



A small brown mouse with a white belly is perched on a piece of wood in a garden setting. The mouse is looking towards the camera with large, dark eyes. The background consists of green leaves and branches.

Mammals

IN THE GARDEN

by Andrew Burbidge
and Tony Start

Most mammals in Perth gardens are not Australian natives—they have been brought in by people from other countries as pets or hitched a ride in ships. However, a few lucky people can still find Australian mammals at the bottom of the garden and most of us, with a little effort, can become aware of the mammals that fly overhead. Andrew Burbidge and Tony Start discuss Perth's original mammal fauna and suggest ways of helping conserve the species that remain today.

Although few Perth gardens provide homes for native mammals today, there are still many areas in and around our city where some species thrive. But if we are to foster and enjoy native mammals in our city's surrounds, we will have to care for our suburban bushlands as well as our suburban gardens.

Thus our challenge is a collective one. This principle of collective responsibility is just as important in providing for birds, reptiles and frogs in the metropolitan area. While we can often support a few individual animals by providing food and breeding sites in our own gardens, long-term survival of populations may depend on the cumulative contributions of the individuals in several suburbs. Furthermore, particularly among mammals and birds, individuals will need the resources of several gardens for survival and many will need resources in nearby public areas for breeding; for instance, the types of nest hollows found in old trees are seldom available in gardens.

MAMMALS OF YESTERYEAR

Dr Darrell Kitchener of the Western Australian Museum has researched the mammals of the northern Swan Coastal Plain. With the addition of information on mammals in the Darling Range this



has shown that, in the early years after European settlement in 1829, the Perth region (roughly the area on the mainland enclosed by Yanchep, Walyunga, Mundaring, Jarrahdale and Mandurah) probably harboured 40 species of native mammals, including the dingo, which was introduced from Asia about 4 000 years ago (see Box 1).

We say 'probably harboured' because the historical record is poor. For example, the British Museum has three specimens of the large-footed mouse-eared bat, labelled 'Swan River', all collected last century. Modern information suggests that this bat occurs from the Kimberley

around the north coast and down the east coast to Victoria and the extreme south east corner of South Australia. It is easy to conclude that the label perhaps reflects the port from which the specimens were shipped rather than the collecting locality. However, such speculation may be dangerous—it is possible that we have overlooked a cryptic, nocturnal species. After all, it is relatively common in cool, wet parts of Victoria. Dr Kitchener's current research may clarify the origin of these specimens.

As was the case elsewhere in Australia, the mammals of the Perth region were very important to the Aboriginal people. To the Nyoongar people, mammals are an integral part of the land and of the 'Dreaming' (beliefs that ancestral animals were involved in the creation of the land and its bounties). Aborigines also used mammals for food, skins, hair and sinews.

The first mammals to be recorded by Europeans in the Perth region were quokkas. In 1658, the Dutchman Samuel Volckertzoon mistakenly described quokkas as 'a wild cat resembling a civet but with browner hair'. His fellow countryman Willem de Vlamingh noted in 1696 'a kind of rat as big as a cat' on an island off the mouth of the Swan River. Those early explorers, who had never encountered kangaroos or wallabies, assumed the quokkas to be some extraordinary type of giant cat or rat. We now know better, but the name Rottnest perpetuates Vlamingh's mistake, for it is derived from the Dutch and meant rats' nest. Fortunately, quokkas are still very common on Rottnest, where they are one of the most visible of the



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The western pygmy possum occurs in the Darling Range, mainly where there is thick undergrowth. It sleeps during the day in a nest, its body temperature often dropping considerably.

Above: Although common on Rottnest Island, quokkas have disappeared from the Perth region; their swamps have been cleared and remnant populations have fallen prey to foxes.

Photos - Jiri Lochman

Left: Chuditch usually den in burrows under tree roots or in hollow logs. Research by CALM scientists has shown that they benefit from fox control.

Photo - Todd Soderquist

native mammals in the Perth area, even if one has to catch a ferry to see them.

The most important native mammal to the first European settlers would have been the western grey kangaroo. Because the fledgling colony produced little food, many settlers quickly became dependent on it for meat. This led to early disagreements with the Nyoongars, who could not compete with the settlers' guns. Kangaroos were not the only species hunted by Europeans; western brush wallabies, tammar wallabies, quokkas and brushtail possums were abundant and used for meat and fur.

MAMMALS OF TODAY'S PERTH

Of the 39 or 40 original residents, just 24 species remain in the Perth region. Only one of the original species is extinct—the wurrung—but many others have disappeared from most of their original range and survive on islands (muning, boodie) and/or as small threatened populations on the mainland (chuditch, dibbler, numbat, woylie, tammar wallaby, warru, quokka). Some species have disappeared only recently. Numbats survived near Jandakot Airport until about 1980, but increasing urbanisation along with greater numbers of introduced predators sealed their fate. Others are hanging on by the skin of their teeth. The ash-grey mouse, for example, was last recorded at Burns Beach in 1977 and has not been seen since, while the noolbenger (or honey-possum) is now rarely recorded, although it is still common in pockets such as the heathlands in Yanchep National Park. In

Top: A metallic 'tik-tik-tik' indicates the presence of the white-striped mastiff-bat, which flies fast above the tree tops.

Photo - Noel Speechley

Above: Brushtail possums, more than any other native mammal, have adapted to the urban environment, living in roof cavities and hollow tree limbs. They can be tamed by offering fruit at a regular feeding point.

Photo - Geoff Taylor/Lochman Transparencies



the older built-up suburbs, even diligent searching and observation are unlikely to reveal any native species, except the bats that fly overhead at night.

Western grey kangaroos are great survivors; they still occur on the outskirts of the city, disappearing only as their habitat is converted to bitumen, buildings and gardens. In built-up areas, golf courses have become one of their last refuges and they can be seen on the fairways in the evenings or the early mornings.

Brush wallabies have been declining throughout the South West (the only place they occur) over the last 25 years or so and are now rarely seen on the coastal plain near Perth. They may still be seen in the forests of the Darling Range, although sightings are much rarer than they were ten or twenty years ago. Sadly, most people

are more likely to see a dead one on the roadside than a live one in the bush. This reflects their nocturnal habits as much as their vulnerability to traffic; foxes and dogs are probably a much greater threat than vehicles. Despite these trends, if you are determined to see one, a spot-lighting excursion along the quieter roads in the forest will usually produce results.

Echidnas are more common than most people realise, but they are masters at remaining hidden. Unfortunately, many are killed by vehicles while crossing roads. Even the threatened chuditch, our largest marsupial carnivore, still occurs in low numbers in the Hills Forest and in the foothills. Its conservation is now guided by a recovery plan. Research by Department of Conservation and Land Management (CALM) scientists has shown that the chuditch benefits from



Left: Now no longer found near Perth, western ringtail possums are common in some Busselton gardens.

Photo - Jiri Lochman

fox control, and 'Operation Foxglove', which is controlling foxes over a large part of the northern jarrah forest, should see its numbers increase.

Brush-tail possums actually do better in some parts of Perth than in many areas of bush (as do western ringtail possums at Busselton). In suburbia, roof cavities provide shelter, gardens provide succulent leaves, blossoms and fruit for food, and foxes are scarce. But cars, dogs, cats and modern houses with their enclosed eaves are reducing their chance of survival in suburbia. If there are possums in your area, you can foster them by constructing nest boxes, thus providing shelter without damage to your ceiling.

Quenda survive in some densely vegetated areas, especially around rivers, creeks and swamps, and some lucky people living on larger blocks in the

outer metropolitan area are able to see them in their gardens at night. Foxes and cats, together with urban expansion, are gradually reducing their numbers. Bushfires that burn out a habitat remnant can also lead to the local extinction of quenda. Unless there are other areas occupied by quenda nearby, they are unable to re-colonise as the vegetation recovers.

The mainly carnivorous water-rat, a large native rodent, was prized by early settlers for its fine, dense, richly coloured fur. Water-rats still occur in some metropolitan lakes, streams and rivers; their presence being given away by their feeding platforms, which contain bits and pieces of gilgies, large aquatic insects, mussels, birds and fish that they have eaten. They live in a nest at the end of a tunnel in the lake or river bank, or

sometimes in a hollow log.

In the Hills Forest, several mammals remain. As well as the western grey kangaroo, western brush wallaby, chuditch and quenda, brushtail possums can be found here and there, while some smaller species, including brush-tailed phascogales, mardo and pygmy-possums, can be live-trapped by skilled naturalists. Observant people will notice that not all the kangaroos in John Forrest National Park (and perhaps some other areas in the hills) are western greys; euros can also be seen there.

Of the species that are gone, most have had their habitats destroyed, or their populations wiped out by introduced foxes, cats and dogs. However, these predators are not the only introduced mammals to establish in the wild and disrupt native species (see Box 2). Smaller native rodents have been replaced by the introduced black and brown rats and the ubiquitous house mouse (although bush rats still occur in Yanchep National Park), while the palm squirrel, a native of India, has spread through suburbs south of the Swan River. Only frequent control prevents its further spread from its escape site at Perth Zoo. Ferrets, which are domesticated pole-cats, are found in the wild occasionally and would be a major pest if they were to become common.

FLYING MAMMALS

As well as the ground-dwelling mammals, there are eight species of bat in the area. As far as we know no species has disappeared since European settlement (possibly excluding large-footed mouse-eared bats). In this respect, bats are unique among the families of mammals that once inhabited the Perth region.

Although infrequently seen, some species manage to do quite well in suburbia. Perhaps the most widespread species is the white-striped mastiff bat. Its almost-metallic 'tik-tik-tik' at half-second intervals is a characteristic sound, even in the city centre, on summer nights unless you are hard of hearing high frequencies (its signal is about 10 to

12 kHz). Mastiff bats forage over the trees and roof tops. They are the swifts of the bat fauna, travelling very fast and covering huge distances in their nightly feeding forays. Turning a powerful spotlight skywards when you hear one pass over will often pick it out, streaking through the night sky on long narrow wings.

Sometimes, down by the oval in the glow of flood lights or around street-lights in a well-treed carpark, smaller, more agile bats can be seen dodging and twisting in pursuit of insects. Their dexterity is worth watching; remember that they are emitting sound pulses, well beyond the range that we can hear, and listening for echoes in order to 'see' where both obstacles and food are located. It is often hard to believe that they depend on sound, not light, to navigate and hunt.

These little bats may belong to any of the species in the area (other than the white-striped mastiff bat) and often there will be several species feeding around the lights. Without catching them or recording their vocal calls on sophisticated equipment and analysing the recordings using computers, it is difficult to identify the species you are observing. However, this does not detract from the wonder of their dexterity or the satisfaction of knowing they are helping to control all sorts of insect pests.

That bats need caves is largely a myth. It is true that a few species are cave-obligates, mostly in the tropics; it's also true that where there are caves you will often find bats taking advantage of good roost sites. However, most of the bats in the Perth area are tree-bats, roosting by day in trees. Many of them will live in small colonies in hollow tree limbs. Some, however, will live solitary lives under exfoliating bark or even in dense clusters of leaves. Sometimes they roost in dark corners in buildings.

Those old trees in the park are worth protecting, dead limbs and all, and the mature trees must be allowed to become 'over-mature'. The hollows will provide homes for most of our suburban bats as well as tree martins, parrots and even possums or owls in the biggest hollows. We recently saw a Council 'tidy up' the dead branches in old trees near one of its ovals. They displaced a colony of bats as well as tree martins that nested in the dead, hollow branches. No doubt the action was well-meaning, but those

BOX 1:

The mammal fauna of the Perth region in 1829 and today

SPECIES Recorded in 1829

Still on mainland in Perth region?

echidna, <i>Tachyglossus aculeatus</i>	y
chuditch, <i>Dasyurus geoffroyi</i>	y
dibbler, <i>Parantechinus apicalis</i>	-
mardo, <i>Antechinus flavipes</i>	y
brush-tailed phascogale, <i>Phascogale tapoatafa</i>	y
fat-tailed dunnart, <i>Sminthopsis crassicaudata</i>	-
Gilbert's dunnart, <i>Sminthopsis gilberti</i>	y
white-footed dunnart, <i>Sminthopsis granulipes</i>	-
grey-bellied dunnart, <i>Sminthopsis griseoventer</i>	y
numbat, <i>Myrmecobius fasciatus</i>	-
quenda, <i>Isoodon obesulus</i>	y
dalgyte or bilby, <i>Macrotis lagotis</i>	-
wōylie, <i>Bettongia penicillata</i>	-
boodie, <i>Bettongia lesueur</i>	-
western grey kangaroo, <i>Macropus fuliginosus</i>	y
euro, <i>Macropus robustus</i>	y
western brush wallaby, <i>Macropus irma</i>	y
tammar wallaby, <i>Macropus eugenii</i>	-
warru or black-footed rock-wallaby, <i>Petrogale lateralis</i>	-
wurrung or crescent nailtail wallaby, <i>Onychogalea lunata</i>	-
quokka, <i>Setonix brachyurus</i>	-
muning or banded hare-wallaby, <i>Lagostrophus fasciatus</i>	-
brushtail possum, <i>Trichosurus vulpexula</i>	y
western ringtail, <i>Pseudocheirus occidentalis</i>	-
mundarda or western pygmy-possum, <i>Cercartetus concinnus</i>	y
noolbenger or honey possum, <i>Tarsipes rostratus</i>	y
King River eptesicus, <i>Eptesicus regulus</i>	y
Gould's wattled bat, <i>Chalinolobus gouldii</i>	y
chocolate bat, <i>Chalinolobus morio</i>	y
?? large-footed mouse-eared bat, <i>Myotis adversus</i>	-
lesser long-eared bat, <i>Nyctophilus geoffroyi</i>	y
western long-eared bat, <i>Nyctophilus major</i>	y
western false pipistrelle, <i>Falsistrellus mackenziei</i>	-
white-striped mastiff-bat, <i>Tadarida australis</i>	-
southern mastiff-bat, <i>Mormopterus planiceps</i>	-
water-rat, <i>Hydromys chrysogaster</i>	y
southern bush-rat, <i>Rattus fuscipes</i>	y
pale field-rat, <i>Rattus tunneyi</i>	y
ash-grey mouse, <i>Pseudomys albocinereus</i>	y
dingo, <i>Canis familiaris dingo</i>	-

TOTALS: 40 species

24 species

BOX 2:

INTRODUCED WILD MAMMALS OF THE PERTH REGION

rabbit, <i>Oryctolagus cuniculus</i>
house mouse, <i>Mus musculus</i>
brown rat, <i>Rattus norvegicus</i>
black rat, <i>Rattus rattus</i>
five-striped palm squirrel, <i>Funambulus pennantii</i>
red fox, <i>Vulpes vulpes</i>
cat, <i>Felis catus</i>
polecat or ferret, <i>Mustela putorius</i>
pig, <i>Sus scrofa</i>
goat, <i>Capra hircus</i>



Above: Western grey kangaroos are common on the outskirts of the city and are often seen on some golf courses.
Photo - David Gough

Right: Native water-rats still occur in large urban wetlands such as Lake Joondalup. Conserving bush remnants is important if native mammals are to persist in the Perth region.
Photo - Jiri Lochman



ordering it did not consider its effect on wildlife. It is up to all of us to ensure that these sites are protected.

HOW TO OBSERVE MAMMALS

Most of our native mammals are very difficult to see. They are nocturnal and secretive and keep away from open places where cats and foxes hunt. The presence of mammals in remnant bushland or gardens is often first indicated by their tracks, diggings or droppings. If signs indicate that you are being visited by a native mammal, try to observe it by watching after dark. Sit still at a vantage point or in a hide and wait—once you see something, use a torch or spotlight to illuminate it. Your next problem is to try to identify it.

There are books on Australian mammals that you can use (see Author Box). If you see a rat or mouse-sized mammal on the ground, you are probably seeing one of the introduced species—native rodents have now almost disappeared from the Perth region. However, a few dunnarts and native-mice may remain and in the hills, it is just possible that you are seeing a mardo—a marsupial that is as happy climbing trees as it is on the ground. Young quenda can also look a bit like a rat with a short tail!

All native mammals are protected by law and it is illegal to kill or harm them. However, if you come across a dead body, for example on the road, and wish to have its identity confirmed, you should send it to the Western Australian Museum. Scientists at the Museum are keen to obtain specimens, especially those that

are not badly damaged, to develop historical records of changes in distribution and abundance of mammals, and for their education programs. It's best to place the body in a plastic bag, freeze it and take it in yourself—if this is not possible, the remains can be preserved in methylated spirits. To ensure the specimen is properly preserved, you will need to cut open the body cavity (where the intestines are), otherwise the preservative can not do its job; after all, skin is designed to be waterproof!

MODIFYING GARDENS

If you have a bush block or live adjacent to bushland, it is possible to attract some species to your garden—as long as you don't let cats and dogs roam free! Nest boxes will increase the attractiveness of an area for brushtail possums and mardo; as will the availability of food—possums like fresh fruit and salad. But don't provide too much food. Wild animals should not become dependent on handouts—if they do, they may die when you take a holiday. Local plants, rather than those from other places, provide a wider range of insects and these in turn can become food for bats and birds.

Keeping the bush healthy is important for all our mammals. Quenda, for example, like thick vegetation near the ground to provide protection from predators; this is why they are found mainly near wetlands today. In the absence of foxes, dogs and cats they are quite capable of inhabiting the more open bush of the coastal plain banksia

woodlands. Other species also prefer thick scrub; it is the best way to avoid becoming a meal for a predator. Extensive or frequent fire in habitat remnants is not recommended—these open up the bush and promote weeds, particularly on the coastal plain.

We have seen that it is not easy to have mammals in your garden, but, with a sensible approach to planning and good park management, it is possible to have some mammals in your suburb.

Andrew Burbidge, Director of CALM's WA Threatened Species and Communities Unit, and Tony Start, Head of the Bioconservation Research Group, part of CALM's Science and Information Division, have both studied mammals for many years. They can be contacted at CALM's WA Wildlife Research Centre at Woodvale on (09) 405 5100.

The authors suggest the following books to help identify mammals:

Strahan, R. (ed) 1983. *The Australian Museum Complete Book of Australian Mammals*. Angus & Robertson publishers, Sydney. (A revised edition is in preparation and should be published in 1994.)

CALM (1992). *Perth Outdoors: A Guide to Natural Recreation Areas in and Around Perth*. Department of Conservation and Land Management, Perth. (Features and photographs of some species.)

LANDSCOPE

VOLUME TEN NO. 1 SPRING ISSUE 1994

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



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



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



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



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

C O V E R

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

The illustration is by Philippa Nikulinsky.



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Cartography: Land Information Branch CALM, Promaco Geodraft

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Subscription enquiries: ☎ (09) 334 0481

Colour Separation by Prepress Services

Printed in Western Australia by Lamb Print

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Published by Dr S Shea, Executive Director
Department of Conservation and Land Management,
50 Hayman Road, Como, Western Australia 6152.