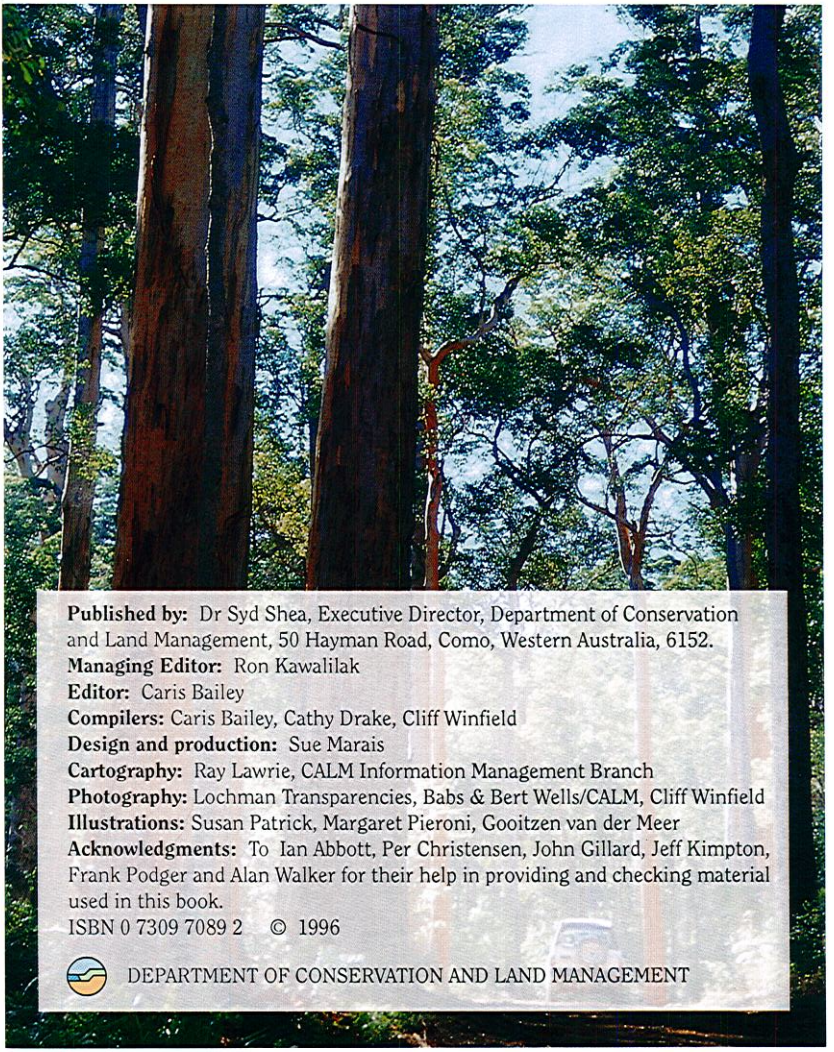
A CALM MAP AND DRIVE GUIDE

GREAT FOREST TREES DRIVE

SHANNON NATIONAL PARK



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DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

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SCALE 1cm=100m

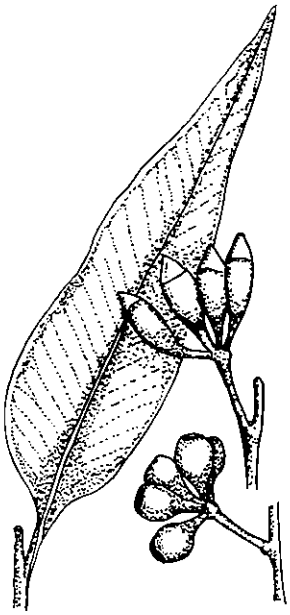
0 100 200 300 400 500 metres

INTRODUCTION

Shannon National Park is set in some of the most magnificent karri country in Western Australia's southern forest.

The Shannon has giant forest trees, delicate orchids, paperbark swamps, some ancient wildlife, granite outcrops rising like islands above the sea of trees and much more to explore.

The prominent forest tree here is karri, one of more than 700 eucalyptus or gum tree species unique to Australia. Karri grows only in the wettest corner of Western Australia.



karri leaf, buds and seed capsules

It occurs in a band roughly 40 kilometres wide between Nannup and Denmark, with some outlying areas at the Porongurups, Albany, Mt Manypeaks and Karridale, in areas where annual rainfall is at least 1100 millimetres. It is related to other moisture-loving eucalyptus trees, but the nearest close relative grows 3000 kilometres away in Victoria.

Karri grows to a maximum height of about 90 metres, making it one of the tallest trees in the world. The tallest is believed to be the Californian redwood, or sequoia, which can grow up to 112 metres.

About 175,000 hectares of karri forest grow on State-owned land. More than 46% of this is in national parks and reserves managed by the Department of Conservation and Land Management (CALM) and cannot be logged.

The remainder in State forest is managed to provide for a variety of uses including timber production, recreation, water, honey, wildflowers and tourism - in a way that ensures they are permanently sustainable.

Strategic trees

Like many other Australian plants which have evolved in an environment prone to fire, karri has its own strategies to enable it to regenerate after bushfires, helping the species to survive at the cost of some individuals.

Mature karri and jarrah are among the most fire resistant trees in the world. The jarrah trees, however, are much more resilient and can often survive several intense bush fires because of their thicker bark and their lignotubers, woody underground swellings which will sprout new shoots called coppice. These shoots keep the tree alive until it can repair the fire damage to the crown of the tree.

Both jarrah and karri have epicormic buds under the bark of the trunk. After fire damage to the crown, these dormant buds shoot as clumps of foliage so the tree can carry out its essential functions while the crown recovers.

Bushfires are less common in the karri forest than the jarrah forest. However, fires in the karri can be extremely fierce, with flames as high as the trees themselves, fuelled by the flammable material that builds up on the forest floor.

karri in Shannon National Park

An intense fire can kill many karri, usually the very old and very young trees.

You will often see areas of natural even-aged stands in the karri forest where entire patches of forest have been killed by a previous bushfire.

Karri trees produce an enormous quantity of seed every three to five years. When the tree tops are seared by a bushfire, the woody seed pods dry and open within two or three days, dropping hundreds of thousands of tiny (two millimetres in diameter) seeds on the recently burnt ground.

Free from competition, the seeds grow quickly on the fertile ash bed created by the fire - within a year the seedlings could be two metres high.

There is a wide range of opinion about what constitutes a natural fire frequency for the southern forests, but most people agree that burning off fuel is an acceptable method of reducing the risk and effects of bushfires. This was a practice carried out by Aboriginal people for tens of thousands of years.

CALM uses a mosaic of planned fires known as prescribed burns to reduce fuel on some land as a measure to prevent wildfires taking hold and causing mass devastation, and in other areas to regenerate habitats. With the benefit of research and experience, these fires are designed to preserve the range of species and structural diversity over the whole ecosystem.

These controlled bushfires are deliberately lit when fuel and weather conditions enable the forest managers to predict and control fire behaviour.

Shannon's sea battle

While Shannon National Park is an ancient landscape, its name comes from a nineteenth century sea battle off the east coast of America.

The Shannon River was named not long after the Swan River Colony was established in 1829, presumably by settlers with a keen interest in what was then recent history. Britain and America had come to blows over Britain's policy of searching neutral ships bound for Europe, in an attempt to break Napoleon's supply lines.

In 1813, Sir Philip Broke led the Royal Navy's *Shannon* into battle against the American frigate, *Chesapeake*, off the coast of New England. Britain's victory was commemorated here not only in the naming of the Shannon River, but also at nearby Broke Inlet and Chesapeake Road.

In an effort to overcome the shortage of building materials after World War Two, Shannon was one of several areas chosen to build new timber mills in the late 1940s. It briefly held the record as the State's biggest timber mill and then was closed in 1968, although timber harvesting continued here until 1983.

In 1988, Shannon became a national park covering 53,500 hectares. The entire drainage system for the Shannon River is contained within the park and adjoining coastal D'Entrecasteaux National Park. This means that the river and stream system and the underground water flowing through the forest all drain within the national park and are protected by the forested catchment.

The park has many values: scenic landscape, conservation of plants and animals, and water catchment protection.

jarrah in flower

The early inhabitants

Aboriginal people have lived on the Australian continent for more than 40,000 years.

The excavation of sites at Lake Jasper and Malimup, in D'Entrecasteaux National Park, has uncovered a range of stone and bone artefacts.

At Broke Inlet, there are at least eight separate stone enclosures along a distance of less than one kilometre of the estuary's shoreline. These structures are normally submerged and archaeologists believe they were fish traps.

Little is known about Aboriginal occupation of the karri forest itself. The dense forest was probably not as attractive as more open areas, including the coastal fringe, which offered a richer and more easily obtained food source, as well as good tool making materials.

The coastal areas of the southern forests, particularly limestone areas where there are caves, have provided most of the evidence of early Aboriginal life in the area.

Devil's Lair, in Leeuwin-Naturaliste National Park, is the oldest of these sites, with evidence of human occupation dating from 33,000 years ago. Hand stencils in Old

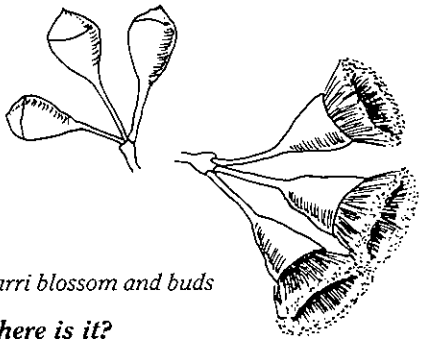
Kurdardup Cave, near Augusta, are the only known examples of painted rock art in a south-west Western Australian limestone cave.

Climate

It can be wet at Shannon - this part of the karri forest has one of the highest annual rainfalls in Western Australia. The southern area of the park receives about 1400 millimetres a year, most of it between April and October, although frequent summer showers occur.

Winter temperatures range from an average minimum of 7 to a maximum of 14.5, while in summer the average range is 14 to 26 (temperatures recorded in degrees Celsius at nearby Pemberton).

The best time to see wildflowers is from October to December, when the whole forest, from the coastal flats to the karri, puts on an amazing display. You'll need to pack insect repellent if you're visiting in summer, or in early autumn when the March flies are at their worst.



marri blossom and buds

Where is it?

The old Shannon townsite is approximately 55 kilometres or about 40 minutes drive south of Manjimup, 65 kilometres north of Walpole, and 32 kilometres from Northcliffe.

Neighbouring parks

Shannon is one of a series of national parks established across the southern forest. Several of these parks are linked for nature conservation purposes and their close proximity makes it easy for visitors to the region to include several parks on their trip. Shannon's neighbours are listed on page 10 in alphabetical order (Mount Frankland and Walpole-Nornalup are still to be gazetted, but are already managed as national parks):

Walpole-Nornalup National Park

Beedelup National Park (1786 ha) features the Beedelup Falls and Walk-Through Tree. A hole was cut in this giant karri tree in the 1970s, allowing visitors to stand "inside" the tree with more than 150 tonnes looming above them. Beedelup is about 18 kilometres west of Pemberton along Vasse Highway.

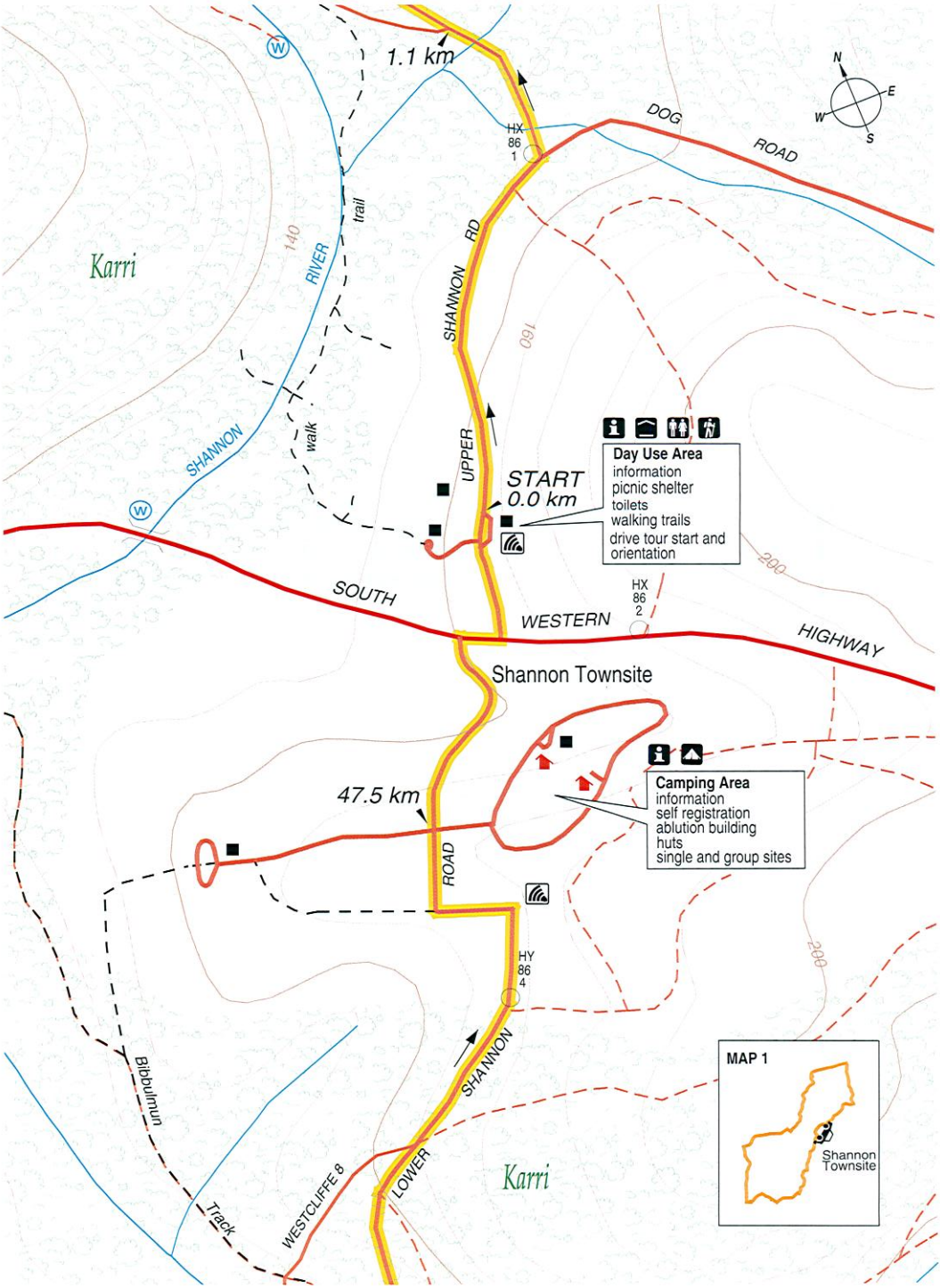
D'Entrecasteaux National Park (114,566 ha) stretches 130 kilometres along the south coast between Augusta and Walpole and borders Shannon National Park. D'Entrecasteaux has long white beaches, rugged cliffs and vast coastal sand dunes. Rugged four-wheel-drive tracks provide most access to the park, but some parts are accessible by two-wheel-drive.

Gloucester National Park (875 ha) is best known for the Gloucester Tree, which has been a fire lookout since 1947. The park contains areas of fine karri and jarrah forests and flanks the east side of Pemberton, making it popular with day walkers from the town.

Mount Frankland National Park (30,830 ha) has some of the most magnificent karri forest in the region, as well as other species such as the famous red-flowering gum. The park is rugged and wild, with limited access. The most visited area is the granite knoll, Mount Frankland. The park is about 20 kilometres north of Walpole.

Walpole-Nornalup National Park (15,861 ha) surrounds the towns of Walpole, Nornalup and Peaceful Bay. It contains many pristine forests, a wilderness area and rugged coastline. The park is probably best known for the huge buttressed red tingle trees which are unique to the Walpole area. Walpole-Nornalup is three kilometres east of Walpole along South Coast Highway.

Warren National Park (2982 ha) covers unlogged karri forest straddling the valley of the Warren River. Heartbreak and Maidenbush trails give excellent views of the valley and access to the river, but the roads are steep and can be slippery - they are not suitable for towing caravans or trailers. Also in the park is the Dave Evans Bicentennial Tree, one of the region's three fire lookout trees open to the public. Warren is 11 kilometres west of Pemberton.


1.1 km
HX 86 1
DOG ROAD
N
E
W
S
Karri
140
RIVER
trail
SHANNON RD
160
SHANNON
walk
UPPER
START
0.0 km
Day Use Area
information
picnic shelter
toilets
walking trails
drive tour start and orientation
200
HX 86 2
SOUTH WESTERN HIGHWAY
Shannon Townsite
47.5 km
ROAD
Camping Area
information
self registration
ablution building
huts
single and group sites
HY 86 4
200
Bibbulmun Track
WESTCLIFFE 8
LOWER SHANNON
Karri
MAP 1
Shannon Townsite

THE GREAT FOREST TREES DRIVE

This 48-kilometre drive takes in some of the most spectacular old growth karri forest in the south-west, punctuated with six picnic and information stops, and two walks. You will also see stunning examples of marri and jarrah forest, sedgeland, heath and granite outcrops.

The roads for the drive are not sealed, but are in good condition, suitable for conventional vehicles and small coaches. Please drive slowly and apply your brakes gently on loose gravel surfaces.

The Great Forest Trees Drive starts north of South Western Highway, just beyond the shingled-roof information shelter and the turnoff to the covered barbecue area and walk trails.

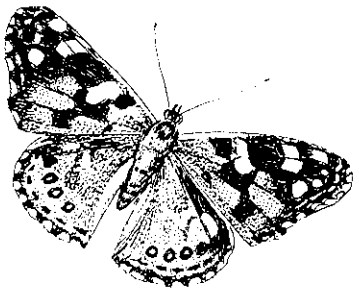
You may want to stop and read the information at the shelter, walk to the dam or have a barbecue lunch before starting or after finishing the drive.

Follow the Great Forest Trees Drive signs from the information shelter onto Upper Shannon Road. You will see the turnoff to the Shannon Dam. This is the last opportunity to turn around for 22 kilometres. From here the northern loop of the Great Forest Trees Drive is one way *only*.

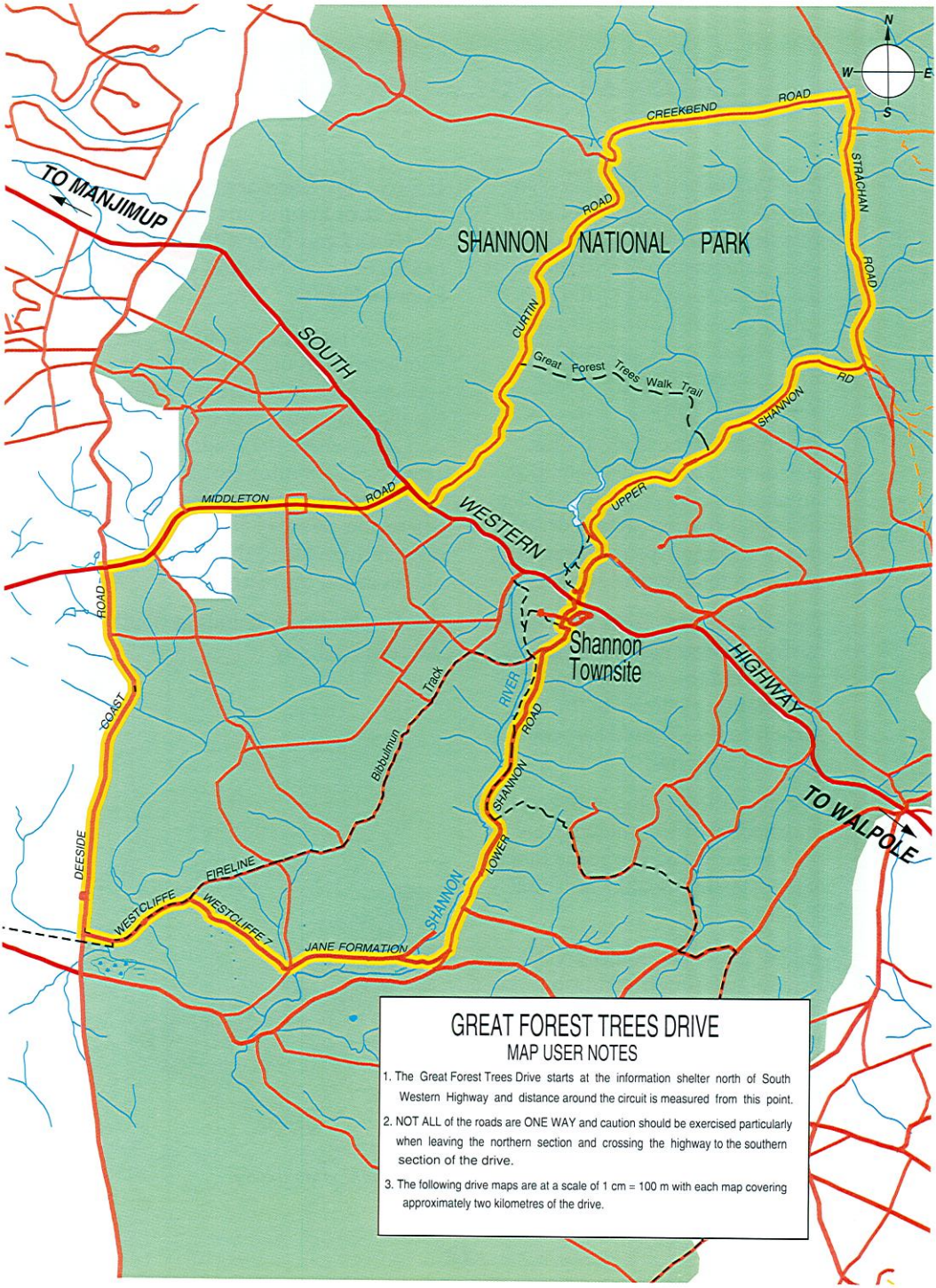
If a tree has fallen across the route, turn around and drive out slowly and carefully with your headlights on, sounding your horn on bends.

The drive takes you about 23 kilometres through the northern section of the park before crossing the highway into the lower Shannon area, where the roads are once again two way. After visiting Snake Gully Lookout, and Big Tree Grove, where you can see karri giants, the drive returns along the river to the old Shannon townsite.

The loop begins and ends at South Western Highway.



Australian painted lady



GREAT FOREST TREES DRIVE

MAP USER NOTES

1. The Great Forest Trees Drive starts at the information shelter north of South Western Highway and distance around the circuit is measured from this point.
2. NOT ALL of the roads are ONE WAY and caution should be exercised particularly when leaving the northern section and crossing the highway to the southern section of the drive.
3. The following drive maps are at a scale of 1 cm = 100 m with each map covering approximately two kilometres of the drive.

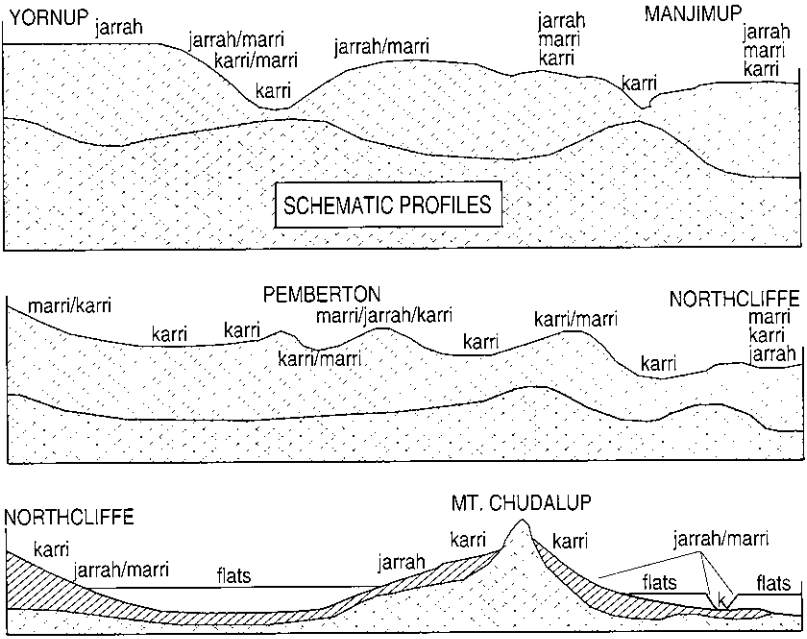
KARRI COUNTRY

Although karri sometimes grows in pure stands, karri country is in fact a mosaic of karri, marri and jarrah trees, with smaller numbers of bullich, paperbark and blackbutt, or yarri. What grows where is usually determined by soil type, which often follows the shape of the landscape.

Typically, pure karri stands grow on the most fertile soils, mainly red earths (karri loams) on lower slopes or valleys. These soils are also moister.

As the soils become more shallow and infertile on the upper slopes, mixed karri and marri forest appears, which is then replaced by jarrah and marri further up the slope. Jarrah and marri forests generally occur in paler, leached gravelly or sandy soil.

This is a simplified model because other environmental conditions affect the distribution of forest trees. There are also transition zones, like the one ahead on the drive, where jarrah, karri and marri grow together in conditions suitable for all three tree types.



UPPER SHANNON ROAD

BUFFER 2

Regrowth Jarrah

HW 87 2

Great Forest Trees Walk Trail

Which Tree is That ?
Start of Great Forest Trees Walk
3 hours for return journey (8 km)

3.9 km

3.4 km

BUFFER 1

MAP 3

Shannon Townsite

Karri: *Eucalyptus diversicolor*

Karri grows up to 90 metres high and three metres in diameter (measured at chest height), with the leaves growing in an umbrella shape. The trunk is straight with smooth, pale grey bark which is shed every autumn in an irregular pattern. The fresh bark underneath is orange. Creamy white karri flowers can be seen with binoculars high in the tree tops, from about September to February. An exceptionally bountiful flowering season occurs every four to seven years for each karri tree. The seed capsules are 0.5 to 1 centimetres long and barrel-shaped.

Jarrah: *Eucalyptus marginata*

The most widespread forest tree in the south-west, jarrah grows up to 40 metres high and two metres in diameter. It is a straight tree with branches shaped a bit like a celery top and has dark grey or reddish brown bark with vertical grooves. It is often brown in the furrows and cinnamon coloured underneath the bark. Jarrah's botanical name *marginata* refers to the thick, slightly reddish margin around the leaf's edge. White blossoms appear in early spring to early summer. The seed capsules are about 1.5 centimetres long and barrel-shaped. The leaves are green and shiny on one side and a duller, pale green on the other.

Marri, or redgum: *Eucalyptus calophylla*

Marri grows to 60 metres in height and two metres in diameter. The tree has heavy, urn-shaped fruits ("honky nuts"), with the largest seeds of any eucalypt. These weigh down the branches and give the marri its characteristic spreading shape. The rusty-brown coloured bark forms a criss-cross pattern over the trunk, is prickly to touch and splinters. Known as the redgum because of the blood-red gum which seeps through cracks in the bark, marri flowers in midsummer to late autumn with prolific creamy white, or sometimes pink blossoms. Marri leaves (*calophylla* means beautiful leaves) are big, glossy green and paler on the underside.

MAP 3, from top:
the distinctive barks of karri, jarrah and marri

A FOREST IN QUARANTINE

Faced with increasing numbers of dead and dying jarrah in the 1970s, foresters were forced to consider a step usually applied to people and animals - quarantine.

Areas of forest were treated as isolation wards by closing roads to stop public access - you'll pass some of these roads on the Great Forest Trees Drive. The closed areas were quarantined so they could be assessed for existing outbreaks of the disease, dieback, and protected from new infections.

Dieback is caused by a microscopic fungus known as *Phytophthora cinnamomi*, which invades living roots and kills susceptible species.

The fungus can also survive in the soil, and when the soil is warm and wet, it swims through the water between soil particles and infects more roots.

The natural rate of spread is nothing compared to the speed with which the fungus can be dispersed when carried in mud on the wheels and underbodies of cars.

The cause of the disease and the way it was spread was not understood until 1964. Until then the killer was unintentionally spread throughout the south-west for more than 100 years by vehicles moving soil and by the use of infected gravel to build new roads.

Although there is some debate over its origins, *Phytophthora cinnamomi* is thought to have been brought into Western Australia by European settlers bringing in grafted stock of their favourite plants, transported in hessian bags with soil around their roots.

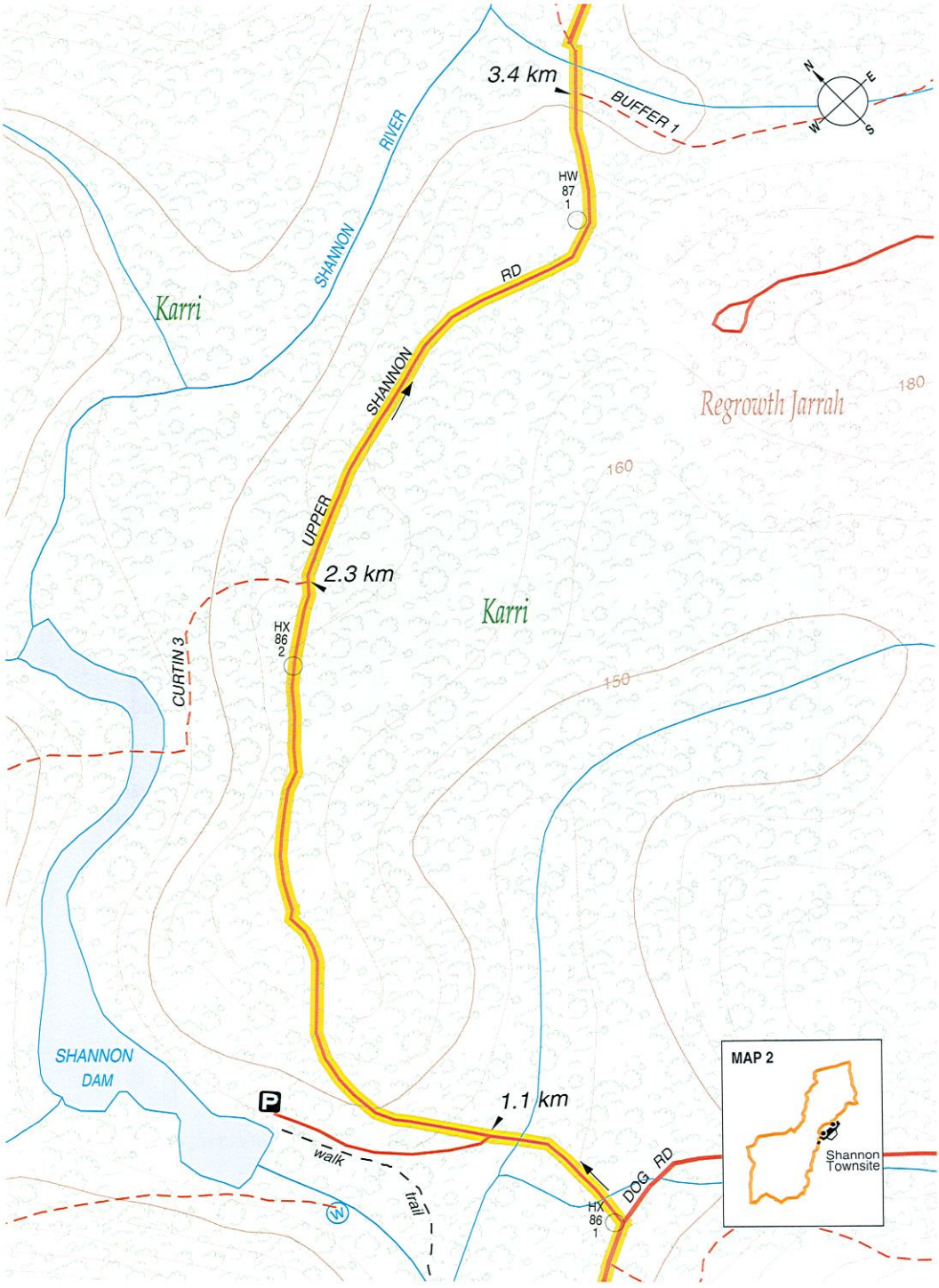
It's estimated that thousands of plant species around the world are susceptible to dieback, including many in the south-west.

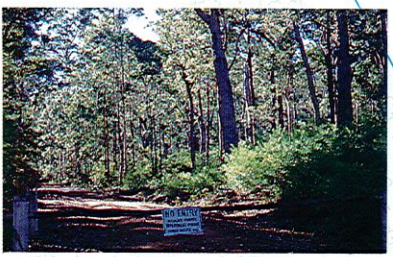
Research into dieback has been carried out, both in Western Australia and overseas, for 50 years, but there is still no practical cure for *Phytophthora cinnamomi* in the forests and heathlands of Western Australia.

It is possible, however, to treat small areas with phosphonate, an otherwise harmless fungicide. The human activities which spread the fungus can also be controlled to a very large extent.

Please help by observing any road closed signs.

MAP 4, from top:
closed for quarantine and dieback's deadly impact


3.4 km
BUFFER 1
HW
87
1
SHANNON RIVER
RD
Karri
SHANNON
UPPER
Regrowth Jarrah
180
160
2.3 km
HX
86
2
Karri
CURTIN 3
150
SHANNON
DAM
1.1 km
walk
trail
DOG RD
HX
86
1
MAP 2
Shannon
Townsite



N
W
E
S

DISEASE RISK AREA
Quarantined to control the spread
of fungal plant disease "DIEBACK"

STRACHAN ROAD

7.2 km

RIVER

SHANNON

Karri

SHANNON ROAD

UPPER

HV 88 1

Karri

180

200

MAP 4

Shannon Townsite

NAVIGATING BY THE TREES

These days, it's possible to stand anywhere on the planet and pinpoint your position on a map using a computer and a satellite.

In 1924, the breakthrough in mapping Western Australia's south-west forests was the introduction of reference trees, a surveyed grid of specially marked trees.

While a forest has many features, they can look pretty similar. Take away the roads and other developments and imagine trying to find your way from here to Manjimup with nothing but a good sense of direction. How would you know when you crossed the boundary out of Shannon National Park? How would you re-trace your steps if you needed to come back?

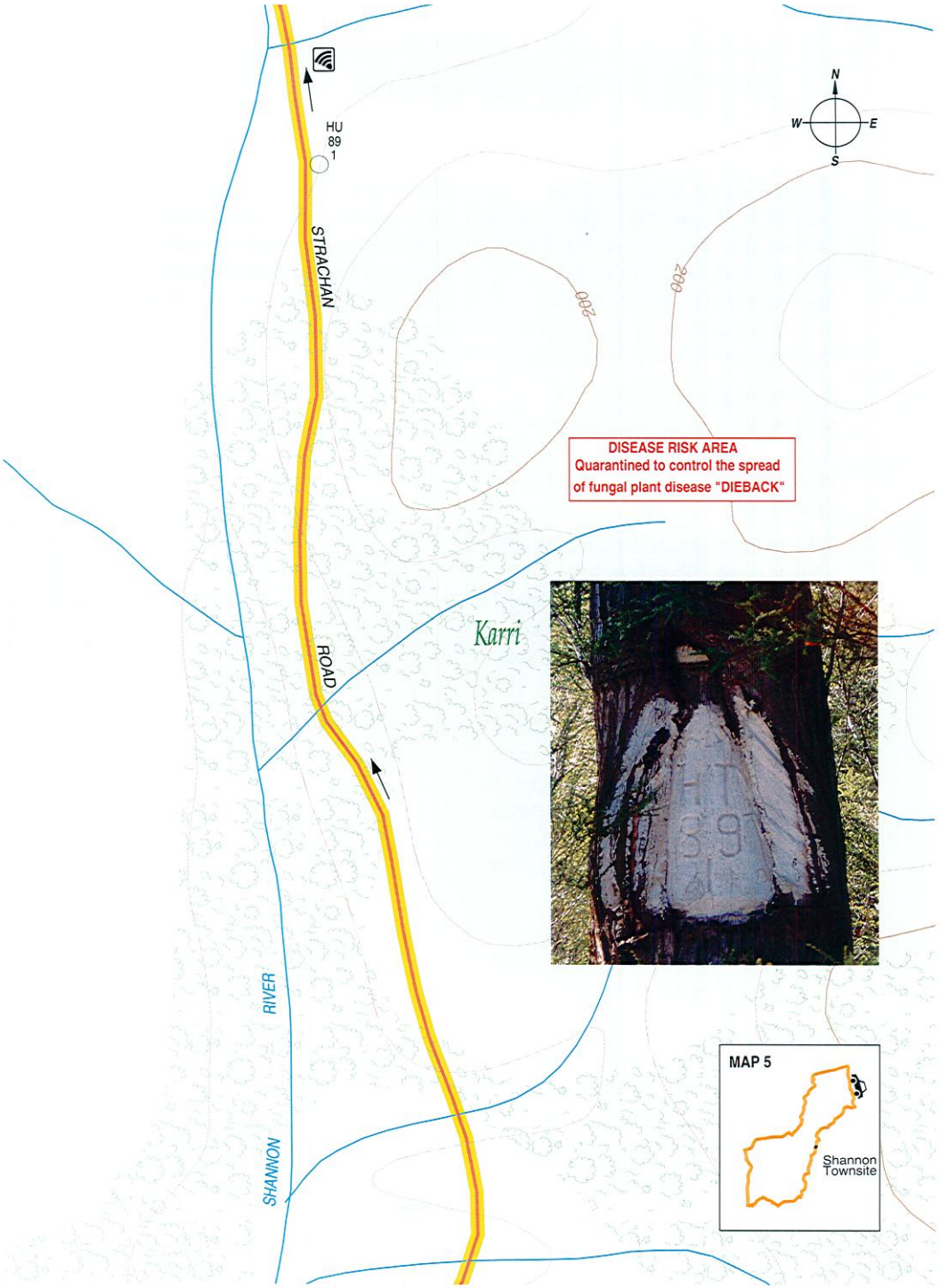
The early foresters came up with their own system of signposts: trees. Probably inspired by army maps at that time, the system was based on a grid one mile by one mile. Within each square, reference trees were surveyed and specially marked by cutting a shield into the trunk, each with its own grid identification.

Anyone travelling through the forest could find a reference tree and pinpoint their location on a map, whether they were here to classify forest species, to find a campsite, to build new roads, or to fight fires.

The next major advance in forest mapping was the adaptation of the wartime use of aerial photography for mapping, then came computers and satellite navigation.

Today's super computers mean that incredible amounts of information can be stored about the landscape and print it out in whatever combination forest managers require. For example, it is possible to generate a map showing pure karri stands in national parks, less than one kilometre from a road, which haven't been burnt for 50 years. CALM currently records data under 70 different headings, including land ownership, vegetation types, rainfall zones, past fires and disease outbreaks.

As you drive around the Great Forest Trees Drive you will see several reference trees - look out for HU 89 1, just to the right of the track on the map below.


HU
89
1
STRACHAN
ROAD
RIVER
SHANNON
Karri
200
200
N
W
E
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DISEASE RISK AREA
Quarantined to control the spread
of fungal plant disease "DIEBACK"
MAP 5
Shannon
Townsite

South-western Australia is an ancient land and still home to some of the plant, insect, frog and fish species that lived here when Australia was joined to Africa, Antarctica and South America in the giant continent, Gondwana.

One of these survivors in the southern forest is the Shannon mud-minnow, a fish whose nearest relatives all became fossils millions of years ago.

Like many rivers in this region, the 60-kilometre Shannon flows only after winter rains. During the dry season, the water level drops and the river becomes a series of pools in a dry bed.

The mud-minnow copes with this change in surroundings by burrowing into the river bed at the start of the dry season and forming a small water-filled chamber. It then seals the chamber and waits for the river to fill again.

Other prehistoric animals have been equally successful, particularly those living in swampy areas.

Other features surviving from Gondwanan times are the granite outcrops, such as Mokare's Rock west of Shannon Dam, and others which can be found to the south of the main karri forest.

These outcrops, known as monadnocks, are usually quite prominent and may have been islands when the sea level was higher than it is today. This would explain their quite distinctive plant life.

MAP 6:
the Shannon mud-minnow,
Lepidogalaxias salamandroides

CREEKBEND

ROAD

HT 88 1

HT 89 1

11.7 km

RIVER

STRACHAN

MINDANUP ROAD

SHANNON

HU 89 1

190

200

180

DISEASE RISK AREA
Quarantined to control the spread
of fungal plant disease "DIEBACK"

MAP 6

Shannon Townsite

How can a tree survive when the centre of its trunk is burnt out?

Losing the centre of its trunk certainly weakens the tree structurally, but a burnt out hollow takes away only part of the trunk's living tissue, which is in the layer just below the bark.

The centre of the trunk, or heartwood, is the oldest part of the tree and it's here that decay usually starts. Fungus from the soil can get into the heartwood at the base of the tree, or air borne spores will enter higher up through any damaged branches.

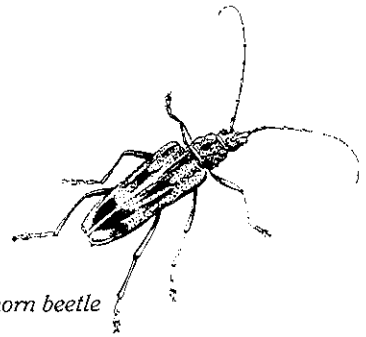
Wood rotted by fungus burns easily, so the tree is vulnerable to any fire hot enough to burn through the healthy, outer layers. This can happen if another tree falls against it and then catches fire, concentrating heat against the standing trunk.

Once the heartwood has been exposed, subsequent fires will burn deeper and deeper until it's possible for someone to stand in the hollow, or even drive a car through the opening, as happened in the tingle forest near Walpole.

Adversity of a different kind is responsible for another prominent feature on the trunks of some forest trees: large bulbous growths known as burls.

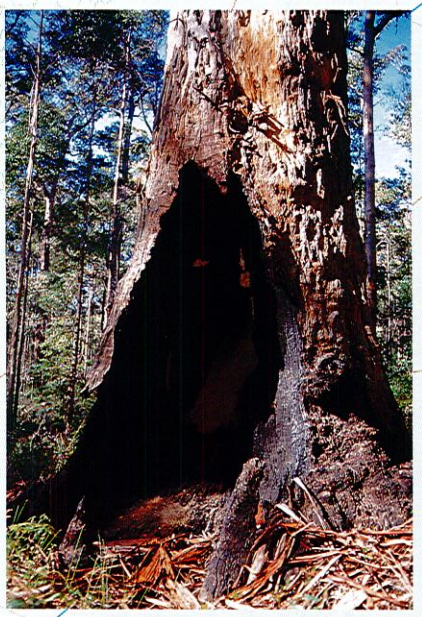
Burls are usually triggered by insect attacks - the normal response to grow new tissue over the area attacked is exaggerated for some reason and sometimes quite large growths are produced.

The timber grain inside a burl is quite distinctive, which means burls are highly sought after by craftspeople.



long-horn beetle

MAP 7:
bushfires have burnt out about a third of the base of this karri



Karri

200

ROAD

HT
87
1

CREEKBEND

200

200

W
S
N
E

MAP 7

Shannon
Townsite

A large forest fire produces the same energy as an atom bomb....every ten minutes.

Fires started by lightning strikes have been a natural part of the forest since prehistoric times, so the plants and animals - and more recently, the people - in their path have had to work out survival strategies.

Plants, for example, have evolved a range of defence mechanisms from the thick, fire-resistant bark protecting the jarrah's trunk to using a fire to trigger germination.

Karri is one of the many plants that stores its seeds in hard, woody pods which open only after the heat of a big fire. The seeds are then scattered into the burnt out clearing where there is not only room to grow, but a fertile layer of ash. Germination at any other time is unlikely to be successful on the crowded forest floor.

Unlike plants, animals have the option of trying to escape the flames. Some do so by burrowing into the ground or taking shelter in fallen logs for the few minutes it usually takes for a fire front to pass through. If the flames are not too big, some larger animals actually run through them to escape.

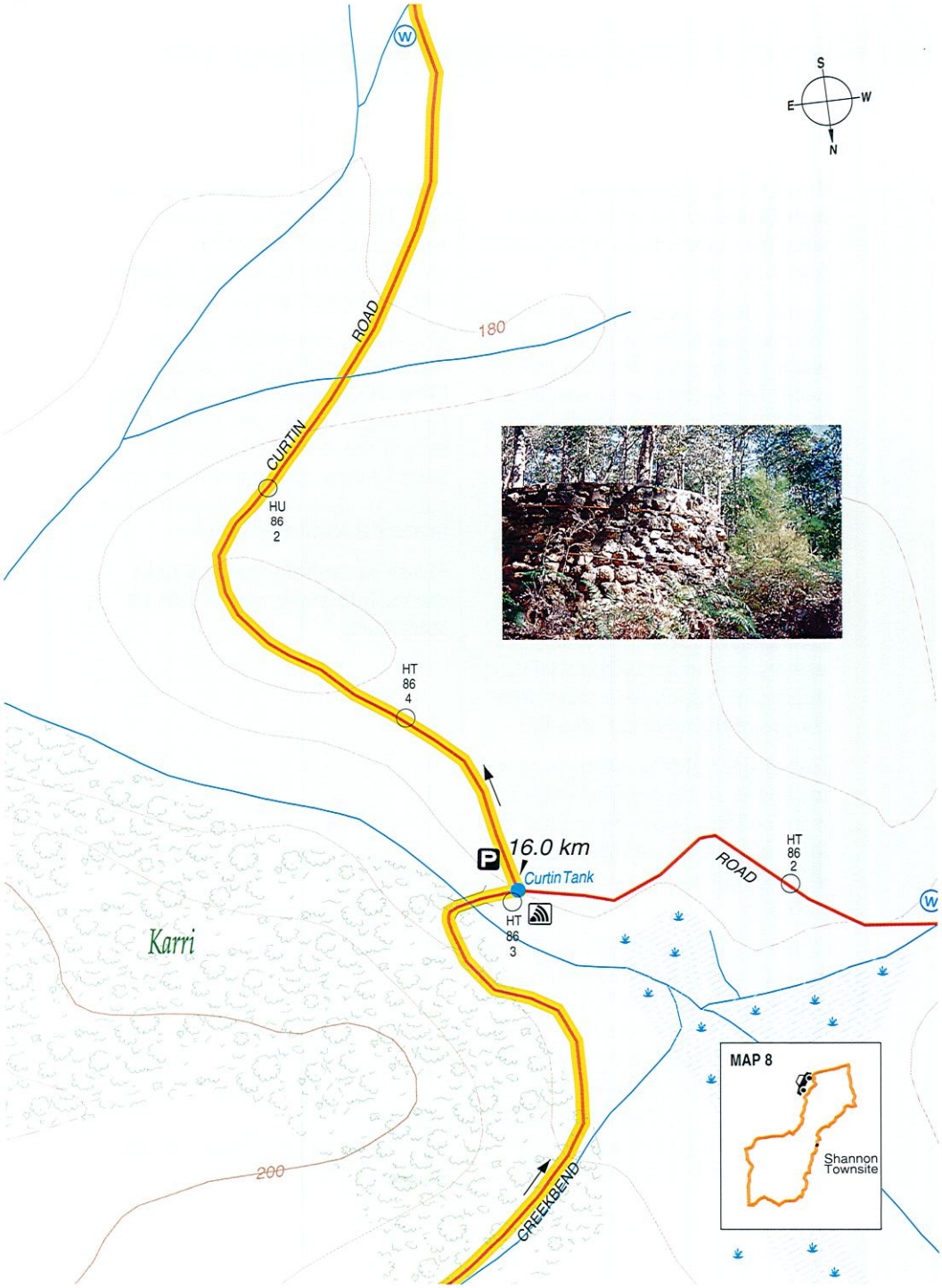
If individual animals are unsuccessful, nature's strategy is to replace them with their neighbours' offspring. Most animals produce multiple offspring, but many do not survive, either because they fall victim to predators, or because there is not enough food and water for them. A big fire will reduce the number of competitors and let neighbouring animals recolonise the area.

Losing individuals is not an acceptable human strategy, so resources are put into preventing fires and fighting those that do occur.

PRIME MINISTER'S TANK

The water tank in the fork of the road pictured on MAP 8 was built for fighting fires in the days of the Shannon mill. The tank and the forest block in which it stands are named after Australia's wartime Prime Minister, John Curtin. The former prime minister was also once secretary of the Victorian Timber Workers' Union.

State-owned forests are divided into management areas called blocks and named after such things as local landmarks, Aboriginal names and prominent people. Nearby Weld block gets its name from the Weld River, which in turn was named when Governor Weld fell off his horse into the river while out exploring.


S
E
W
N
W
ROAD
CURTIN
HU
86
2
180
HT
86
4
16.0 km
Curtin Tank
HT
86
3
ROAD
HT
86
2
W
Karri
200
CREEKBEND
MAP 8
Shannon
Townsite

Strategies for fighting big bushfires were put in place soon after the Forests Department was formed in 1919.

In the 1920s, foresters rode out to a fire on horseback with a canvas water bag hung around the horse's neck. The firefighter carried an axe, a metal rake and feed for the horse.

The plan was to rake a series of firebreaks, starting at the rear of the fire, then the flanks and eventually working up to the head of the fire. This could take hours, or even days of work.

Fire rakes are still used today, but usually only in areas inaccessible to bulldozers, which have taken over the job of trying to cut off a fire.

Just as fire fighting methods have improved, so has fire prevention, from building water points and fire lookouts in the tree tops, to fire spotter planes and controlled burning.

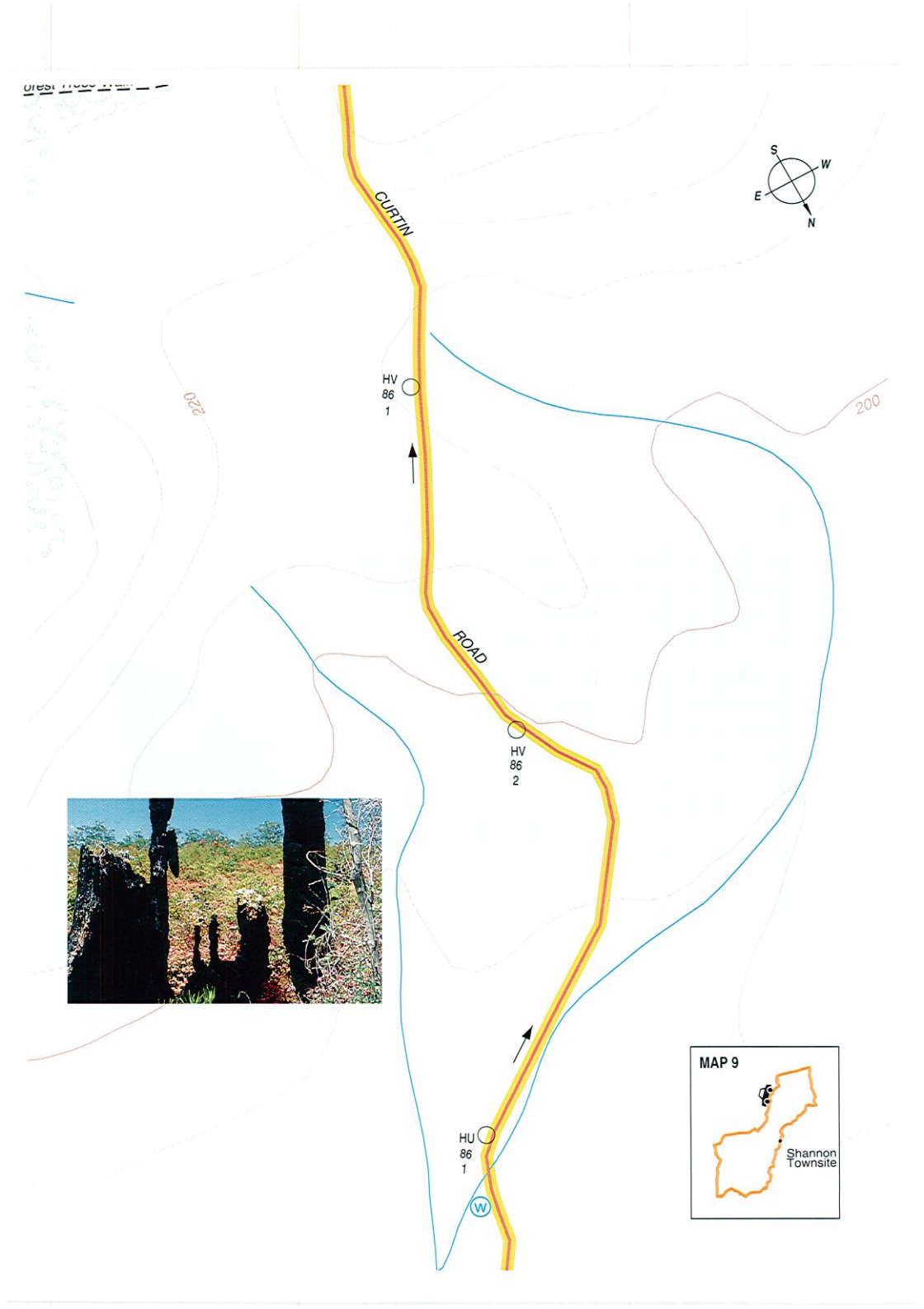
CALM deliberately burns strategic areas to reduce the huge amount of leaves, bark and branches that builds up on the forest floor. These burns are controlled by establishing firebreaks beforehand and starting the fire when the leaf litter is damp underneath and the right weather conditions are forecast.

Creating buffers where the fuel has been burnt off makes it much easier to control bushfires, particularly those too big to tackle with bulldozers and fire hoses.

The energy released by a fire is measured in kilowatts - one kilowatt is usually the heat put out by a single bar electric heater. The heat at the Ash Wednesday fire front in Victoria, for example, was equal to one hundred thousand bar heaters stacked every metre.

Please be careful when you're in the bush to make sure you don't start a fire.

MAP 9:
young karri regeneration in the open space created by bushfire


CURTIN
ROAD
S
W
E
N
HV
86
1
HV
86
2
HU
86
1
W
220
200
MAP 9
Shannon
Townsite

Spring time transforms the forest, bringing a blaze of brightly coloured wildflowers. Different plants flower throughout the year, but the showiest display is certainly in the spring.

Native wisteria (*Hardenbergia comptoniana*) is one of several creepers found across the south-west. Also known as wild sarsaparilla, it is a vigorous climber and can be found growing five metres up neighbouring trees. Its pea-shaped flowers are deep blue-purple in colour and hang in sprays up to 20 centimetres long.

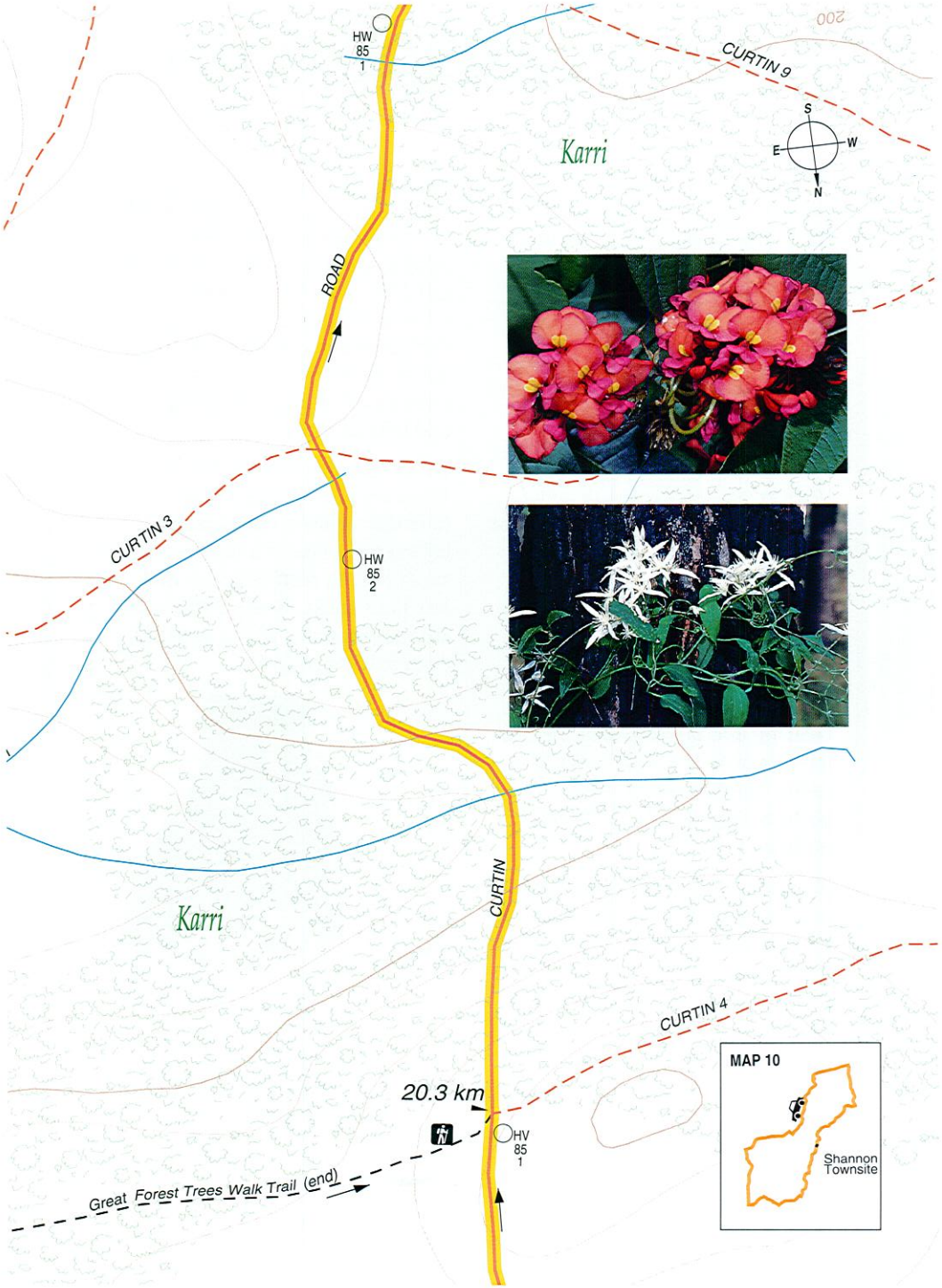
Another of the peas, the coral vine (*Kennedia coccinea*) grows in vivid contrast to native wisteria, with clusters of red, yellow and orange flowers. Coral vine is particularly abundant in the season after a summer wildfire and is one of the few *Kennedia* species to grow as a climber. Other species found in the south-west grow as ground creepers.

White clematis (*Clematis pubescens*) is one of more than 250 species of clematis, but only three of them are found in Western Australia - the others are found mainly in temperate areas of the northern hemisphere. These creepers usually grow near water, earning them the common name of "travellers joy" in some countries, including Australia.

For more information about wildflowers in the karri forest, turn to page 72.

Australian admiral

MAP 10, from top:
coral vine and white clematis


HW
85
1
CURTIN 9
Karri
S
E
W
N
ROAD
CURTIN 3
HW
85
2
Karri
CURTIN
CURTIN 4
20.3 km
HV
85
1
Great Forest Trees Walk Trail (end)
MAP 10
Shannon
Townsite

This is quokka country, despite many people's belief that they are found only on Rottnest Island, off Perth.

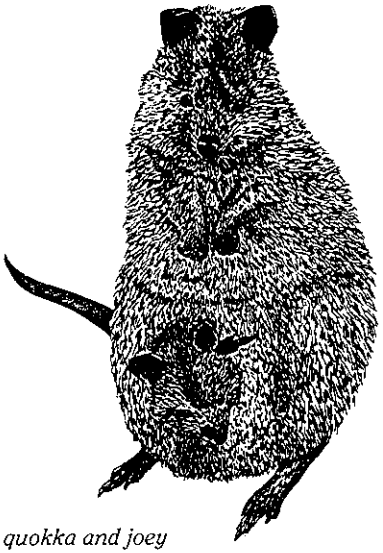
Quokkas have been linked with the island ever since the explorer Willem de Vlamingh mistook them for a kind of rat in 1696 and named the island "Rottenest", or "rat nest" in his native Dutch. An earlier Dutch explorer, Samuel Volckersen, was far kinder when he described the quokka as a "wild cat with brown hair", but it was Vlamingh's name that stuck.

These small wallabies were once common across the State's south-west before European settlement. The loss of some habitats to clearing and the arrival of the fox, which preys on a wide range of native animals (see Nature's poisons on page 68), led to its decline.

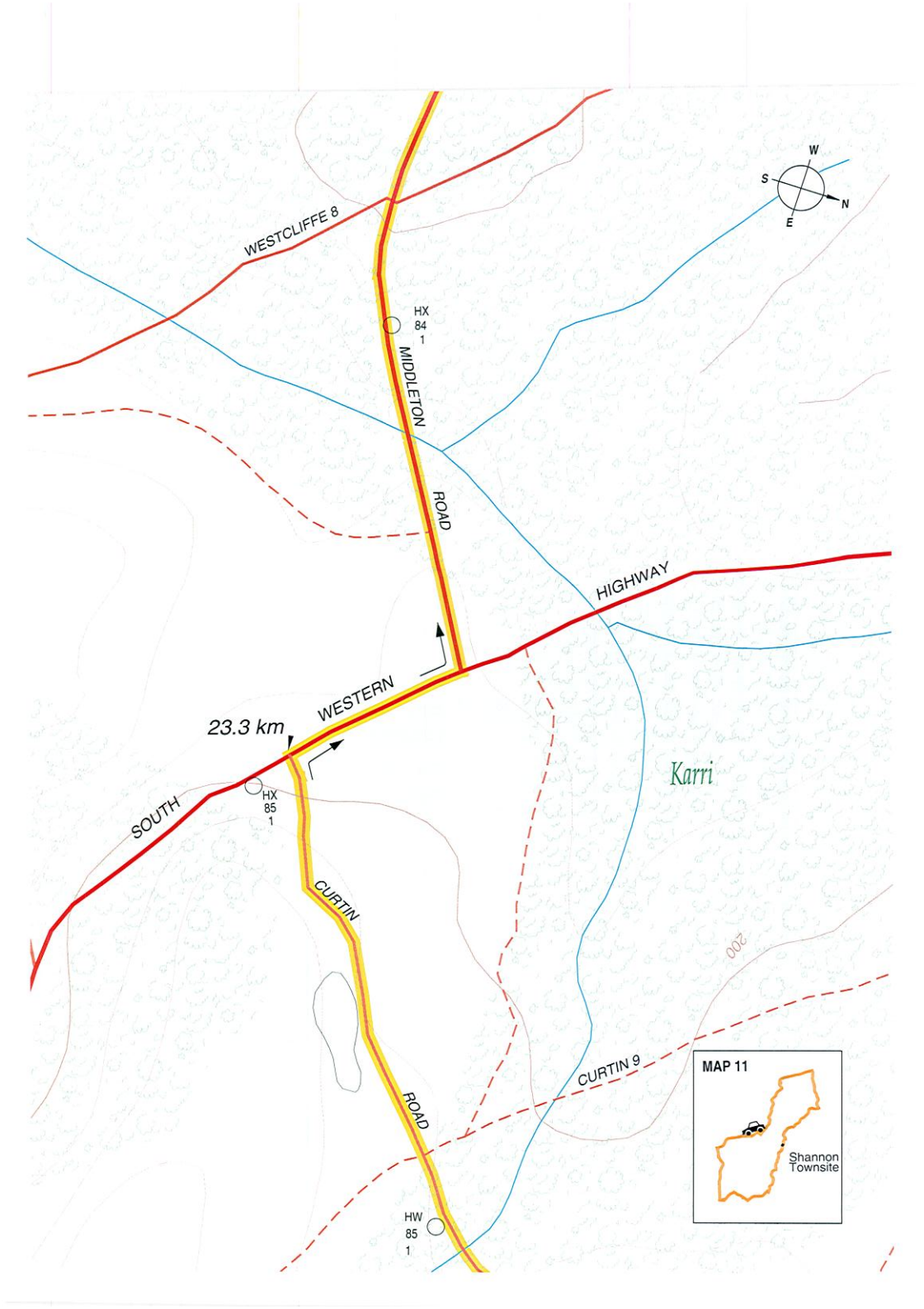
Mainland quokkas are now found only in isolated pockets, preferring densely vegetated areas around swamps and streams, which makes them hard to spot. However, they have been recorded in Shannon National Park.

Quokkas give birth to a single joey in autumn, which crawls through its mother's fur to the pouch, where it suckles for four to six months. The mother then mates again the day after she gives birth, but this embryo only partly develops and remains in that state until the fate of its sibling is known: if the first joey survives, the second embryo degenerates; but if the older joey dies, the embryo will start growing again and take its place.

Other rare species found in the Shannon include the mardo (a small carnivorous marsupial between the size of a mouse and a small rat), Peregrine falcon and Mueller's snake. Some of the other animals recorded in the park are described on page 64.



quokka and joey


W
S
N
E
WESTCLIFFE 8
HX
84
1
MIDDLETON
ROAD
HIGHWAY
WESTERN
23.3 km
SOUTH
HX
85
1
CURTIN
ROAD
Karri
200
CURTIN 9
HW
85
1
MAP 11
Shannon
Townsite

Two small plots of trees from far away forests flank Middleton Road, on this stretch of the drive.

These plots are part of a series of trials planted in the 1960s and 1970s to find the best species suitable for timber plantations. Most plots are in the south-west, but others have been planted in the Goldfields and even the Kimberley, where Indian sandalwood is being grown.

The first trials were probably the European pines planted by the government of the day near Waroona in 1896. With the knowledge gained from decades of monitoring trial plantings, CALM scientists have developed a successful tree breeding program, leading to pines which are up to 60 per cent more productive than the early imports.

There are now more than 70,000 hectares of State-owned pine plantations, supplying a thriving local industry which produces a range of timber products.

The most popular plantation trees today are bluegums, which CALM and private growers are planting on already cleared farmland in partnership with local landowners and large investors. Nearly 10,000 hectares have been planted since the early 1990s under this project and this will increase to more than 55,000 hectares by 2006.

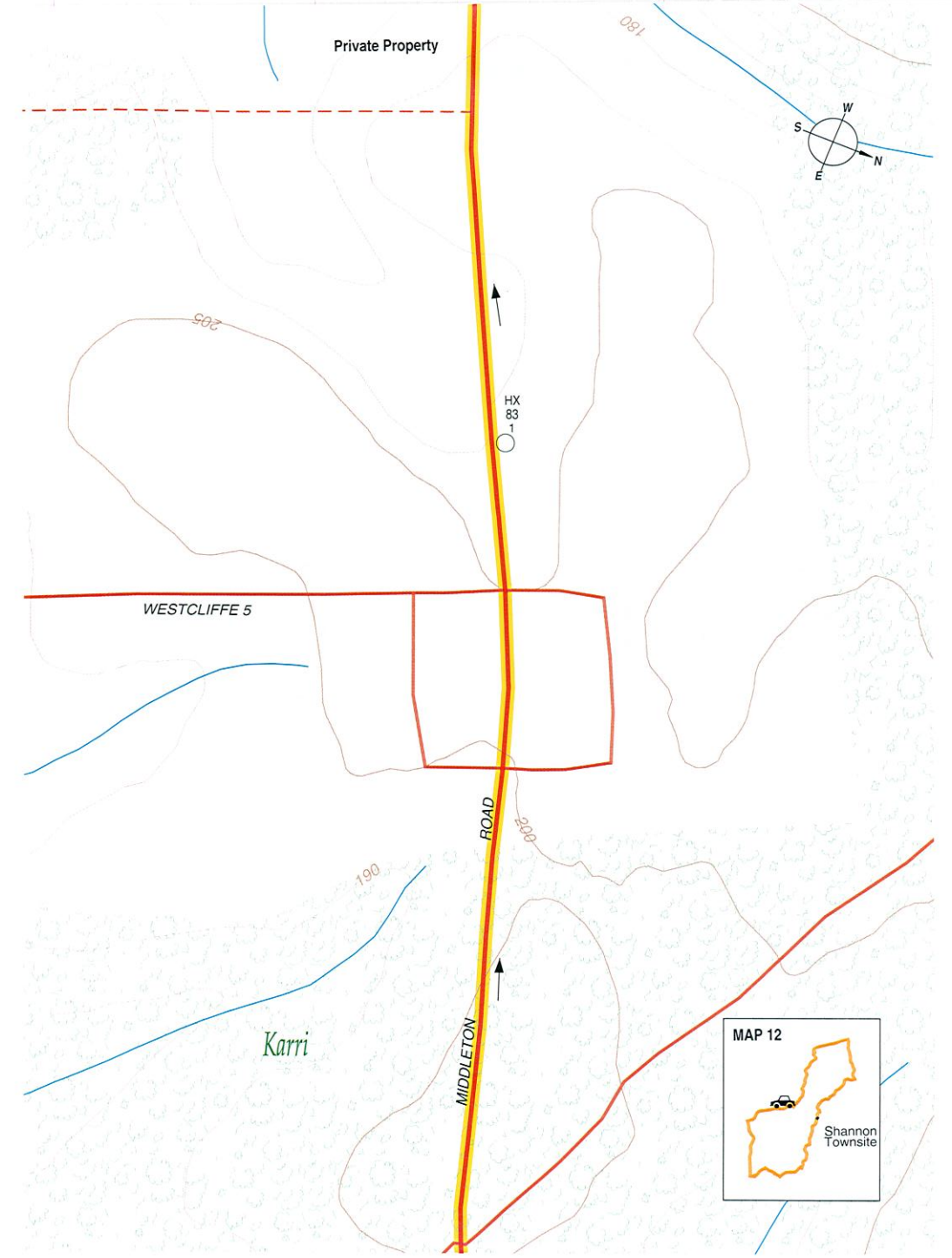
The wood fibre that is harvested will be used to make top quality writing and art papers, while the stumps will be left to regrow another crop, continuing to draw down water tables. The rise in water tables caused by clearing the original vegetation is now known to cause rising salinity levels on farmland and in streams.

The trial plantings along Middleton Road and elsewhere around Shannon National Park were established in the 1960s and are a mix of pines and different eucalypts.

Foresters were worried that dieback could devastate the forest and they were looking for resistant species to replant sites attacked by the disease, as well as the best species to plant on poor forest sites to increase timber production.

However, the fungus responsible for dieback has not spread as rapidly as was feared and the Shannon trials are no longer monitored.

meat ant


Private Property
180
W
S
N
E
205
HX
83
1
WESTCLIFFE 5
ROAD
200
190
MIDDLETON
Karri
MAP 12
Shannon
Townsite

FARMS IN THE FOREST

The first European settlers came to Western Australia in the 1820s, but it wasn't until the arrival of a convict labour force in the 1850s that the colony started to grow.

As settlers spread inland from the coast, they grazed their sheep and cattle in the forest and then began to clear land to grow pasture, crops and orchards.

Their first target was the more open woodlands for pasturing stock and then clearing followed along the more fertile valley bottoms.

It was soon discovered that soils which supported blackbutt, or yarri, were among the most fertile, so these were some of the first forests to be cleared.

After the First World War, the Government of the day decided to clear karri forest and create new dairy farms in what was known as the group settlement scheme.

Under this scheme, groups of European settlers were granted parcels of land which they cleared in turn after drawing lots to determine the order. The tall forest was cleared using primitive methods and hand tools - many of these farms were abandoned when the harsh conditions and vigorous karri regrowth defeated the spirit of the newcomers.

Thousands of hectares of prime karri forest were ringbarked and cleared because it was mistakenly thought that the size of the huge trees indicated these were the best soils for agriculture. However, as with many Western Australian soils, the land here is low in nutrients. The native vegetation has adapted to these conditions, but agricultural crops need to be fertilised.

The clearing scheme was strongly opposed by the new Forests Department, but it was the Depression that ended the largely uneconomical scheme. About 20 per cent of the southern forest had been cleared.

The land not ringbarked during the 1920s was eventually secured as State forest.

MAP 13:
farmland carved from the forest


28.8 km
DEESIDE
COAST
ROAD
HX
82
1
MIDDLETON
ROAD
W
S
N
E
JEFFREY
ROAD
MIDDLETON
ROAD
Private Property
HX
82
2
Private Property
ADAM
ROAD
MAP 13
Shannon
Townsite
180

CATTLE IN THE KARRI

Since the late 1800s, cattle have been driven from farms in this region to graze on the coastal heath over summer and autumn.

Aboriginal stockmen taught the graziers how to burn the bush each year during the annual cattle run. This practice, which was used to encourage new growth to attract kangaroos, was equally successful in providing feed for cattle.

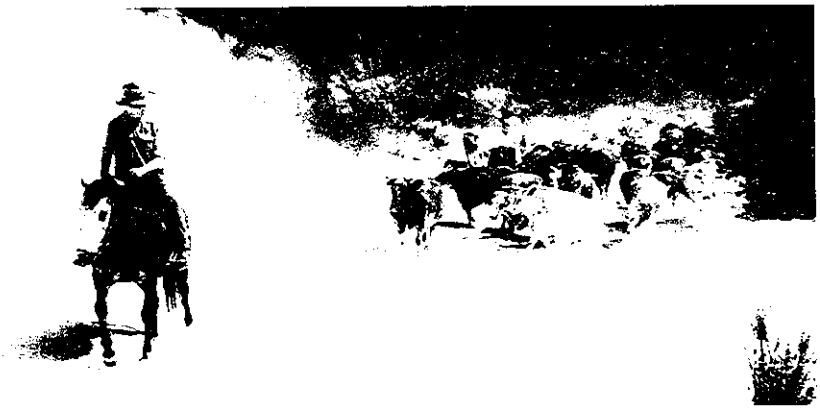
One of the early stock routes was the track used by the Muirs, one of the pioneer families to settle in the southern forest region. What is now Deeside Coast Road began as a single bridle track from the Muirs' property, Deeside, north of Shannon National Park.

Up to 200 cattle at a time would be driven down the track - during the war when labour was scarce, one man and a dog would manage the drive alone.

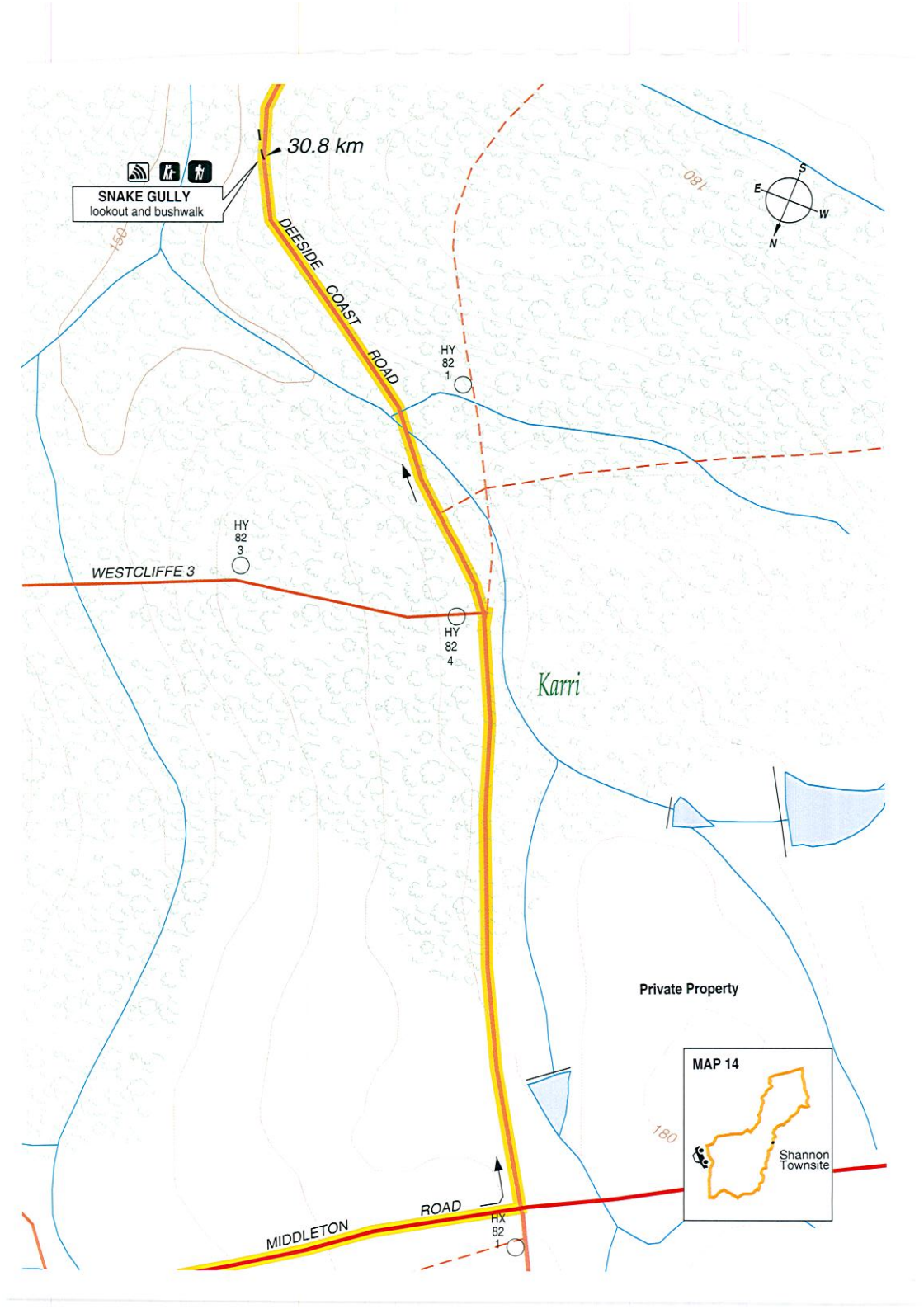
Taking the cattle to the coast saved farmers from hand feeding their herds and gave their pastures a chance to regrow when the rain began. Coastal grazing began informally, but some land was purchased and leased in the 1920s.

Later, residents of the Shannon townsite would look on the annual treks to and from the coast as a mark of the passing seasons.

Today, much of the area that was briefly cattle country is now part of the 120,000 hectare D'Entrecasteaux National Park, which borders Shannon National Park.



droving cattle to the coast near Shannon (photo courtesy of Jack French)


30.8 km
SNAKE GULLY
lookout and bushwalk
DEESIDE COAST ROAD
HY 82 1
HY 82 3
WESTCLIFFE 3
HY 82 4
Karri
Private Property
MAP 14
Shannon Townsite
MIDDLETON ROAD
HX 82 1
S
E
W
N
150
180

The view through the trees across the valley at Snake Gully Lookout is a good opportunity to observe birds.

Compared with other forest ecosystems, karri forest is not especially rich in birds. Even so, more than 80 species of birds have been identified in the diverse forest, woodland, shrubland and swamp habitats of the Shannon.

Each layer within the forest is home to different species of birds - some live and feed mainly in the canopy, or tree tops, and others dwell only in the understorey.

The number of birds active in the forest depends on the season, weather and time of day. Mornings are most popular, followed by the late afternoon.

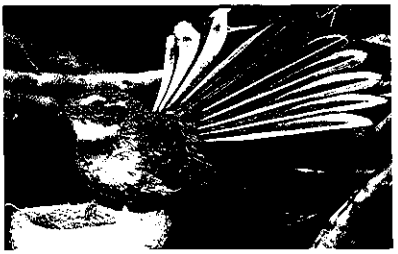
Rainy and windy days are not the best for bird watching, but once the rain stops, birds come out to forage again. Birds that require nectar, such as honeyeaters and lorikeets, will be in much bigger numbers when certain plants are flowering.

In the karri forest you are likely to see and hear parrots and cockatoos in the tree tops. They nest in hollows and are the seed and fruit eaters of the forest. Their bills are designed to chew and hook seeds from seed capsules and pry insect larvae from tree bark.

You might not be able to see cockatoos or parrots but perhaps you can hear their calls. Another group of birds, including the New Holland honeyeater, prefer the tall shrubs and smaller trees in the mid-storey.

The karri forest floor is less populated, although wrens, pardalotes and treecreepers can be seen in large numbers close to the ground and grey fantails flutter about, catching flies along the streams. Emus are nomads and can be found roaming through open parts of the forest looking for young green shoots, insects, fruits and seeds.

For more details about birds of the karri forest, turn to page 60.



grey fantail on the nest

MAP 15:
the lookout at Snake Gully

Karri

S
W
E
N

190

170

HZ
81
2

HZ
81
1

ROAD

COAST

DEESIDE

WESTCLIFFE 2

Karri

180

Snake Gully
lookout and bushwalk

MAP 15

Shannon
Townsite

The giant karris at Big Tree Grove are perhaps 300 years old and about 85 metres high. Karri is one of the tallest trees in the world and can weigh up to 150 tonnes.

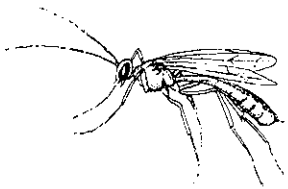
These trees are senescent, or in decline from old age. Some of their neighbours have already died and collapsed. Senescent trees repair damage much more slowly and lose leaves more rapidly than they can replace them. Mature karri trees normally replace all their leaves about every 18 months, depositing around seven tonnes of leaves per hectare onto the forest floor each year.

Aging branches may break and drop off and the open wound is then more likely to attract wood borers and fungi.

There is quite a bit of space between these giant karri trees. They have commanded the space in the forest for some time and suppressed the growth of new karri.

As each karri giant grew taller and taller towards maturity it spread its canopy and successfully competed against nearby trees for moisture, nutrients and light. Karri trees are crown shy, which means branches are never intertwined. In this way, the trees make efficient use of the available sunlight on the canopy.

Under the ground there is strong competition for water and nutrients. Karri roots can extend ten to 15 metres around the tree and form a network of hundreds of kilometres.



khneumon wasp

MAP 16:
a boardwalk takes visitors around some of the giants at Big Tree Grove


WESTCLIFFE Bibbulmun Track
WESTCLIFFE 7
36.8 km
140
120
FIRELINE
JB 82 1
carparks & bus bay
picnic tables
36.0 km
WESTCLIFFE 1
FORMATION
Karri
Warwaberup Swamp
JB 82 2
JB 82 3
34.3 km
DEESIDE COAST ROAD
Big Tree Grove
35.0 km
JANE Bibbulmun Track
MAP 17
Shannon Townsite
E
N
S
W

THE RAIL LIFELINE

Railways were once the main link between remote forest settlements.

The first step in the development of the Shannon mill was to build a railway line to link it to the outside world.

The 34-kilometre track from Northcliffe was begun in 1946, but took several years to finish because of the post-war shortage of building materials and machinery.

Earthworks for the line were built with picks and shovels and then the railway sleepers and bridge timbers were cut by hand.

The railway gang lived in a bush camp - which they built themselves - until they got closer to Shannon and then moved their base to the site of the new town.

Once the Northcliffe-Shannon line was completed, a series of temporary spur lines was built. These linked the areas where timber was being cut, known as coupes, to the mill. Once the timber marked by the foresters as suitable for cutting was felled and the logs hauled back to the mill, the spur line would be taken up and laid again at the next coupe.

When they weren't hauling timber, the trains were essential transport as there were few roads for many years and, even after the roads improved, few cars.

the remains of one of the bridges on the Northcliffe to Shannon railway

BULLICH AND WARREN RIVER CEDAR

Early European settlers were obviously fond of naming their strange new surroundings here after things they knew. This extended not only to place names transplanted straight from Britain, but to other features.

Jarrah, for example, was known for many years as Swan River mahogany, and one of the other forest trees growing here became the Warren River cedar (*Agonis juniperina*). The tree, of course, looks nothing like a cedar, but their timbers were thought to be similar.

Warren River cedar, or the native cedar, is similar to peppermint, but grows to a height of 27 metres. Unlike the weeping branches of a peppermint, Warren River cedar is a spindly tree with leaves on a few high branches. It grows only in, or near, water.

Also growing in this area is the eucalypt known as bullich, or swamp karri (*Eucalyptus megacarpa*). With a maximum height of 30 metres, the bullich is much shorter than the karri, but it does have smooth, pale grey bark which it sheds. Like the new bark on a karri, the fresh bullich bark comes in shades of orange, yellow, pink, grey and white.

As its other common name suggests, bullich often grows near swamps and streams. It produces white flowers from autumn to spring.

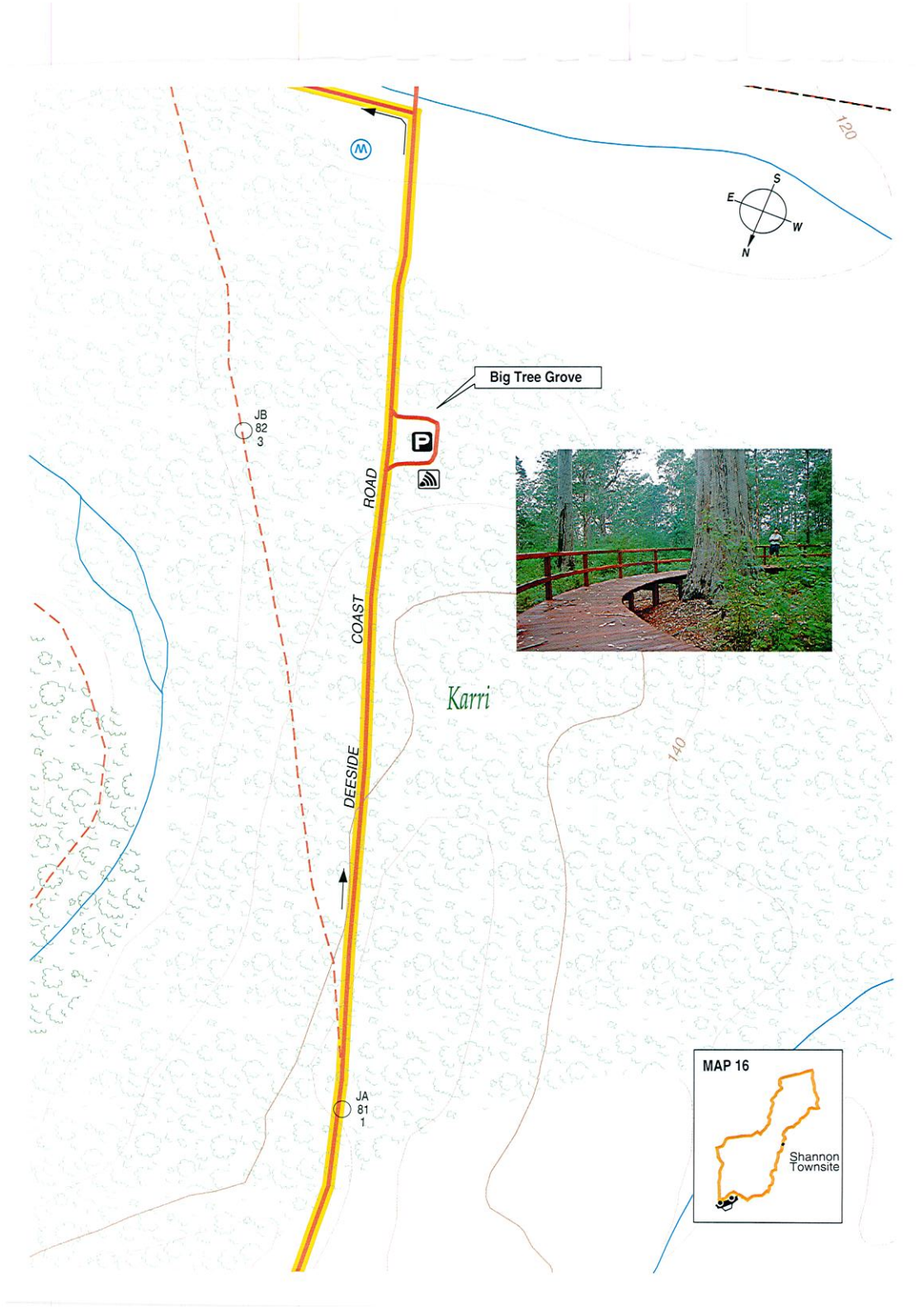
Early timber cutters also gave this tree the name "bastard karri" as it was often mistaken for karri and felled for timber. Unlike karri, bullich has a brittle timber and is useless for sawmilling.

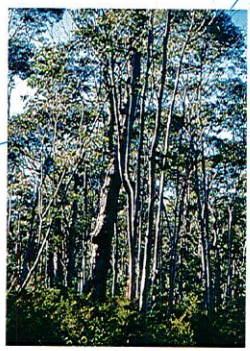
Karri hazel and karri sheoak are also named after European trees.

Karri hazel (*Trymalium floribundum*) usually grows in dense thickets as a large shrub, but is also found as a small tree up to nine metres high. It has masses of cream coloured flowers in winter and spring.

Karri sheoak (*Allocasuarina decussata*) and the more widely distributed common sheoak (*Allocasuarina fraseriana*) produce timber similar to the European oak. Sheoaks are otherwise more like pines, producing long greenish "needles" and cones. They also have distinctive corky bark.

MAP 18:
a grove of bullich


120
S
E
W
N
Big Tree Grove
JB
82
3
ROAD
COAST
DEESIDE
Karri
140
JA
81
1
MAP 16
Shannon
Townsite



JB 84 1

N E S W

JANE FORMATION

SHANNON RIVER

JEFFREY ROAD

Karri

JC 83 3

JB 83 1

WESTCLIFFE 7 Track

Bibbulmun

MAP 18

Shannon Townsite

SNOTTYGOBBLE AND PEPPERMINTS

Snottygobble and peppermints may sound like something off a child's menu, but neither is all that appetising.

Instead, these are the common names of two of the smaller trees found in karri forests and elsewhere in the south-west.

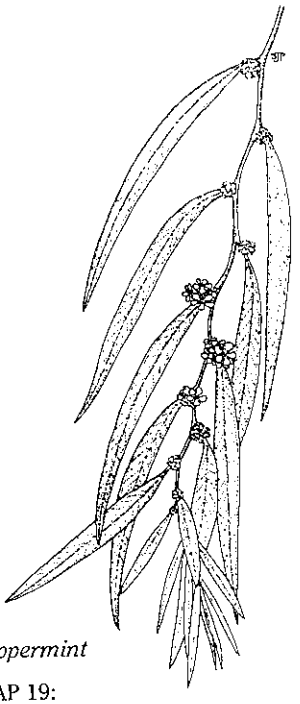
Snottygobble is thought to have got its name because of the way its soft, fleshy fruit turns jelly-like when it drops on the ground and over-ripens. The sticky fruit also changes in colour from green to yellow-green, which may make it easier for fruit-eating animals to find. Snottygobble is also known as "emu bush" after one of these animals.

Snottygobbles grow in eastern Australia, but are known there by the Aboriginal name, "geebungs".

The upright snottygobble (*Persoonia longifolia*) grows in the Shannon, reaching a maximum height of five metres. It flowers in summer, with sprays of deep yellow or orange blooms.

Peppermint (*Agonis flexuosa*) and swamp peppermint (*Agonis linearifolia*) both produce an aromatic oil in tiny glands on their leaves. Crushing the leaves produces the strong scent of peppermints. The peppermint tree grows to ten metres high and has weeping branches, while the swamp peppermint is usually a shrub. Both produce clusters of small white flowers in spring and summer.

There are many other forest tree species to be found in karri country - more than 20 different types of eucalypts alone have been recorded.



peppermint

MAP 19:
snottygobble, in the centre of the picture, growing in the forest understorey


JB
85
1
LOWER SHANNON ROAD
N
E
S
W
140
RIVER
Karri
40.9 km
JB
84
2
40.5 km
SHANNON
FORMATION
PRESTON ROAD
Karri
JANE
MAP 19
Shannon
Townsite

SPOTTING THE FIRES

The great height of karri trees was a real problem for early foresters who wanted to extend the system of fire lookout towers built on high ground in the jarrah forest.

The lookouts were obviously essential in spotting fires before they got too big, giving firefighters their best chance at bringing them under control before they did too much damage.

The problem in the karri forest was finding enough vantage points that were high enough to build look-outs and the solution proved to be building lookouts in the tree tops themselves.

In the 1930s, a forester called Jack Watson designed his own climbing gear and later used it to scale 40 potential lookout trees.

Once a suitable tree was chosen, the rungs of a ladder were hammered into the tree trunk. The holes for these rungs were drilled by hand by a man sitting on the rung below, moving slowly up the tree as each new rung went in.

The top of the tree was then lopped by a single axeman about 40 metres off the ground, to give the lookout cabin a clear view and then the timber to build the cabin was hauled up by rope and pulley. Lookout cabins had to be higher than the surrounding forest canopy, but this meant they were exposed to winter storms and lightning. Each of the cabins was built with a lightning conductor - secondhand tram wire brought down from Perth proved to be the most effective.

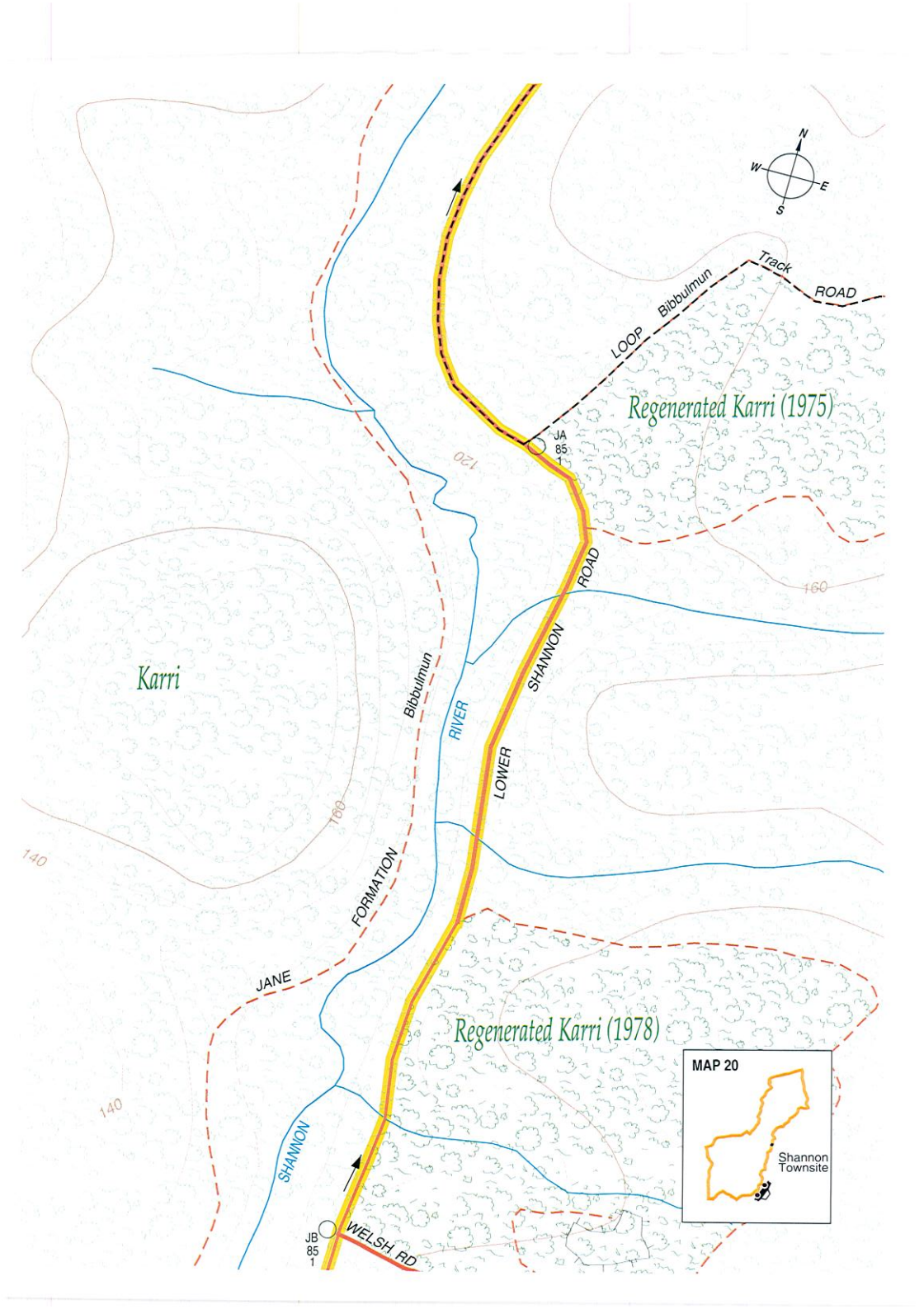
The first lookout tree in the karri forest was the Alco Tree, built in 1936-37 about 16 kilometres north-west of Manjimup, with a cabin floor 24 metres off the ground.

The tallest lookout cabin built between 1936 and 1952, known as Gardner 2, was 63 metres high. It replaced Gardner 1, just south of Pemberton, which was declared unsafe after only two fire seasons because the upper branches had deteriorated.

A Forests Department file later noted: "Top of this tree fell off in 1966 (apparently in a storm)."

One towerman was on Gardner Tree during a summer thunderstorm and as the lightning came closer and closer to the tree, he rang the duty forester at Pemberton and said he was thinking of climbing down until the storm passed.

Worried about the danger of fires being started by the lightning, the


N
W
E
S
Track
ROAD
Bibbulmun
LOOP
Regenerated Karri (1975)
JA
85
1
120
160
ROAD
SHANNON
Karri
Bibbulmun
RIVER
LOWER
160
140
FORMATION
JANE
Regenerated Karri (1978)
MAP 20
Shannon
Townsite
140
SHANNON
JB
85
1
WELSH RD

forester urged the towerman to stay where he was. He pointed out that there were dozens of trees in nearby paddocks which had survived countless electrical storms.

The towerman is reported to have said: "That may be so, but there's a bloody sight more of them lying on the ground - I'm coming down."

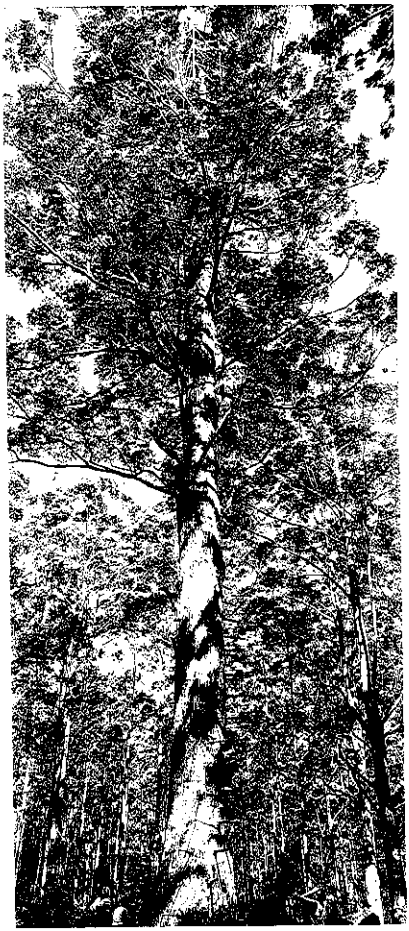
CALM has opened three lookout trees to the public, not far from Shannon.

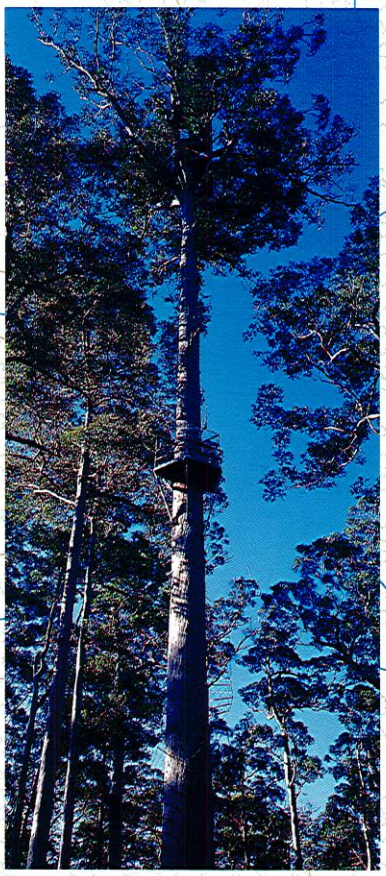
There's Gloucester Tree (*right*), just three kilometres from Pemberton, Dave Evans Bicentennial Tree (*see MAP 21*), eight kilometres south of Pemberton and Diamond Tree on South Western Highway between Pemberton and Manjimup.

The lookouts at Gloucester and Diamond trees are both about 60 metres off the ground and Bicentennial lookout is more than 60 metres high, making it the highest treetop lookout in the world.

Fire spotter planes carry out most of the early detection work these days, but some fire lookouts are still used when wind conditions are unsuitable for the planes.

Another lookout site close to Shannon townsite can be found at Mount Burnside, where a small wooden cabin was built on top of a rocky outcrop. This site gives a marvellous view to the coast and eastwards to Mount Frankland.





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Karri

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MAP 21

Shannon Townsite

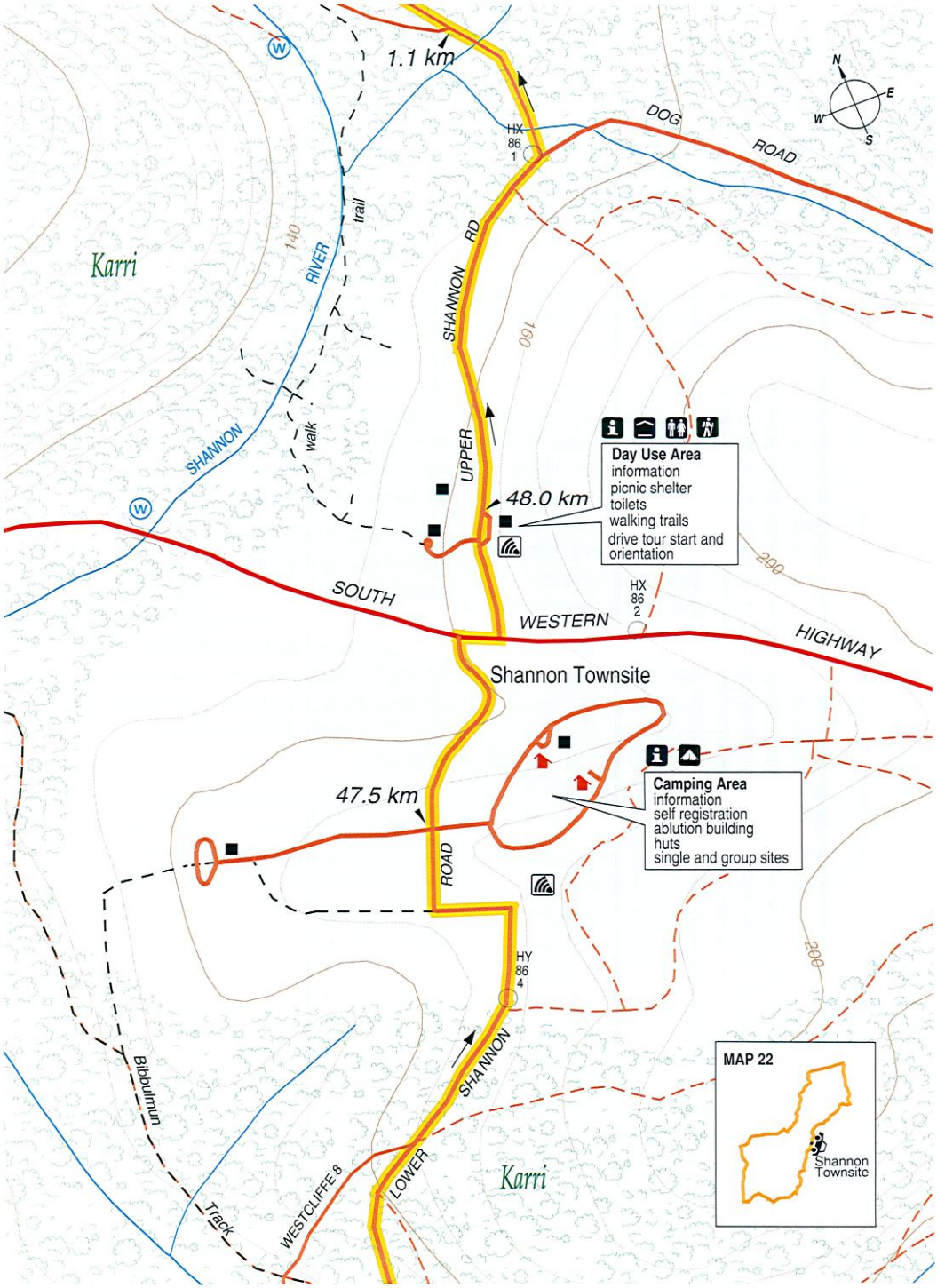
The Shannon was one of the last areas in the south-west opened up for logging, due to its inaccessibility. The Shannon area was remarkably pristine until the 1940s, when an acute shortage of timber after World War Two prompted the WA government to establish a timber mill there. Timber cutting began in the Shannon basin in the mid-1940s and the town and timber mill were established in the late 1940s.

The information shelter at the beginning of the Great Forest Trees Drive was the site of the old mill and the town was built across the highway where the camping ground now stands.

The settlement was designed for 90 mill houses in a double horseshoe surrounding the area which eventually included a hall, church, school, butcher, baker, general store, post office and nurse station. A small Forests Department settlement with ten houses was next to the mill site.

The town's first residents were the men working on the railway link from Northcliffe, who lived in timber huts prefabricated in Pemberton and bolted together at

steam-driven reciprocating cross-cutting saw in operation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Day Use Area
information
picnic shelter
toilets
walking trails
drive tour start and orientation
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SOUTH WESTERN HIGHWAY
Shannon Townsite
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single and group sites
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WESTCLIFFE 8
LOWER SHANNON
Karri
MAP 22
Shannon Townsite

Shannon. Even after the new town was established and families moved in, many amenities still had to be finished: the power supply went off at midnight, there was no running water and groceries were delivered on order from Northcliffe.

In winter, water for the townspeople and the mill could be drawn from the Shannon River, but there were problems in summer when the river often dried up. A dam was built upstream from the mill site in 1949 to ensure summer supplies. The picturesque location meant it also became a popular swimming and marroning place.

The Shannon mill was steam driven and, at its peak, employed 162 men. It produced enough timber to build 1000 houses a year and, for a time, was the biggest mill in the State.

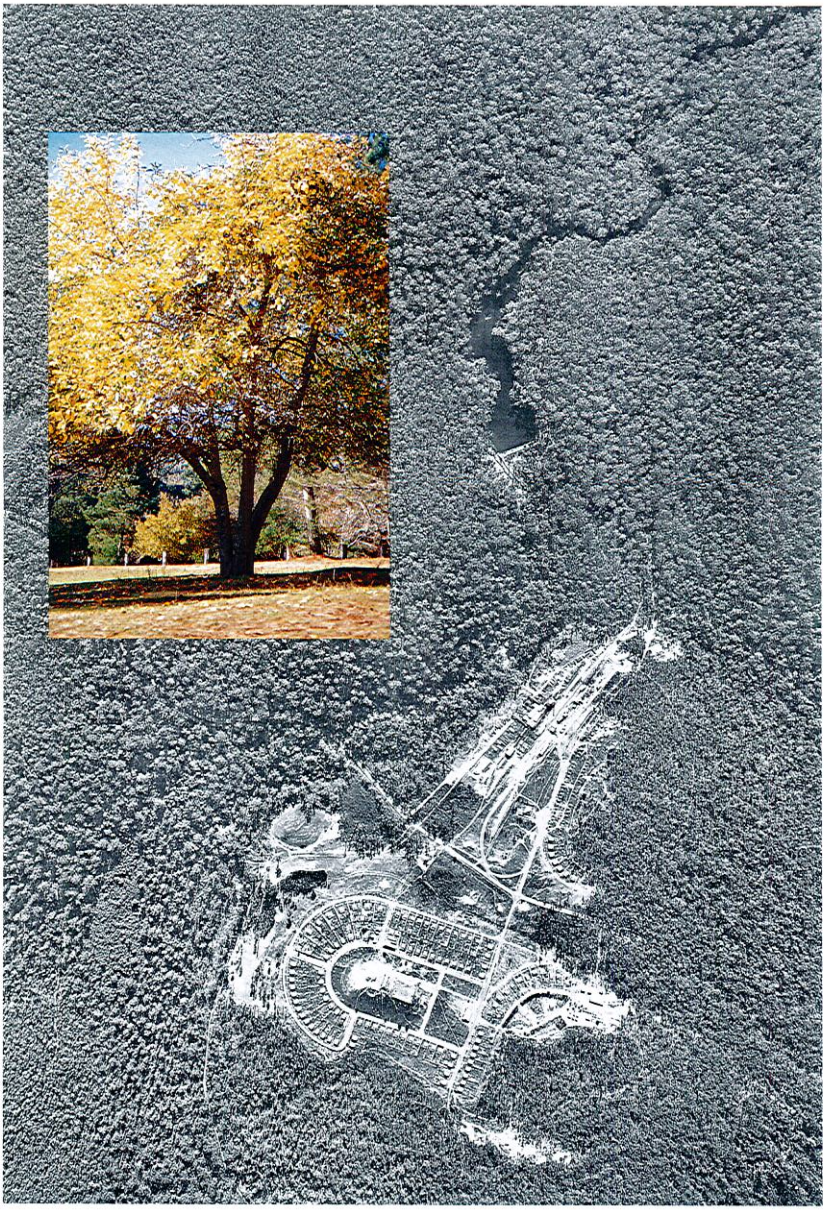
Shannon filled its record order in 1958 - the supply of 40 beams, each 61 feet long, for the Western Australian Government Railways Midland workshop. The beams were cut from seven logs with an average diameter of 12 feet and average weight of about 23 tons, which was nearly double the weight of most of the logs put through the mill. WAGR ordered the beams to build the base of corridor railway carriages, replacing the imported oregon used to make earlier carriages.

The Government-owned mill was sold in 1961 and then closed in 1968 when the new owners rationalised their timber business, and transferred most of the Shannon workforce to the mill at Pemberton. Logging in the Shannon basin continued until 1983 and the area was gazetted as a national park in December 1988.

Elsewhere in State forest where karri logging continues today, there's increasing emphasis on value adding. As well as supplying the sort of structural timber for which the Shannon mill was once famous, today's mills also produce furniture grade karri and karri veneers.

After Shannon mill closed, the houses from the old townsite were sold and transported away. Today, traces of the mill town and forestry settlement can be seen, such as the fruit trees still growing in the cleared areas of the Shannon camping ground.

You can see traces of the foundations of old buildings and railway lines along the Shannon Dam walk trail. Old logging tramways and roads are now used for walk trails and scenic drives.



Shannon townsite and dam, 1962

(reproduced by permission of the Department of Land Administration, Perth, WA, under DOLA Licence No. 502/96)

Inset: *one of the ornamental trees planted by a Shannon resident*

THE KARRI HARVEST

Logging in the karri forest began in the 1880s when Maurice Coleman Davies built his first sawmill at Karridale, south of Margaret River, in 1882.

Davies, a South Australian businessman, came to the area looking for suitable timber to cut sleepers for a contract he had to build part of the Adelaide to Melbourne railway.

He established another four timber mills in the area, built harbours at Flinders and Hamelin bays, installed 65 kilometres of railway line and introduced steam trains to Western Australia to haul logs and timber.

At its peak, his company employed more than 1000 people. Davies developed the Karridale settlement, where he built a store, hospital, town hall, church, library, sports ground and race course. Employees paid no rent or tax and the settlement had its own currency.

However, Davies operated in the days before logging was controlled and by 1913, the timber close to Karridale ran out and the last mill was closed.

Other karri mills were built at Torbay and Denmark in the 1880s. The land where these forests were felled has mostly been converted to agriculture.

Closer to Shannon, karri logging began from about 1912-14 when large sawmills were built at Jardee, Deanmill and Pemberton.

Regeneration began in the 1920s after the Forests Department was established in 1919 and the first areas of State forest were set aside.

The dense undergrowth in a karri forest makes it hard for karri seedlings to survive, so nature usually makes room for the new trees with a bushfire. The karri seeds released after a big fire not only have no competition for moisture and sunlight, but are provided with a layer of fertile ash in which to grow.

Forest studies have shown that, if seedlings are to grow rapidly into mature trees, they need a gap at least as wide as the height of the mature trees in the surrounding forest. Such a gap lets in plenty of sunlight and, more importantly, lets the seedlings develop the extensive root systems they need to draw enough moisture and nutrients from the soil.

The early foresters decided that logging should follow the same pattern as the natural disturbance caused by fire, to create gaps big enough to promote regeneration.

This form of forest management, or silviculture, was successfully applied at Big Brook, outside Pemberton, in the 1930s. The area was clearfelled and the logging debris burnt to fertilise the new seedlings, which were the start of today's regrowth forest, now a popular recreation site.

The forest Maurice Davies' company felled at Boranup also regenerated and this 120-year-old regrowth forest is now reserved for its conservation values as part of Leeuwin-Naturaliste National Park.

today's regrowth forest at Boranup

Baudin's black-cockatoo

This large parrot (50-60cm) is largely confined to the south-west forests. It is one of two white-tailed black-cockatoo species found in the south-west. Carnaby's black-cockatoo is very similar, but found mainly in drier areas and has a shorter bill. Baudin's black-cockatoo forms flocks or pairs during the breeding season. It feeds on marri seeds and fruits and the larvae of wood-boring insects.
Identification: black cockatoo with white tail panels and white cheek patch.
Call: loud "plee-erk" call, can sound like a sad wailing.

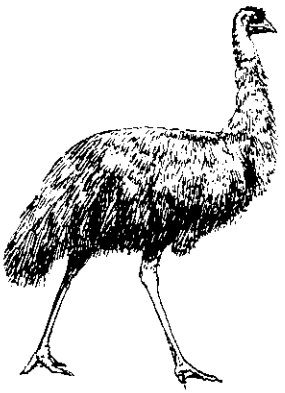
Emu

Australia's largest native bird and the second largest flightless bird in the world, the emu grows up to two metres high. Nomadic birds, they are found throughout the Australian mainland. Chicks are reared by the males.
Identification: large bird with brownish-grey feathers, long legs and large feet, each with three toes.
Call: deep grunts, although the females also make an unusual drumming sound.

Spotted pardalote

This tiny (8-9cm) bird shares the canopy with the parrots, moving along the branchlets turning leaves in search of insects, especially leaf miners and lerps.
Identification: yellow rump and breast, red-orange tail, with black head tail tip and wing tips, with bright white spots.
Call: a gentle "sleep maybe" or just "maybe", persistent in the breeding season.

emu



Purple-crowned lorikeet

A small parrot (about 16cm) often seen dashing between blossoms. It has a brush-tipped tongue for gathering nectar and pollen from flowers, mainly the eucalypts. It is often most abundant when the karri is flowering and usually flies in small flocks.

Identification: green with orange forehead and ear patch, light blue belly and purple on the head.

Call: a high pitched screeching "zit-zit".

New Holland honeyeater

This medium-sized bird is the most common honeyeater in the forest. They have long piercing beaks to feed on nectar. In the karri forest, the New Holland honeyeater is often seen feeding on the yellow kangaroo paw when it is flowering.

Identification: streaky black and white honeyeater with white cheek patch, white beard, eyebrow and yellow bands on wings and tail. It is similar to the white-cheeked honeyeater, which is less likely to be found in karri country.

Call: a variety of sounds, from a shrill chattering to a loud "tchlik" or weak whistling "pseet".

Wedge-tailed eagle

This is Australia's largest bird of prey, with a wing span of up to two and a half metres. The wedge-tail is now protected, but was hunted by generations of landowners who mistakenly believed it destroyed livestock.
Identification: plumage varies from pale brown to blackish-brown and nearly black. The bird has large legs and feet with sharp talons. Seen from below, the tail is long and distinctly wedge-shaped.
Call: a variety of sounds, including a cat-like screech and repeated double whistle.

Red-capped parrot

A medium-sized (36cm) parrot found only in the State's south-west. Red-capped parrots eat marri seeds from immature honky nuts and prefer to nest in marri hollows.
Identification: males have a scarlet crown, a broad yellow band around the neck, purple breast, red rump, bright green wings and back, with blue flight feathers. The tail is even richer green, edged with bright blue. Females and young males are duller and have larger areas of green.
Call: "kurr-ak" repeated during flight or a shriek when alarmed.

White-breasted robin

Only found in the south-west of Western Australia, the white-breasted robin is often seen perched on a small branch waiting to pounce on insects and lizards on the ground. It is often seen in pairs hopping along the ground.
Identification: dark grey, white-breasted bird, with the typical robin shape.
Call: penetrating double whistle.

Splendid fairy-wren

A small bird (12cm) which earns its name from the brilliant blue colour of the male's plumage in the breeding season.

Identification: breeding males are cobalt blue, with a lighter cheek patch and black bands across the eye, nape and breast. Their blue wings have a greenish metallic sheen. Out of the breeding season, males are a drab greyish-brown, with bluish wings, a white-tipped tail and dull white underside. Females are similar, but with greyish-brown wings and less colourful tails.

Call: a variety of sounds including loud, rich warbling and shorter calls, such as a staccato "prip-prip".

Rufous treecreeper

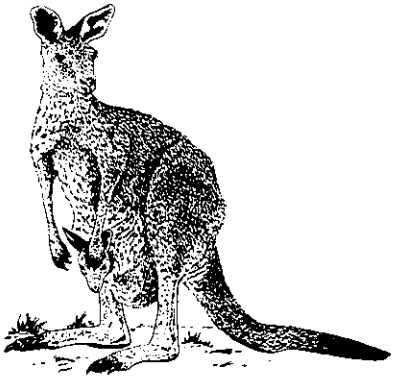
This small bird searches for insects on tree trunks and logs, or on the forest floor, but some are quite bold and will hop up onto tables beside picnickers, looking for food. Usually seen in groups of three, rufous treecreepers hop about with one foot in front of the other and flash their tails laterally as they forage.

Identification: rufous treecreepers are mainly ash-brown, with rufous-ochre faces and underparts. They have long, curved bills and large feet.

Call: single whistle repeated erratically.

Western grey kangaroo

Widespread across southern Australia, these animals are actually grey-brown to red-brown in colour. The males can grow to more than two metres from head to tail, while the females are smaller. Joeys are usually born in summer, but don't come out of the pouch for about nine months. The best time to see kangaroos is in early morning or late afternoon.

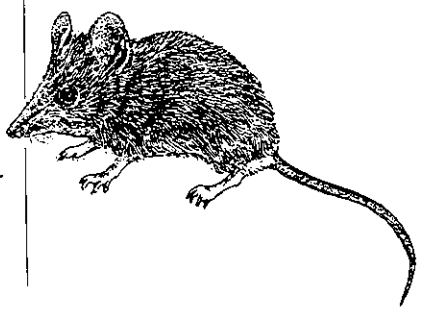


Quenda

The quenda, or southern brown bandicoot, is a threatened species in Western Australia. These rabbit-sized mammals have large hind-quarters, but their bodies narrow to a long, pointed snout. Their fur is usually dark grey-brown, with yellow flecks and they use their strong claws to dig for food such as bulbs and insect larvae.

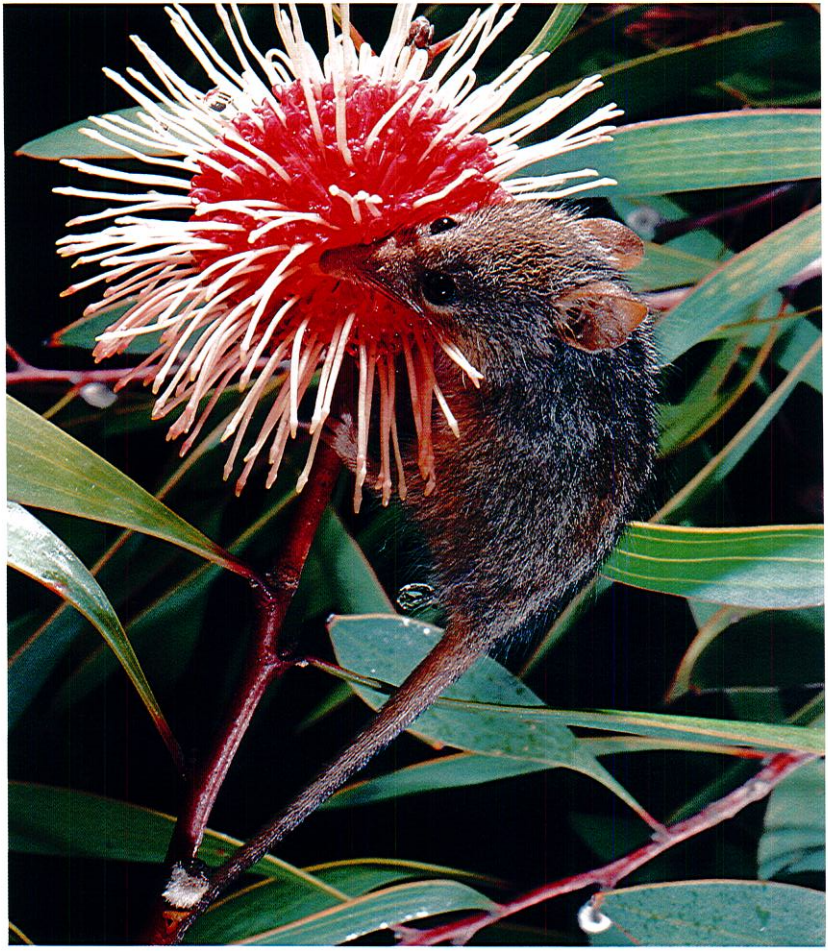
Grey-bellied dunnart

This aggressive hunter lives on insects and lizards and is about the size of a mouse. Its fur is grey above and paler below. The males do not die immediately after mating, as happens with some species of dunnart, but it is rare for them to live to the next breeding season.



Honey possum

Apart from some bats, this mouse-sized possum is the only mammal in the world to feed exclusively on nectar and pollen. Its long snout and brush-tipped tongue are perfectly developed for probing flowers. Honey possums are usually nocturnal in the summer, but may be seen in the morning and late afternoon in cooler weather.



Water-rat

Water-rats (*below*) live in nests they build at the end of tunnels in lakes, or river banks, or sometimes in hollow logs. More obvious signs of their presence are the feeding platforms they use - flat surfaces scattered with food scraps from their mainly carnivorous diet. Water-rats have thick fur which is black to dark grey above and cream to orange beneath. Dark hair covers their thick tails, which usually have a white tip.

Chocolate wattled bat

One of the eight species of bats found in south-western Australia, the chocolate wattled bat roosts in trees during the day. Like all bats, it emits sound pulses beyond the range of human hearing and then listens for echoes to locate obstacles and food.

Western brush wallaby

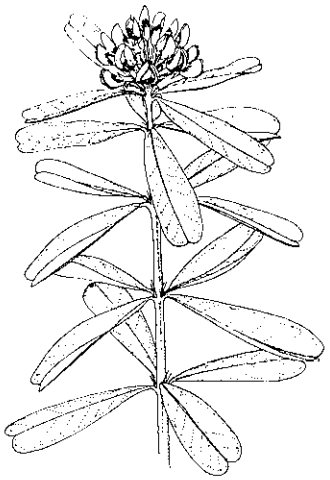
Also known as the black-gloved wallaby, this predominantly grey wallaby has black paws. The tips of the ears, the end of the tail and feet are also black. Western brush wallabies are found only in the south-west of Western Australia and both males and females grow to about 1.2 metres long. Their abundance has decreased in the past 20 years, but increased numbers have been recorded recently in some forest areas where baiting for fox control has been carried out.

meat ant

Among the wildflowers growing in Shannon National Park and across the southern forest, is a group of plants known as poison peas.

They earned this name from European settlers whose cattle and sheep died after grazing on the plants. The plants were later found to contain fluoroacetate, the same chemical that is manufactured synthetically as the poison 1080.

Why do the plants grow with this arsenal? It's just one of a range of defence mechanisms plants have developed over millions of years to try to protect themselves from being eaten so they can reproduce.



Gastrolobium bilobum

Other plants have made themselves unpalatable with tough leaves and bitter tastes, or protected themselves with sharp thorns, or even kept their leaves up beyond the reach of grazing animals.

The poison peas, or *Gastrolobium* species as they're known scientifically, evolved another form of deterrent. Poisoning its leaves didn't solve the problem of being eaten, though, because some animals could tolerate the poison and their offspring evolved an even stronger tolerance.

However, the poison peas may help solve another problem: the threat to the survival of some native animals caused by the European fox and feral cats.

Neither foxes nor cats are native to Australia and these hunters have had a devastating effect on our wildlife, contributing to the extinction of ten species in this State.

Another 31 species are threatened, including the State's faunal emblem, the numbat, ground-nesting birds and reptiles.

Although the cat has been here longer - probably coming ashore from Dutch trading ships passing our coast long before European settlers arrived - it is the fox that is thought to do the greatest damage.

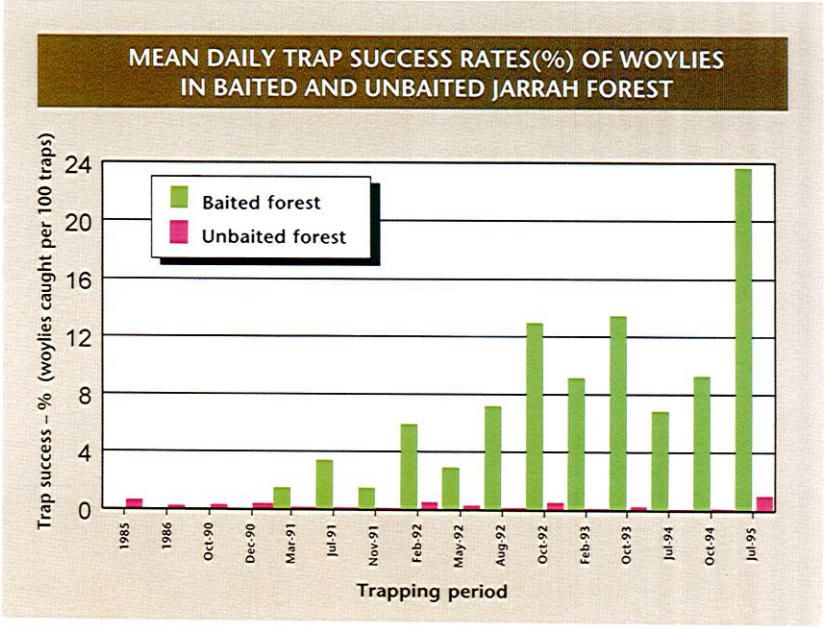
The red fox was brought to Australia in the 1860s and 1870s so settlers could pursue the sport of fox hunting. By the 1940s, foxes were abundant in Western Australia's south-west and medium-sized native animals began to decline in number.

It was pioneering research by CALM scientists that established the link between rising fox numbers and declining wildlife and then proposed a solution.

Just as cows and sheep brought to this country can't tolerate 1080 in the poison peas, neither can foxes and cats. This means it's possible to develop baiting programs to control feral predators without harming native wildlife.

Fox baiting programs, such as those in forest near Collie, have led to dramatic increases in the number of native animals (*see graph*).

The woylie has increased in numbers to the extent that it has been taken off the list of endangered animals. This is the first time on mainland Australia that an endangered list has been amended as a result of a wildlife management plan.



CALM's program to control foxes and feral cats and increase the abundance of native wildlife is known as Western Shield. The goal of protecting wildlife over an area of nearly five million hectares - more than half the size of Tasmania - makes Western Shield the biggest wildlife conservation program in the world.

Western Shield has three elements: fox baiting on a scale never before attempted; a significant increase in research into the separate problem of controlling cats; and, once feral predators are controlled, returning native animals to areas where they once thrived.

Feral cats have not proved as easy to control as foxes because of the different way they hunt and their different food preferences.

Cats prefer live prey, so they are not very interested in the dried meat baits that foxes are quick to find and consume.

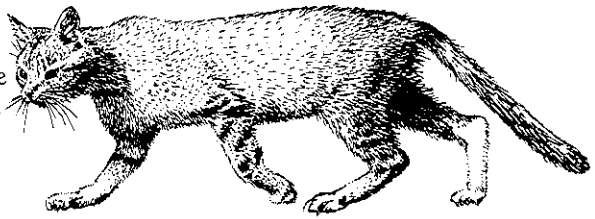
This has led CALM scientists to work on a special feral cat bait with encouraging results. Their studies have also shown there are certain times of the year when cats' live prey is scarce, indicating times when baiting will be most effective.

The aim is to integrate fox and feral cat control as quickly as possible, but because of the different distribution of the feral hunters, it's possible to proceed with fox baiting while cat research continues.

Foxes remain most abundant, and cause the greatest damage, in the south-west. Feral cats, on the other hand, prefer the State's semi-arid and arid regions.

As you drive around the south-west, you will see signs indicating where fox baiting is being carried out, all of which carry important warnings to pet owners about taking their animals into a baited area. Dogs are susceptible to 1080 and should always be muzzled and kept on a leash if taken into an area that has been baited.

feral cat



Above: *European red fox*
Below: *campers at Shannon have reported seeing chuditch, one of the mammals threatened by foxes*

Two distinctive banksias grow across the southern forest - one has the largest flower spikes and leaves of all the banksias and the other produces a dome-shaped flower, rather than the usual cylinder shape. As with all banksia flowers, both of these are actually made up of hundreds, or even thousands, of individual blooms.

Bull banksia (*Banksia grandis*) has pale yellow flowers in spring and summer which grow in spikes up to 40 centimetres long and the leaves are held in clumps. Honey possums, honeyeaters, wattlebirds and silvereyes feed on the nectar and Carnaby's black-cockatoos and red-capped parrots come for the seeds.

Holly-leaf banksia (*Banksia ilicifolia*) is a primitive banksia whose leaves, as well as flowers, are quite different from the bull banksia. The leaves of the holly-leaf banksia are shorter than many other banksias and, as its common name suggests, similar in shape to those of holly.

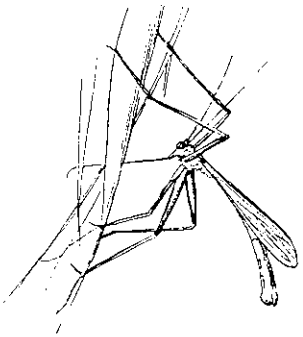
However, the dome-shaped flowers which grow for much of the year are its most unusual feature. The flowers are yellow when they first appear, but then turn pink and finally dull red as they age, putting on this show to attract as many pollinators as possible.

Another common small tree with striking flowers is the karri wattle (*Acacia pentadenia*), also known as the tom cat acacia because of its pungent smell. Sometimes found as a tall shrub, the karri wattle grows up to ten metres tall. Its flowers are cream, or pale yellow, and multiple blooms grow together as ball-shaped flower heads.

Karri wattles grow only between Nannup and Denmark and inland as far as Mount Roe.

This is just part of the floral display put on every year in the southern forest - more than 1500 native species of flowering plants have been recorded here, 99 of which grow nowhere else in the world. Ten per cent of the forest's flowering plants are orchids - these plants are usually small, but produce a variety of beautiful, bright-coloured flowers.

scorpion fly



The rich purple-blue of hovea is one of the first wildflowers to appear across the forest, with flowers starting in June and continuing through to November. There are six species of hovea in the south-west, but all of them have masses of distinctive pea flowers in brilliant purples and blues.

Croweas (the most commonly found of which is *Crowea angustifolia*) also have profuse flowers. These erect shrubs have fine glossy leaves and produce masses of star-shaped flowers, usually in white. Some croweas are pink - look out for examples along Curtin Road on the northern loop of the Great Forest Trees Drive.

The water bushes are also typical of the karri forest (*Bossiaea aquifolia* and *Bossiaea webbii*). These tall shrubs grow in thickets in the karri undergrowth and produce small orange-yellow pea flowers. Known by Aboriginal people as netic, the shrub gets its common European name from the way its leaves hold water after it rains and tip it on anyone brushing against them.

Right, from top: *one of the acacias known as the karri wattle, hovea, crowea and pink bunny orchids*

DIEBACK'S OTHER VICTIMS

Dieback is a plant disease which kills susceptible species by rotting their roots and starving them of water and nutrients. It can also have a devastating effect on plants - and even animals - that have never been infected by the disease.

The direct result of dieback is to kill susceptible plants, but all organisms depend on one another to a greater or lesser degree for their survival. When one species disappears, there will be both adverse and beneficial consequences for other species.

The indirect results of the death of diseased plants include less food and less shelter for other plants and animals, as well as more room for resistant plants to grow.

The scientific name for the fungus which causes dieback, *Phytophthora*, comes from two Greek words meaning "plant destroyer" and it describes a number of related fungi.

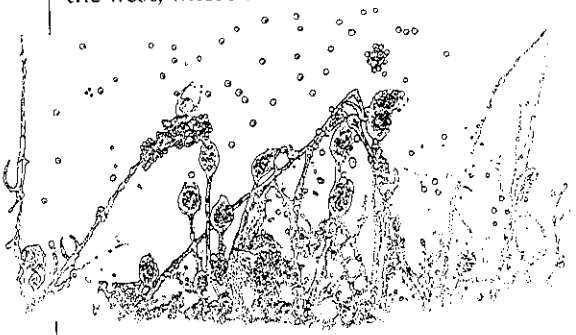
The Irish potato famine of the 1840s was caused by one of the *Phytophthora* species not found in Western Australia. The disease wiped out potato crops across Ireland and caused the Irish population to plummet by three million people through starvation and emigration.

Hundreds of different plant species in Western Australia are attacked by *Phytophthora cinnamomi*, including rare native plants.

What many people don't realise is the large number of animals that will die as a consequence of these infections. The threat to animals is particularly high if the plants killed are ones the animals depend on to provide cover from feral predators.

The different relationships between plants affected by *Phytophthora cinnamomi* and their healthy neighbours can be illustrated by banksias.

There are 75 species of *Banksia* and with the exception of one which also occurs naturally in New Guinea, they are found only in Australia. They grow across Australia, but are most abundant in the west, where about 58 are



magnified spores of the fungus which causes dieback

found exclusively. This abundance is threatened by the very high susceptibility of most western species to dieback.

Many banksias flower during late summer and autumn or winter, when little else is in bloom, making them a vital food source. Their pollen and nectar provides food for a whole host of small animals and birds, including numerous insects, the honey possum, black-cockatoos and several honeyeaters.

Birds feed not only on the plants' nectar, but on the wasps, moths, butterflies, beetles and ants attracted to the flowers and to grubs in decaying wood.

The honey possum is almost entirely dependent on a diet of nectar, with banksias one of its main sources of food. The pygmy possum also visits the banksia groves during flowering. They live mainly on an insect diet and have been observed to breed when the banksias flower on the south coast. Both possums use rotted out hollows in the trunks of banksias for their nests.

The blackboy is also extremely important to the fauna of the south-west. Blackboys vary in their susceptibility to *Phytophthora cinnamomi* but some species have died in great numbers.

western pygmy possum feeding on a banksia flower

The blackboy's flower spike attracts many honeyeaters and later, as the seeds ripen, the parrots move in.

The mat of hanging dead leaves provides a retreat and nesting site for small animals, such as marbled geckoes, birds and the pygmy possum.

When the mature blackboy dies and starts to decay, it provides food for beetle grubs, which in turn are eaten by the common marsupial mouse. The mouse even moves into the blackboy stump, nesting in cavities created when the grubs' tunnels collapse.

The mardo, or yellow-footed marsupial mouse, is another animal which shelters in the partially decayed trunks. As decay proceeds and the hollows become too large, the mice vacate the premises and lizards such as Smith's skink and the red-legged skink move in. Small colonies of long-eared bats occasionally make a home in the hollow trunks.

Snakes are also commonly found in old blackboys, including the little whip snake, the crowned snake and Mueller's snake.

While the insects and animals that depend on decaying blackboys can live for a while on those killed by dieback, the plants are not replaced, and the cycle ends.

These are just a few of the examples available of the wider community at risk from dieback. The ripple effects resulting from plants killed by dieback go further.

Plants which are not infected by the disease could still fall victim. After the birds which feed on dying banksias move away, dieback resistant plants will lose some of their pollinators and their chances of reproduction will be reduced.

In one study at Two Peoples Bay Nature Reserve, just east of Albany, small birds feeding on plants were recorded for an hour each morning for eight days. Four dieback sites were compared with four healthy sites. There were 42 birds from seven different species recorded in the healthy areas, but only five birds from three species in the diseased sites.

Plants killed by dieback may be replaced eventually by others more resistant to the fungus. Jarrah, for example, is the only forest eucalypt affected by the disease and as it dies, seedlings produced by neighbouring marri slowly take over.

Many irreversible changes occur wherever *Phytophthora cinnamomi* invades and has a high impact. The openings in the vegetation created when plants die, for example, can lead to the spread of native annuals and exotic weeds and grasses.

Dieback is one of the most widespread plant diseases in the world and scientists have been working for 50 years to find a cure. As well as looking for a practical cure for the disease in Western Australian conditions, CALM is looking for ways to contain its spread and improve plant resistance.

The very real fears in the 1970s that our whole jarrah forest would be infected have not eventuated for a range of reasons, including lower than average rainfall conditions since 1967, which tend to slow the natural spread of the fungus.

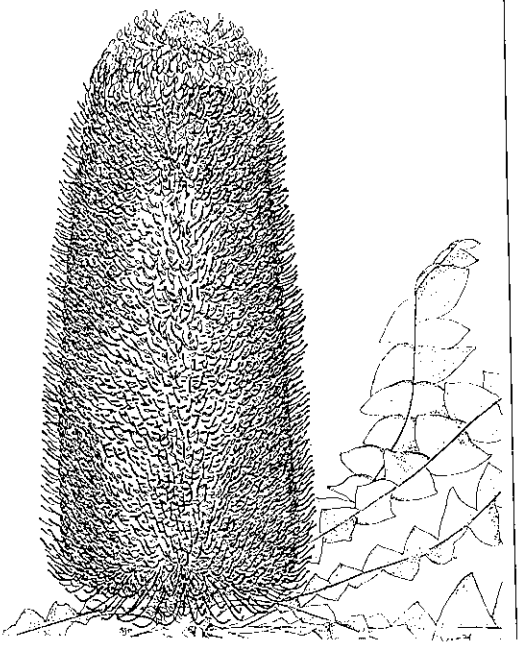
Control methods now being developed include trial applications of the systemic fungicide, phosphonate, and the selection of dieback-resistant plants to replace those killed by the disease.

Public education is also important because understanding the problem explains the need to keep to well-formed tracks when driving through the bush and why some roads have had to be closed.

honey possum nesting in a blackboy stump

- Barbecues and picnic tables
- Bibbulmun Track
- Camping area with toilets, hot water showers, drinking water, shelters and a small function room
- Shelters
- Toilets
- Park radio stops

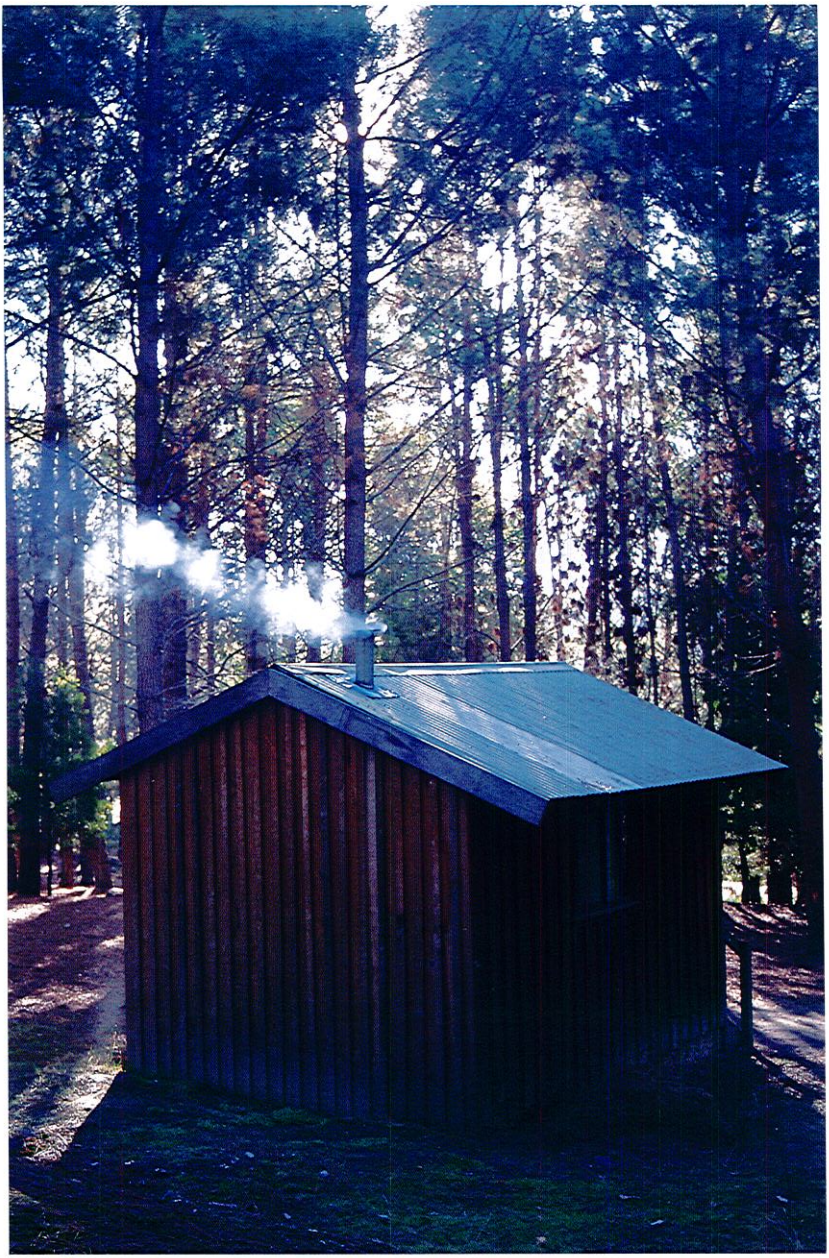
bull banksia



When lighting barbecues or camp fires make sure that you:

- always use fireplaces when they are provided;
- if no fireplace exists, dig a shallow pit to contain the embers;
- clear all leaf litter, dead branches and anything else that may burn for at least three metres around the fire (this also applies to portable stoves);
- do not leave the fire at any time while it is burning;
- make sure the fire is completely out before leaving. Use soil and water to extinguish the embers and bury the ashes.

On hot or windy days the fire risk is very high or extreme: no barbecues or camp fires are allowed in these conditions. Country radio stations broadcast fire risk warnings, or check with shire authorities, tourist bureaus or the nearest CALM office for advice on the fire risk before lighting a fire in hot weather.



one of the shelters at Shannon camping area

Boating

Broke Inlet, at the mouth of the Shannon River, offers some excellent water for canoeing, sailing and windsurfing. The inlet is closed from the sea by a sand bar for ten months of the year, until winter rains flush down the river. Shannon Dam, north of South Western Highway, is also good for canoeing although the small parking area can get very crowded at popular times of the year. CALM is preparing plans to extend facilities at the dam, but caution is needed in the meantime. The 60-kilometre long Shannon River usually flows only in winter and much of it is unsuitable for canoes.

Bushwalking

Great Forest Trees Walk
The Great Forest Trees Walk joins two sides of the northern loop of the Great Forest Trees Drive. The walk is on old forest tracks, has some steep grades and crosses the Shannon River on stepping stones. You can either walk out and back (8 kilometres) or get someone to meet you at the other end (4 kilometres).

Melobasis *sp.*

The Shannon Dam and Mokare's Rock Walk
(3.5 kilometre return to the dam or 5.5 kilometre loop to Mokare's Rock)

This walk trail begins near the covered barbecue area at the start of the Great Forest Trees Drive. The first 600 metres of the trail is sealed and suitable for prams and wheelchairs.

The trail takes you along the river to the dam. Remnants of the old railway line can be seen along the trail. The surrounding forest was cut during the logging days and has now regenerated.

After spending time at the dam you can either return to the beginning or continue on to Mokare's Rock and complete the 5.5 kilometre circuit. The route to Mokare's Rock is steep in places, but the view of leafy karri crowns and across the Shannon Basin is magnificent. There is a boardwalk across Mokare's Rock so that visitors do not damage the fragile carpet of mosses, flowers and lichens growing on the rock.

Bibbulmun Track

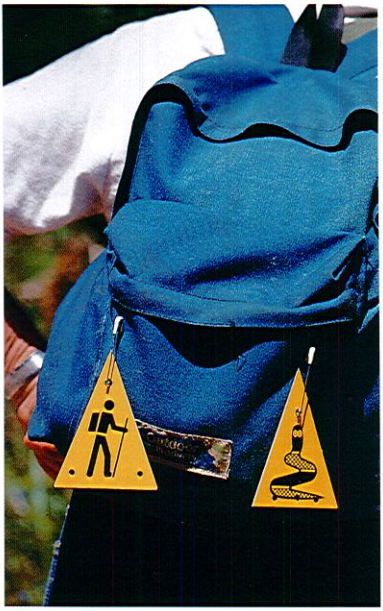
The Bibbulmun Track, part of which runs through Shannon National Park, is Western Australia's only true long distance walking trail. It stretches 650 kilometres from Kalamunda, in the Perth hills, to Walpole, on the south coast, with a further 190 kilometre extension planned to take it to Albany.

The name given to the track is that of a distinct Aboriginal language group, the Bibbulmun. Though the Bibbulmun people often travelled long distances for tribal meetings, corroborees or to get to fresh food sources, the track doesn't follow any traditional route.

The ending "-up" means "place of" in the Bibbulmun language, so Dwellingup is "the place of nearby water", while Balingup is "the place of the native warrior".

The track's snake logo represents the Waugal, a powerful mythological character recognised in both Bibbulmun tradition and wider Nyoongar Aboriginal culture. Often called the "rainbow serpent" the Waugal features in many Dreamtime creation stories and was widely seen to be responsible for creating many of the recognisable landforms of the south-west.

CALM is in the process of upgrading the track to make it safer and more enjoyable for walkers. The new route, which is expected to be finished by 1998, will take the track from Northcliffe through D'Entrecasteaux National Park, across the southern boundary of Shannon National Park and through to Walpole-Nornalup National Park.



taking a hike - this walker's backpack carries the Bibbulmun track logo

Camping

The camping area has 23 sites, some for group camping. All sites have barbecue facilities and most have a picnic table. Camping fees are collected through a self registration system clearly marked in the centre of the campground.

CALM volunteer campground hosts are based at Shannon during popular visitor times, to answer any questions about the park and to help with CALM's Go Bush activity program held at Easter. The program is open only to campers and includes activities such as guided nature walks, bird watching, forest tours by bus and spotlight walks to see nocturnal animals.

Shannon Lodge, next to the camping area, is available for groups and can sleep up to ten people. It has a shower, toilet, hot water and two bunk beds (without mattresses, sleeps four). The lodge can be booked by contacting CALM 's Pemberton office on (097) 761 207.

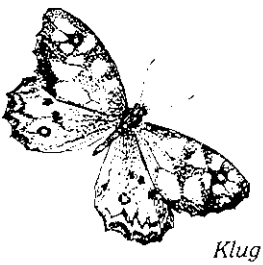
Fishing

You can fish for trout and marron (the native freshwater crayfish) in Shannon River and the dam, but you'll need a licence from the Fisheries Department.

Broke Inlet and the beaches of D'Entrecasteaux offer superb shore fishing for amateurs, but please, keep your cars and four-wheel-drives on the marked tracks.

Scenic drive

A 48-kilometre loop drive on good roads, with picnic stops and a park radio circuit. Eight separate radio stops are signposted along the drive and park broadcasts can be heard on 100FM from 6.00 am to 7.30 pm in summer and from 9.00 am to 5.30 pm in winter. For more details about the Great Forest Trees Drive, see page 12.



Klug's xenica

OTHER CALM PUBLICATIONS

- For more information on what to do in the karri forest, pick up a copy of "Karri Country" free at a tourist bureau or CALM office.
- CALM has published a number of pocket-sized Bush Books, with detailed information and colour photographs on WA's plants and animals, including *Common Trees of the South-West Forests*; *Common Wildflowers of the South-West Forests*; *Common Birds of the South-West Forests* and *Mammals of the South-West*.
- For bushwalks in the Pemberton/Northcliffe area: *Pemberton Bushwalks; Forests at Your Feet*.
- *Lookouts of the Karri Country* by Dave Evans.
- For detailed biological information: *The Karri Forest*, by Dr Per Christensen.

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Walpole 6398
Telephone (098) 401 027

red-legged weevil

TOURIST BUREAUS

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