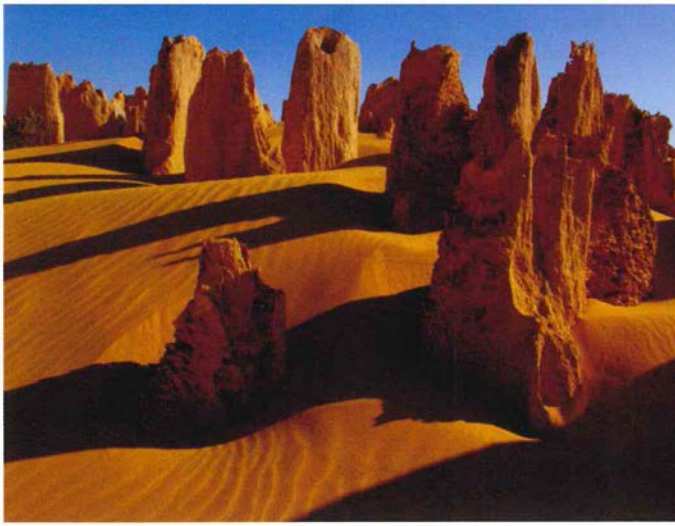


Photo – Samille Mitchell/DEC

Pinnacles Desert.

Other examples of pinnacles can be seen south of Nambung National Park, near Guilderton, Lake Gnangara, Bibra Lake and Mandurah, though these are less developed.

FEATURES IN THE PINNACLES The astute observer may see clues to the origin of the pinnacles in some of their features. For example, many of the pinnacles display cross-bedding structures, where the angle of deposition of the sand changes abruptly. This indicates that the dunes, from which the limestone bed formed, were originally laid down by the wind. In contrast, sand deposited under water generally forms horizontal layers. However, sand moved by the wind is laid down in front of moving dunes, which may slope very steeply. The windward side of the dunes slope at a much lower angle than the side which is sheltered from the wind. Thus the limestone rocks can show what the dominant wind direction was thousands of years ago.

Another notable feature of some of the pinnacles is their mushroom-like shape. These are remnants of the calcrete capping mentioned

earlier. The mushroom shape has formed because the capping is harder than the limestone below it and therefore weathers at a slower rate. This layer of very hard limestone formed at the interface between the organic soil and the calcium-rich sand, within the zone of the heaviest chemical weathering.

Formations resembling petrified twigs, a few centimetres high and as thin as a straw, can also be seen. These are formed as plant roots absorb water from the surrounding sand. Dissolved calcium carbonate in this water precipitates around the roots, cementing the sand and hardening the area. Known as rhizoliths, these formations are exposed when the wind erodes the softer sand around them.

Other egg-shaped structures in the limestone were formed in a similar manner and are actually the fossilised pupal cases of a species of weevil. The beetle-like larvae burrowed into the sand and then secreted a case around its body in readiness for metamorphosis. Once again, the higher acidity of these structures encouraged water to dissolve calcium carbonate and then cement the sand around the cases. The egg-shaped formations are hollow inside and some even have holes in one end from which the adult weevil emerged. They have since been exposed by erosion.

THE WINDS OF TIME Although the formation of the pinnacles would have taken many thousands of years, they were probably exposed only in quite recent times. Aboriginal artefacts at least 6,000 years old have been found in the Pinnacles Desert despite no recent evidence of Aboriginal occupation. This tends to suggest that the pinnacles were exposed about 6,000 years ago and then covered up by shifting sands, before being exposed again in the past few hundred years. This process can be seen in action today – with the predominantly south-westerly winds uncovering pinnacles in the southern part of the Pinnacles Desert but covering those in the north. Over time, the limestone spires will no doubt be covered by other sand drifts and the cycle will be repeated, again and again.

THE FORMATION OF THE PINNACLES

Sand dunes form - cross-bedding reflects different periods of dune development.

Plants colonise the dunes - their roots play a role in helping turn the dune sands into limestone.

Extensive dissolution of softer parts of the limestone over a long period of time has left harder pinnacles of limestone, surrounded by insoluble residue of sand.

Plants colonise the dunes - their roots play a role in helping to turn the dune sands into limestone.

PINNACLES DESERT DISCOVERY

The Pinnacles Desert Discovery (PDD) interpretive centre is located amid the kwongan heath on the edge of the yellow sands of the Pinnacles Desert. Step inside and you'll be swept up on a journey through the desert. Using award-winning internal design, interpretation, merchandising and world-class facilities, the PDD encourages visitors to use all of their senses to identify and experience the hidden wonders and signs of life in the Pinnacles Desert and the environment around them. It includes displays, soundscapes, video footage, back-lit panels, objects and static displays that interpret the geology of the pinnacle formations and the cultural and natural heritage values of the area. Displays do not provide whole didactic stories, but rather stimulate thought and encourage visitors to make the desert experience unique to themselves, limited only by their imagination and powers of observation.

Visitors can also buy a memento of their visit at the centre's retail gallery, which stocks products that have been selected and developed to reflect the values of the site.

The building has been designed to blend with the surrounding environment and incorporates solar power, passive solar building design and rainwater collection and use. Toilets and car park facilities are available on site and a 1.5–kilometre return walk trail through the pinnacles starts from the visitor centre (see overpage).

Above: PDD centre exterior.

Below: PDD centre interior.

Photos – John Gollings

PINNACLES LOOP TRAIL

1.5 kilometres return

Starting from the Pinnacles View Lookout, this walk trail winds its way through the Pinnacles Desert to a lookout and back to the Pinnacles Desert Discovery centre. The 1.5-kilometre trail provides you with the opportunity to immerse yourself in the landscape and explore the origins of the intriguing pinnacle structures.

SIGNS OF LIFE The scorching sands can be a desolate place, but they provide a blank canvas that reveals the tracks and traces of the previous night's activities. Look closely for the signs of life in the desert as you move through the pinnacles. Long winding trails left by sand gropers are commonly seen in the winter, as these invertebrates are forced to the surface to avoid the dense wet sand below. Often the smallest things are the most interesting, so look closely. Emus and kangaroos are regular visitors to the desert but are rarely seen during the heat of the day. Their tracks are commonly seen in the desert and can provide clues to what they are feeding on, where they are going and where they sheltered during the day.

A WINDOW BACK IN TIME As you progress through the first of the pinnacles, take a close look at them for evidence of the soil structure within which they were created. Is there evidence of how the sands were laid down? Distinctive or different layers of limestone in each pinnacle show that these layers were laid down over different periods. You may be able to find some burnt limestone that has been recalcified into the formation of the pinnacles indicating the presence of fire in the landscape many thousands of years ago.

When the pinnacles were formed below the soil surface, the soil environment immediately around roots was very different. This resulted in the concentration of calcium and quite a different pattern of calcification, which can be seen exposed in the walls of the pinnacles. These areas are paler than the parent material and reflect the form of the root or root mass that influenced their development. Have a close look at the pinnacles for these forms and shapes. Many

Photo – George Watson/DEC

are small and finger width, winding through the pinnacle. Others are large with often only parts of the shape visible as semi-circular or tubular forms. All of these structures and shapes in the pinnacles provide clues as to the formation of pinnacles beneath the soil surface.

COASTAL INFLUENCE As you climb the central dune to the Desert View Lookout, take a moment on reaching the top to look back to the coast. It is from here that the calcium carbonate, which cements the sand to form limestone, came. White dunes are visible in the distance. These have formed as calcium-rich sands from the ocean are blown inland by the prevailing south-westerly winds. To your right, large white mobile dunes can be seen burying a grove of tuart trees. These sands are lighter than the large-grained yellow sands around the pinnacles and at your feet. The yellow sands upon which you stand have had the white calcium leached out and the lighter shell fragments blown away to form the mobile dunes to the north.

PLANTS FIGHT FOR LIFE As the trail continues past the Desert View Lookout, it takes you through pockets of vegetation fighting for a foothold in this difficult environment. Vegetation gradually invades the southern side of the desert as sands in this region are heavier and more stable and existing vegetation provides shelter and a seed source for the advancing kwongan heath.

APPRECIATING THE PINNACLES As you cross the road on the final leg of the trail, you arrive at an area with some of the largest pinnacles in the park. Take your time and use all your senses to make this experience unique and personal. Find a comfortable spot and close your eyes. Take a deep breath of the fresh air that has flown for kilometres over the Indian Ocean. Listen closely to the sea breeze and feel its soft caress upon your face, one of the principal forces that have exposed the pinnacles. Feel the bite of the sun on your skin. Hear the chatter of small birds hidden in the thick heath, and the distant calls of crows patrolling the desert for a meal. There is life here; its evidence is all around; you just need to look closely and use all your senses.

Photo – George Watson/DEC

Above: Desert view lookout.

Below: Nambung coastal dunes.

Photo – Brett Dennis/Lochman Transparencies

LAKE THETIS LOOP TRAIL

1.5 kilometres return

Lake Thetis, two kilometres from Cervantes, supports a threatened ecological community of stromatolites and other bacterial communities. The Lake Thetis Loop Trail leads you around the shores of the lake, providing opportunities to see and learn about these communities and the interesting environment that supports them. The 1.5-kilometre trail provides access for people with disabilities along an initial 300 metres of boardwalk, which passes the best examples of stromatolites in the lake. The first stromatolites formed 3.5 billion years ago and may have played a key role in transforming life on the planet. Cyanobacteria in the rocky structures converted carbon dioxide into oxygen on a massive scale, thus paving the way for the earliest oxygen-dependent life. You can learn about the stromatolites' fascinating role in Earth history by reading interpretive signage along the walk trail.

BLISTER MAT COMMUNITY The first 200 metres of boardwalk protects a crenulate microbial or 'blister mat' community from the trampling feet of visitors. Bacteria growing in the moist surface soil produce gas bubbles resulting in a blister-like appearance on the soil surface. This community is easily damaged; vehicle tracks and footprints through this area can remain for many years.

HOW STROMATOLITES WERE FORMED A small viewing platform brings you up close and personal with stromatolites, without getting your feet wet. The domed rock-like structures on the shores of the lake are stromatolites. These are living colonies of cyanobacteria which cover the wet surface of the domes. As the colonies of bacteria grow upward, they bind calcium carbonate, depositing it on the surface of the dome and increasing the size of the structure incrementally. Different types of cyanobacteria deposit calcium carbonate in varied forms, producing differently shaped domes. The dark areas on the structures are active cyanobacteria colonies which are continuing to grow the stromatolites.

Photo – Steven Buitenhuis/DEC

Above: Stromatolites, Lake Thetis.

Below: Lake Thetis viewing platform.

Photo – Michael Ziebarth/DEC

LAKE LIFE The waters of the lake are 1.5 times saltier than seawater, creating a very harsh but stable environment in which few micro-organisms can survive. The bacteria that are able to survive in these conditions have few competitors and have therefore been able to survive for thousands of years.

The Lake Thetis trail leaves the boardwalk and continues around the eastern side of the lake. It is here that you are most likely to see a range of waders and waterbirds. Migratory waders such as the bared godwit feed on crustaceans and other invertebrates at the water's edge. Australian shell ducks, musk ducks, little cormorants and Australian pelicans are also common.

Tiny invertebrates form the basis of the diet for many migratory waders. They feed on a purple 'sulfur bacteria' that forms a thick layer in the deoxygenated water at the bottom of the lake. This mat of bacteria is occasionally brought to the surface during periods of bad weather and often results in bands of foam being formed and blown ashore on the northern side of the lake.

FORMING THE LAKE The entire lake can be viewed from the lookout on the north-east corner of the lake. Three to five thousand years ago, the sea retreated leaving a series of saline lakes along the coast. Many of these lakes have been filled in with shifting sand. Lake Thetis has retracted in size with its southern shores gradually being filled in by wind-blown sand. Fine particles were suspended in the lake's water column and eventually deposited on its northern shores resulting in a deposit of clay marl that was mined over the past 30 years for use as a compacted road base.

The final leg of the trail follows the northern shore of the lake and through some of the rehabilitated areas of the old marl pit. Old decaying stromatolites are hidden among the samphire on the edge of the lake. These show the internal structure of stromatolites and how calcium carbonate has been laid down over thousands of year to form them.

The trail returns past picnic tables to the car park.

Above: Pelican.

Below: Shelduck.

Photos – Babs and Bert Wells/DEC

MORE THAN PINNACLES

While the Pinnacles Desert is the main attraction to the area, Nambung National Park features two other popular recreational sites.

HANGOVER BAY With its wide sweep of sandy beach, Hangover Bay is particular popular for swimming and snorkelling. The site features barbecues, toilets, picnic area with shelters and interpretive information on the area's natural features and the adjoining Jurien Bay Marine Park.

KANGAROO POINT Kangaroo Point offers another coastal recreation area, with toilets, barbecue facilities, picnic sites and beach access. This is a popular shore-fishing and boating area.

Photo – George Watson/DEC

Above: Hangover Bay.

Below: Sand dune landscapes near the Pinnacles Desert.

Photo – George Watson/DEC

COASTAL PIGFACE

(Carpobrotus virescens)

FAMILY Aizoaceae, the carpet weeds, fig marigolds.

Coastal pigface is a succulent, ground-hugging plant with attractive pink flowers. Trailing over coastal dunes, this species grows along all sandy and most rocky beaches throughout southern WA. Native bees visit its flowers and rock parrots and emus eat its sweet, succulent fruits. Aboriginal people would also eat the fruit, either fresh or dried.

DESCRIPTION This prostrate shrub has trailing red to grey branches up to two metres long. The greyish-green leaves are held in opposite pairs and have three faces. These fleshy leaves are up to 65 millimetres long and the pinkish-mauve flowers are 40 to 60 millimetres in diameter and have a white centre. The succulent fruits are a purplish-red colour when mature.

OTHER NAMES The Aboriginal name is bain.

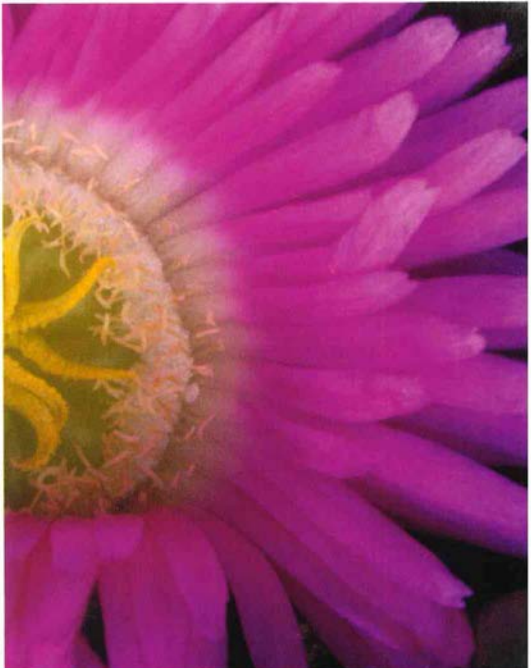
DISTINCTIVE FEATURES The species is distinguished from other forms of pigface by its young red branches and bright pink flowers with a white centre.

HABITAT AND DISTRIBUTION Coastal pigface grows on the beach or sand dunes from Israelite Bay to Geraldton, including offshore islands.

FLOWERING TIME Mainly from August to September.

Photo – Juri Lochman

Photo – Marie Lochman



NATIVE WISTERIA

(Hardenbergia comptoniana)

FAMILY Papilionaceae, the peas.

Native wisteria is common throughout the higher rainfall areas of the south-west, where its deep bluish-purple pea flowers form a colourful part of the understorey. This Australian genus has only three species, with just one in WA. All are twining shrubs and climbers.

OTHER NAMES Wild sarsaparilla.

DESCRIPTION Native wisteria is a vigorous twining shrub or climber. Some stems occasionally grow five metres up nearby trees. During late winter and spring it produces masses of purple pea flowers arranged in sprays up to 20 centimetres long. Each leaf typically has three leaflets up to 13 centimetres long. After flowering it produces cylindrical pods up to 43 millimetres long.

DISTINCTIVE FEATURES This attractive creeper is characterised by its vigorous twining habit, purple flowers and large divided leaves.

HABITAT AND DISTRIBUTION Native wisteria is common in the sandy soils of the coastal plain and, more rarely, in gravelly soils between Green Head and Albany.

FLOWERING TIME June to October.

Photo – Gerhard Sauracker/Lochman Transparencies

YELLOW TAILFLOWER

(Anthocercis littorea)

FAMILY Solanaceae, the nightshades.

Like other members of the Solanaceae family, *Anthocercis* species contain active chemicals called 'Tropane alkaloids' that can be poisonous if consumed, but have also been used for many years to produce pharmaceutical drugs like atropine.

DESCRIPTION This shrub grows to three metres high with many branches branching from the base. It has fleshy leaves to about 40 millimetres long and yellow flowers 15 to 25 millimetres long and two to four millimetres wide with thin purple stripes leading to the centre. The fruit capsule tapers to a point.

DISTINCTIVE FEATURES Commonly seen within the park, the yellowtail flower's distinctive glossy green leaves and contrasting yellow flowers make it quite distinguishable. It is a rapid growing, disturbance coloniser, often emerging in numbers after fire. As a result, it is also commonly referred to as 'fire weed'.

HABITAT AND DISTRIBUTION Yellow tailflower grows on limestone sands along the coast from Shark Bay to beyond Israelite Bay and on offshore islands.

FLOWERING TIME June to October

Photo – Rory Chapel/DEC

OLD MAN'S BEARD

(Clematis linearifolia)

FAMILY Ranunculaceae, the buttercup family.

The common name for this species comes from the long feathery tailed fruits which lie over shrubs and branches in woolly masses before being dispersed by the wind. The fruits are readily used by birds to line their nests, aiding in the dispersal of this climber's seed.

DESCRIPTION This vigorous climbing vine has a slender stem and delicate white flowers. The species has both male and female plants. The feathery looking fruits are 70 to 90 millimetres long and appear in woolly masses.

DISTINCTIVE FEATURES Within Nambung, this species can form a thick mat over the coastal heath, creating shelter for kangaroos and other fauna from the fierce summer sun.

HABITAT AND DISTRIBUTION It occurs on near-coastal sands and limestone and in woodland and tuart forest from Shark Bay to Cape Naturaliste, including offshore islands.

FLOWERING PERIOD July to September.

Photo – Rory Chapel/DEC

DODDER LAUREL

(Cassytha racemosa)

FAMILY Lauraceae, the laurels

Dodder is able to survive the harsh nutrient-poor environment by using host plants for nutrients.

DESCRIPTION This parasitic vine has thread-like green–brown or orange–yellow stems spread over its host plant and leaves about two millimetres long. It produces small white to green–yellow flowers and pear-shaped fruits six millimetres long.

DISTINCTIVE FEATURES The small succulent fruits of dodder are enjoyed by a range of birds, which then distribute its seeds in their droppings, most likely at the base of an appropriate host.

HABITAT AND DISTRIBUTION It occurs along the coast from Cape Range near Exmouth to the Great Australian Bight and some offshore islands. Within Nambung, dodder is commonly associated with *Acacia* species which provide a healthy vigorous host.

FLOWERING TIME Most of the year.

Photo – George Watson/DEC

QUONDONG

(Santalum acuminatum)

FAMILY The sandalwoods.

Members of the quondong genus are semi-parasitic – they supplement their needs by tapping into the roots of neighbouring plants and taking water and inorganic nutrients from their host. Their red fruits are an important food for emus and were eaten by Aboriginal people and made into jams, preserves and chutneys by early settlers to the region.

DESCRIPTION This small, upright tree grows to about four metres tall. It has pale yellow–green foliage, which contrasts sharply with species around it. Quondong produces fleshy fruits two to four centimetres across, which ripen to a rich red in late spring and early summer.

DISTINCTIVE FEATURES This tree is characterised by its pale foliage and red fruits. Its kernels, which appear brain-like, can be found littering the ground beneath each bush.

HABITAT AND DISTRIBUTION Quondong grows along the coast from Carnarvon southwards and inland. In Nambung it can be found on the edge of Pinnacles Drive and by following the emu prints on the concrete walk path to the Desert View.

FLOWERING TIME Late spring to early autumn.

Photo – Rory Chapel/DEC

CHRISTMAS TREE

(Nuytsia floribunda)

FAMILY Loranthaceae, the mistletoes.

The Christmas tree is particularly striking in summer when its canopy erupts into massed brilliant orange flowers. It is the only genus in the mistletoe family. The tree is semi-parasitic – its roots make rings around those of nearby trees and suckers within the rings extract water and minerals from their host.

DESCRIPTION This tree grows to eight metres tall with thick branches. It has dull green leaves from four to 10 centimetres long and three millimetres wide. The bark is grey to brown, and is often blackened by fire. The flowers are bright orange and occur in large inflorescences up to 25 centimetres long at the ends of branches. Its fruits are two to three centimetres wide with three wings.

DISTINCTIVE FEATURES This tree is best distinguished by its massed orange flowers in summer and by its dark green fleshy or leathery leaves.

HABITAT AND DISTRIBUTION It occurs on most soil types on the coastal plain, particularly in low-lying areas. It ranges from Kalbarri to Israelite Bay. In Nambung, these trees commonly grow in the poorest soils and are often the tallest trees in the area, growing in small groups.

FLOWERING TIME Early summer.

Photo – Alex George/DEC

RED-EYED WATTLE

(Acacia cyclops)

FAMILY Mimosoceae, the wattles.

The shiny, black seeds of the red-eyed wattle are encircled by orange to scarlet seed stalks, giving them the appearance of a bloodshot eye. The scientific name refers to Cyclops, the mythical one-eyed giant of Greek legend. The striking seeds are retained and displayed in the open pods. Birds are attracted to the seeds and help to disperse them.

OTHER NAMES Western coastal wattle.

DESCRIPTION Red-eyed wattle grows as a domed shrub up to three metres high. Instead of true leaves, it has thick leathery phyllodes – flattened leaf stalks that look like, and function as, leaves. The phyllodes are four to nine centimetres long. The spherical yellow flower heads, four to seven millimetres across, are arranged in groups of two or three. Each head is composed of numerous tiny yellow flowers, each with five lobes. The greyish-brown pods, four to 12 centimetres long, are also thick and leathery. They twist as they dry and open to reveal black seeds surrounded by folded seed stalks.

DISTINCTIVE FEATURES Red-eyed wattle is most easily recognised by its seed pods with their striking seed stalks.

HABITAT AND DISTRIBUTION Red-eyed wattle can be seen in coastal areas, from Eneabba to the Great Australian Bight, continuing east into South Australia. It has also been introduced into South Africa, where it is now a serious weed. This species is common in sandy and limestone soils along the coast. Wattles grow well along the edges of Pinnacles Drive and in the car parks where they take advantage of the water runoff from the bitumen surface.

FLOWERING TIME September to March.

Photo – Bruce Maslin/DEC

Above: Red-eyed wattle seed pods.

Below: Red-eyed wattle foliage.

Photo – George Watson/DEC

TUART

(Eucalyptus gomphocephala)

Stately tuart has dense foliage, dull grey bark and showy white to cream flowers. It is restricted to coastal areas. The largest stands of tuart forest can be seen around Wonnerup and Ludlow, near Busselton, where the trees intermingle with peppermints. Tuart buds are very distinctive; they have swollen bud caps and are shaped like small ice cream cones.

OTHER NAMES Duart.

DESCRIPTION This medium-sized to tall tree grows up to 40 metres high. Its rough, fibrous grey bark flakes into small pieces. The leaves are often curved, 90 to 160 millimetres long, and are a shiny light green above and paler below. The almost stalkless buds cluster in groups of seven. Each bud is 14 to 23 millimetres long, including the prominent broad bud cap which is eight to 10 millimetres long. The fruits are narrow, cup-shaped and 13 to 25 millimetres long, with a fairly broad rim. They have four internal compartments.

DISTINCTIVE FEATURES Tuart trees have icecream cone-shaped buds, as the bud cap is broader than the base.

HABITAT This tree favours sandy soils over limestone in areas near the coast.

STATEWIDE DISTRIBUTION Tuart grows from Jurien Bay to near Busselton.

FLOWERING TIME Summer and early autumn.

USES Because of its strength and high density, tuart timber was once used to craft whim and wagon wheels, journals for propeller shafts, decking for wagons, telegraph pegs and tool handles. The timber beams and decking used in the Pinnacles Desert Discovery centre are tuart.

Photo – Janine Guenther

GOULD'S MONITOR

(Varanus gouldii)

Gould's monitors are striking animals that are frequently seen sunning themselves on roads in almost all parts of the State. Adults have few natural enemies and often show little fear of people. If approached too closely they will produce a challenging stare, raise themselves on their hind legs and tail, and hiss in warning. If startled, they will flee with remarkable speed, so it is best to photograph them from a few metres away.

DESCRIPTION The body is usually brown, dark grey or almost black, with pale cream or yellow spots or eye-like markings arranged across the back in bands. The belly is lighter in colour. The dark legs are spotted and the tail is banded with cream or yellow colouring. The elongated body, long neck and flattened head of this species are typical of the monitors, as is the rough skin which appears quite loose. This species can attain a total length of one and half metres.

OTHER NAMES Race horse goanna, bungarra.

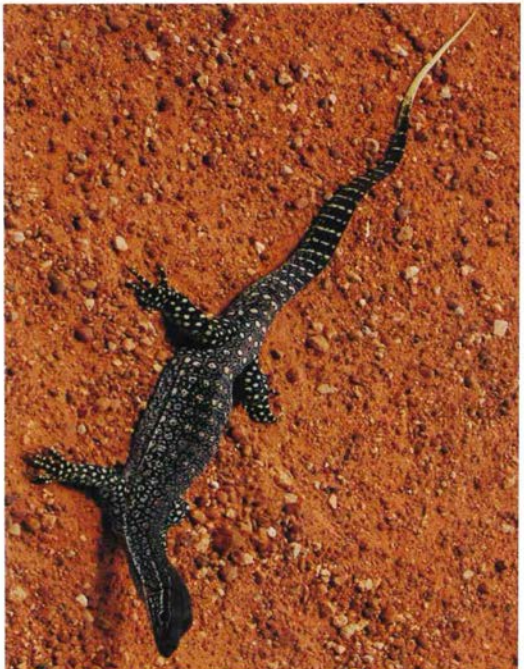
STATUS AND DISTRIBUTION Gould's monitors live across most of the Australian mainland.

PREFERRED HABITAT They occupy a large range of habitats, from desert to forests.

LIFE HISTORY The Gould's monitor lives in a burrow at night and stalks the undergrowth for reptiles, mice or large invertebrates by day. It sometimes feasts on road kills such as dead kangaroos. Like snakes, monitors have forked tongues that enable them to 'taste' the air to locate prey. They lay their eggs in a burrow, to incubate without further assistance.

Photo – Jiri Lochman

Photo – Kathy Himbeck/DEC



BOBTAIL SKINK

(Tiliqua rugosa)

Bobtail skinks are very common in Nambung National Park, where they often bask on roads and rocky outcrops. If approached, a bobtail will often open its mouth wide to display its bluish-black tongue and hiss aggressively. This can be a frightening spectacle. Although they are unlikely to hurt people, they may bite if handled incorrectly.

DESCRIPTION These stout, slow-moving reptiles can reach up to 31 centimetres long. They have a large, triangular-shaped head, a flattened body, a short stumpy tail and large, rough scales on the back. Their colour is very variable. The head and back is often orange-brown to brown with creamy spots, blotches or streaks. The belly is white, creamy or grey with blackish flecks, spots or blotches. They provide a moving home for ticks, which often live in their ears and under their scales.

OTHER NAMES Blue-tongue lizard, shingle-back skink.

STATUS AND DISTRIBUTION These reptiles are found as far north as Carnarvon. They are very common through southern WA and extend through the Nullarbor Plain to south-eastern Australia.

PREFERRED HABITAT During hot weather they can be seen basking on footpaths, roadways or rocks. Please drive slowly to avoid hitting these interesting and entertaining beasts.

LIFE HISTORY Like many reptiles, bobtails hibernate during winter and, if accidentally discovered under a pile of leaves or wood, should be left alone. In spring they emerge ravenous from their hiding places and search widely in search of food and warmth. They eat fruit, flowers, eggs, and molluscs such as snails and slugs. Bobtails give birth to one or two live young each year, which soon leave their mothers to forage alone.

Photo – Babs and Bert Wells/DEC

Photo – Kathy Hindbeck/DEC

SOUTH WEST CARPET PYTHON

(Morelia spilota imbricata)

This non-venomous snake is perhaps the most common one encountered by people. It often lives in close proximity to humans and may shelter in ceiling spaces and sheds.

DESCRIPTION Carpet pythons can reach up to three metres long and 20 centimetres in girth. The large, triangular head has small indentations called labial or heat pits along the rear of the lower jaw and on the lips to aid in hunting. These detect heat radiating from prey. Carpet pythons are coloured in a complex pattern of large black-edged grey to brown blotches or bars. The base colour varies from greenish-brown to black and some populations have yellow highlights on their upper surface. The belly often has a yellowish hue, with three indistinct black stripes.

STATUS AND DISTRIBUTION This snake is listed as specially protected and occurs from Shark Bay south to Albany.

PREFERRED HABITAT Carpet pythons occur in many habitats including coastal heath, forest, shrubland, semi-arid woodlands, around rock outcrops and on windswept islands. In Nambung National Park, they are often seen basking on the roads in the early morning or in the rooves of structures where they ambush swallows and geckoes.

LIFE HISTORY Young carpet pythons consume lizards, birds and small mammals. Adults eat larger prey such as possums, small wallabies and large reptiles. Females grow larger than males and, during the mating season from October to December, they attract males with scent trails. Eggs are laid under rock slabs, in the burrow of other animals, in thick vegetation and sometimes in sheds. The female coils around the eggs and incubates them for 60 days. When her eggs begin to hatch, she leaves the nest site and the young are left on their own.

Photo – Brad Rushforth/DEC

Photo – Anne Cochrane/DEC

EMU

(Dromaius novaehollandiae)

The emu is Australia's largest native bird, and the second largest flightless bird in the world. It is thought to be an early offshoot of the cassowary that has adapted to more arid regions. The birds were once a favoured food of Aboriginal people, who would sometimes place poison plants in waterholes to drug their prey, or attract the birds by imitating their calls. In agricultural areas they are regarded as a pest, as they can damage fences and watering points and compete with stock for food and water. They have been farmed for their valuable meat, skins and feathers for some years.

DESCRIPTION This large bird grows up to two metres high. Its back is decorated with soft, brownish-grey feathers and it has long, powerful legs. Each large foot has three toes.

STATUS AND DISTRIBUTION Emus are common and found throughout the Australian mainland. They are now mostly absent from built-up areas, such as Perth and its suburbs.

PREFERRED HABITAT They live in a wide range of habitats including deserts, dense coastal shrublands, eucalypt woodlands and forests.

LIFE HISTORY Emus dine on native fruits, vegetation and ground-dwelling insects. Adult birds are usually found in pairs or small parties. They are highly nomadic and, in the breeding season, they move into areas of recent good rains. Breeding is usually from March to November, when a sparse nest of grass, bark and sticks is built on the ground. The father does all the parenting. He broods between five and 11 dark green eggs. The male also escorts the chicks, which have attractive black and yellow stripes. At about 18 months, the large juveniles disperse.

CALL The females make an unusual drumming sound, but both sexes make deep grunts.

Photo – Babs and Bert Wells/DEC

Photo – DEC

OSPREY

(Pandion haliaetus)

The huge nests of the osprey can be used generation after generation and often reach up to two metres high. These massive domes of sticks and driftwood are usually lined with seaweed. Early seafarers thought they must have been built by a bird the size of an Andean condor. Although it is often incorrectly referred to as a sea eagle, the osprey is in fact a hawk.

DESCRIPTION Mature adults are between 500 and 630 millimetres long and have a wing span of one and a half metres. The creamy white head is sometimes flecked with brown markings and a dark brown stripe runs on either side of the alert bright yellow eye to the neck. The underparts and legs are also creamy white, while the upper parts and upper wings are mottled light brown, dark brown and black. The bill is black and hooked.

OTHER NAMES Fish hawk.

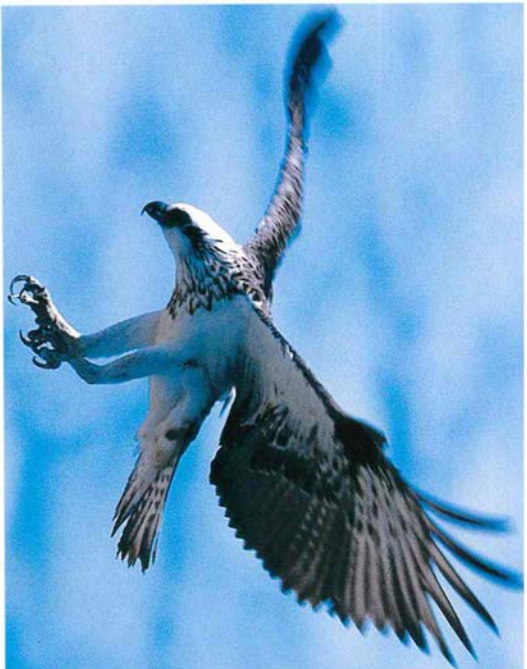
STATUS AND DISTRIBUTION Ospreys are found around most of the Australian coast. In northern Australia, ospreys are quite common and they are moderately common in the south-west, but the species has declined in South Australia and no longer breeds in Tasmania, Victoria and New South Wales. This decline may be due to pollutants causing breeding failures and deaths, and less habitat because of removal of large nest trees.

PREFERRED HABITAT They frequent offshore islands and coastal areas.

LIFE HISTORY Fish are the staple diet of the osprey. In the north they breed between July and September laying between two and four eggs. Aerial displays during courtship are quite spectacular. The male hunts while the females incubates, broods and feeds the voracious chicks. The youngsters leave the nest about eight weeks after hatching.

CALL Ospreys typically produce a short quavering whistle.

Photos – Babs and Bert Wells/DEC



GALAH

(Cacatua roseicapilla)

Galahs have increased in abundance as a result of agriculture. These noisy birds twist and turn as they fly overhead, to show alternately grey and then pink, and give high screeching calls. Galahs, which collect seeds from the ground, may be long-lived. They may gather in flocks where food is abundant and are common in Nambung National Park. Galahs nest in vertical holes in some of the larger pinnacles in the Pinnacles Desert.

DESCRIPTION Most people are familiar with galahs, which are popular pets. They are about 35 centimetres long. The head, neck and breast are pink, with a paler pink 'cap' on the head, while the back, wings and tail are light grey. The male has a brown eye and the female a pink eye. The legs, feet and beak are grey.

OTHER NAMES Pink and grey cockatoo.

STATUS AND DISTRIBUTION Galahs are common and may be seen in flocks of up to 1,000 birds throughout most of Australia.

PREFERRED HABITAT They prefer savannah woodlands and open grasslands.

LIFE HISTORY Galahs pair off in the breeding season and usually form permanent bonds with their partner. They nest in tree hollows lined with eucalypt leaves, to which they return year after year. Courting males often raise their crests and wave from side to side, while chattering softly. Galahs are already superb fliers when they leave the nest. New fledglings may gather together in creches of up to 100 while their parents forage for food. After six to eight weeks they must fend for themselves.

CALL The call is a harsh screeching. When feeding they often give high pitched tinkling calls.

Photo – Babs and Bert Wells/DEC

Photo – Brad Rushford/DEC

CARNABY'S BLACK COCKATOO

(Calyptorhynchus latirostris)

Carnaby's black cockatoos are frequently seen flying over Nambung National Park. Making harsh wailing cries, large flocks often wheel through the sky in search of feeding areas. They feed on marri, banksias and other hard-fruited trees and shrubs. They also strip bark off trees to feed on grubs, but this does not harm the tree.

DESCRIPTION These large birds have long tails with a broad white band. The dusky black feathers have an off-white edge, creating a pattern of thin crescents. The bill is short and rounded, and there is a white cheek patch.

OTHER NAMES Short-billed cockatoo, white-tailed black cockatoos.

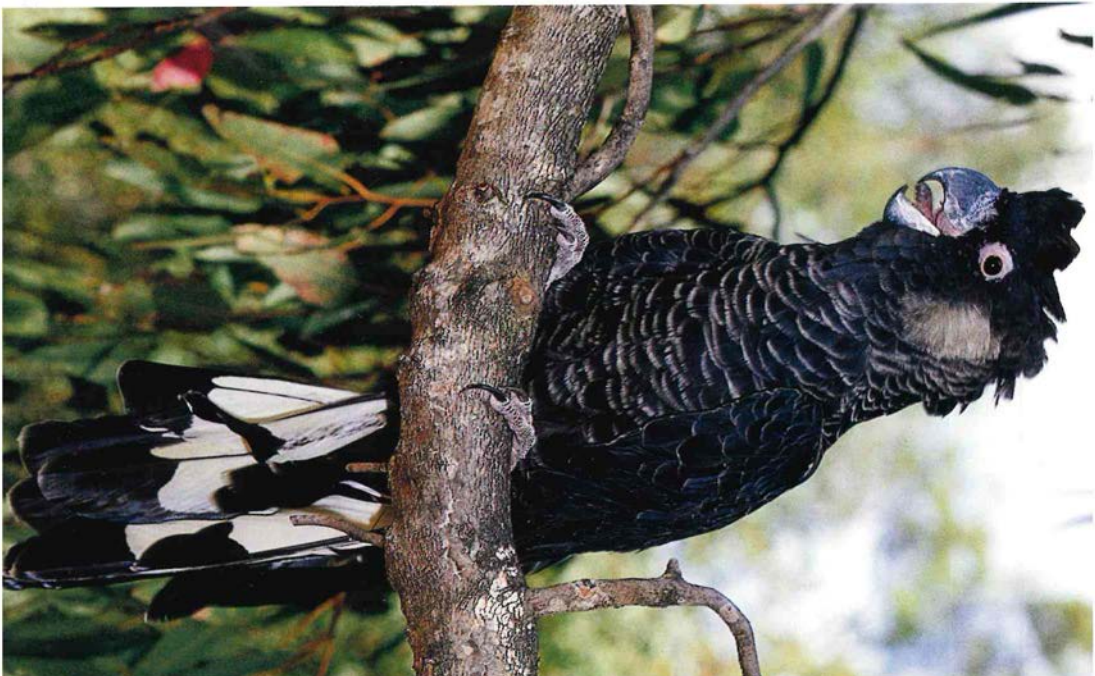
STATUS AND DISTRIBUTION They inhabit the south-west of WA, including the Wheatbelt, and east to Albany and Hopetoun. These critically endangered birds have experienced a rapid population decline due to a shortage of nesting hollows and feeding habitat.

PREFERRED HABITAT Woodlands, forests and mallee areas. They breed in areas such as Lesueur National Park, north of Nambung, where there are wandoo trees with good nest hollows close to free water with an adequate food supply in the adjacent heaths to sustain a breeding population.

LIFE HISTORY These seed-eating birds are expert at biting and tearing open thick, woody seed capsules and cones. They pair for life and nest mainly in tree hollows in the wandoo woodland of the northern Darling Range or Wheatbelt. Two eggs are laid and, although both usually hatch, the second nestling usually dies within 48 hours. The chick fledges at about 10 or 11 weeks of age, but remains dependent until the next breeding season begins. After the chick fledges, the family group joins other cockatoos and moves to coastal areas in search of food.

CALL The flight call is a high-pitched "whee-la".

Photo – Babs and Bert Wells/DEC



NEW HOLLAND HONEYEATER

(Phylidonyris novaehollandiae)

New Holland honeyeaters feed largely on nectar, especially on the flowers of banksias and other heathland species in Nambung National Park. They visit more than 100 plant species and help to transfer pollen from plant to plant. When flowering plants are scarce, they feed on a variety of insects and spiders.

DESCRIPTION New Holland honeyeaters are streaked with black, yellow and white. The black face has white hairy tufts at the edge of the beak. There is a beard-like black throat with long, white, hairy feathers, a white eyebrow set well back and a white ear tuft. The head, wings and tail are largely black, although the tail feathers have a broad yellow edge. The back is lighter, with white streaks, and the breast and undertail are white, streaked black. It is the only honeyeater species in which the adult has a white eye.

STATUS AND DISTRIBUTION This bird is common in the south-western corner and along most of WA's southern coast.

PREFERRED HABITAT Heath and woodlands are the primary habitat of this species.

LIFE HISTORY New Holland honeyeaters nest mostly between July and December and sometimes throughout the year. One to three eggs are laid in a cup-shaped nest, usually in a shrub or low tree. Each pair has its own breeding area, which may be very small in areas of prime habitat, and which is vigorously defended. However, they may feed in communal groups. If food is scarce, dominant birds will expand their territories and force other residents out.

CALL These birds communicate in flight and when feeding with a "tjitt". Territorial singing is a single, high, whistled note.

Photo – Rob Drummond/Lochman Transparencies

ECHIDNA

(*Tachyglossus aculeatus*)

The echidna is best known for its amazing biology. Like the platypus, this mammal lays eggs and suckles its young. The echidna and platypus are in a primitive group known as monotremes. When disturbed, the echidna either curls into a spiny ball to protect its soft underside, or digs its belly into the soil so that only the spines are exposed.

DESCRIPTION Long spines cover the body and fur is present between them. These slow-moving creatures have a bulbous forehead and a long snout to collect their food. Males have a spur on the ankle of the hind leg but, unlike that of the platypus, this is not venomous.

OTHER NAMES Spiny anteater.

STATUS AND DISTRIBUTION They are found throughout the Australian continent and Tasmania. Although not considered threatened, they are no longer frequently seen on the Australian mainland. However, they may be locally abundant in areas such as Nambung.

PREFERRED HABITAT Echidnas may be found in any place with a good supply of ants and termites.

LIFE HISTORY Echidnas are usually solitary. However, when they mate between July and August, several males may congregate around a single female. About two weeks later, a single soft-shelled egg is deposited directly into the pouch. This hatches after 10 days and the young remains in the pouch for about three months, where it suckles milk from the mother's mammary glands. Completely hairless when born, the youngsters are covered with short spines by the time they leave the pouch. These toothless animals expose termite galleries by breaking open nests with their strong forepaws or snout or digging into soil. They then extract the termites with long, sticky tongues. Dingoes and goannas will occasionally eat echidnas. Their relative abundance on large, fox-free islands such as Kangaroo Island in South Australia suggests that the fox is also a significant predator.

Photo – Brad Rushforth/DEC

HOW TO SEE THEM Secretive echidnas are rarely seen. However, extensive diggings at the base of termite mounds and along tracks are a sure sign of their presence. If you are bushwalking and notice large excavations under a log, try shining a torch inside it to see if the digger is still around. These mammals have distinctive cylindrical droppings in which ant remains are easily distinguished.

WESTERN GREY KANGAROO

(Macropus fuliginosus)

Western grey kangaroos are great survivors – in fact, they are now probably found in greater numbers than before European settlement because of the provision of pasture and additional water points. They are seen very frequently in Nambung National Park and are often seen grazing in recently burnt areas.

DESCRIPTION These large, fairly muscular animals are greyish-brown to reddish-brown in colour. The males can grow to more than two metres from head to tail. The females are smaller. Their muzzles have finer hairs than most other kangaroo species.

STATUS AND DISTRIBUTION Western grey kangaroos are widespread and abundant across southern Australia.

PREFERRED HABITAT These 'roos' prefer open heathlands, near water and with nearby forest or woodland.

LIFE HISTORY Western greys are mainly grass eaters. The males may fight for the attention of a fertile female. They breed throughout the year, although most young are born in summer. They usually produce one joey. Newborns resemble a jelly bean and take only a few minutes to climb to the pouch and attach themselves to a teat. They leave the pouch at about nine months but continue to suckle for another nine months, often while another young is occupying the pouch. The mothers and their young use a series of clucking sounds to communicate.

Photo – Babs and Bert Wells/DEC

SIGHTING RECORD

Species	Date	Locality
coastal pigface		
native wisteria		
yellow tailflower		
old man's beard		
dodder laurel		
quondong		
Christmas tree		
red-eyed wattle		
tuart		
Gould's monitor		
south west carpet python		
bobtail skink		
emu		
osprey		
galah		
Carnaby's black cockatoo		
New Holland honeyeater		
echidna		
western grey kangaroo		

Remarks

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Photo – Len Stewart/Lochman Transparencies

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