FROGS
OF WESTERN AUSTRALIA

BUSH BOOKS

What frog is that?

Bush Books are a series of practical field guides to help you learn about and discover WA's unique plants, animals and special features, region by region.

ABOUT THE AUTHORS

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FROGS
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by Carolyn Thomson-Dans and Grant Wardell-Johnson

GOVERNMENT OF WESTERN AUSTRALIA

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

INTRODUCTION

Frogs belong to a class of vertebrates called Amphibia, a name derived from their dual life cycle, which is usually aquatic during egg and larval stages, and terrestrial during adulthood. Despite this dependence on a moist environment, frogs have successfully adapted to a variety of ecological situations. They are found in deserts and high mountains, in all continents except Antarctica, and on many islands.

Australia is blessed with a remarkable number and variety of frogs. More than a third of Australia's total frog fauna occurs in Western Australia, and more than half of these are found only in WA. The State's 80 or so frog species have a remarkable variety of shapes, sizes, life histories and mating calls. Not all of them are described in this book - we have chosen a selection of frogs that either live in the metropolitan area, are likely to be seen elsewhere (such as the green tree frog of the Kimberley) or are of special interest due to their habits (for example, the sandhill frog) or their rarity (such as the orange-bellied frog).

The call of a frog is perhaps its most distinctive and most easily recognisable feature. Each kind of frog has a different call. In the breeding season, which varies from species to species, male frogs emit a loud advertisement call that, among other things, serves to attract a mate. Female frogs that are ready to mate respond to the calling male and move towards the source of the noise. The biggest and loudest males call from the most suitable places for egg laying, which differ for each species. When the female locates the male, mating occurs and the eggs are laid.

All frogs are carnivorous, many catching their prey by means of a sticky extendible tongue attached to the front of the lower jaw. All small frogs have a predominantly insectivorous diet. However, mites, snails, earthworms, spiders and other small animals are also eaten. Larger frogs may eat scorpions, centipedes

Photo – Babs & Bert Wells/Conservation and Land Management

Green tree frog

and lizards. Anyone who has kept frogs in captivity, for even a short time, will know that it is essential to separate large ones from small ones because cannibalism is rife. It is also common in their natural state. The feeding habits of frogs change dramatically during their life cycle. Tadpoles are mostly herbivorous, grazing on algae, while adult frogs are active predators, which feed indiscriminately on moving animals.

Frogs should always be handled with care. Frogs have moist, glandular skins through which they breathe. They also secrete toxic mucous onto their skin, to help protect them from predators. These toxins may prove irritable to people, especially if they contact the eyes or mouth. If toxins get into your eyes, wash them with warm water. The large tree frogs are most likely to cause sensitivity.

A night time expedition to a dam or creek at any time of the year will be rewarded with the sounds of calling frogs. A torch will help you to locate calling frogs. If you live in the country or near wetlands, you can also try listening outside your door.

MAKING YOUR GARDEN FROG FRIENDLY

Gardens can easily be made more frog friendly. Species native to the local area may well make your garden their home if you provide or conserve suitable habitats. They may also help in pest control and provide a year-round chorus that reflects the changes in season. A garden suitable for frogs will also be suitable for a wide variety of other wildlife.

Some gardens are more likely than others to harbour a large variety and number of frogs. On the whole, frogs prefer damp places, so shade and moisture, which always improve a garden, will encourage many species. A pond will always encourage frogs, particularly the motorbike frog. A pond is readily built and need not be a breeding site for mosquitoes, particularly if other animals, such as frogs, are present. An inexpensive but attractive pond can be made from black plastic and old tyres, with rocks and reeds at its edge to hide the construction materials. Of course, these should not be taken from the bush, where they are already somebody else's home. If you live near a swamp, most of the local species will rapidly appear in the garden.

This preference for a damp habitat is due to the way frogs breathe. Their skin needs to be moist, so that oxygen can diffuse throughout it, and be picked up by the blood circulating just underneath. If exposed too long to a dry atmosphere, water will evaporate from the body, and the frog will dry out and ultimately die. Because of the permeable skin of frogs, they are also particularly susceptible to pesticides and other chemicals in the garden. A healthy garden is most easily achieved by minimal and carefully targeted use of chemicals.

Providing abundant shelter sites will encourage many species of frogs (and also invertebrates). The more invertebrates the more frogs, and diversity in the system will reduce the need for continued intervention (such as spraying to remove pests). If logs

Photo – Babs & Bert Wells/Conservation and Land Management

Motorbike frog

and stones are turned over when searching for frogs in the garden or other places, they should be replaced so that their homes will not be destroyed.

SANDHILL FROG

(Arenophryne rotunda)

One of the strangest creatures in Shark Bay is the rotund sandhill frog, which spends most of its days buried in the sand on the dunes of Edel Land and Dirk Hartog Island. It lives entirely in sandhills and is one of very few frogs that goes through its life without ever inhabiting water.

DESCRIPTION: Sandhill frogs have very short legs and toes, and the skin around the hind legs is very loose. They vary in colour from off-white to cream, but may darken rapidly to a grey or brown colour. Their bodies are also spotted with green, brown or red. These diminutive animals range from 26 to 33 millimetres long, with females larger than males. They are thickset, with an evenly rounded head.

DISTRIBUTION: This species is confined to a relatively small area, extending from Edel Land Peninsula in Shark Bay to Kalbarri and inland to Cooloomia. It is also found on Dirk Hartog Island.

PREFERRED HABITAT: It lives entirely in sandhills, in a burrow 10 centimetres below the surface.

LIFE HISTORY: The sandhill frog emerges to feed on ants and other insects when it rains, or when there is a night dew. It does not have tadpoles. The young frogs hatch directly from clutches of creamy white eggs laid in moist sand, some 80 centimetres below the surface.

CALL: The species makes a squelching noise.

Photo – Jiri Lochman

QUACKING FROG

(Crinia georgiana)

This common frog has reddish or yellow eyelids and breeds in shallow water between July and October.

DESCRIPTION: The quacking frog is small, with a maximum length of 3.6 centimetres. The back varies greatly in colour and pattern, but there is invariably a bright red patch on the thighs and groin. Like other members of the genus it has long, unwebbed fingers and toes.

OTHER NAMES: Red-thighed froglet.

DISTRIBUTION: The quacking frog is very common on the coastal plains and in the forests of south-western Australia from near Jurien to east of Esperance.

PREFERRED HABITAT: It lives in the vicinity of temporary swamps, streams, forest gullies and in other moist habitats such as under granite rocks and logs.

LIFE HISTORY: The species has a prolonged breeding season, with most activity occurring between July and October. Males congregate around adequate shallow water, and call to attract females. Particularly favourable sites are found around granite outcrops in the Darling Range. Females are attracted to a chorus of mating frogs and select a mate. A mating pair enter into a sexual embrace, where the male lies on the back of a female and clasps her firmly around the back legs. Eggs are released, then fertilised externally by the male releasing sperm over them. On nights when competition for females is intense, it is not uncommon for four or five males to join a mating pair, resulting in a writhing ball of frogs desperate to fertilise the female's eggs.

CALL: The call is a loud 'quack... quack... quack'.

Photos – Babs & Bert Wells/Conservation and Land Management

GLAUERT'S FROGLET

(Crinia glauerti)

These tiny, quite slender froglets are found only around areas of permanent moisture.

DESCRIPTION: Glauert's froglet has long, unwebbed fingers and toes. There are often reddish lines along the thighs. The skin on its back may either be smooth or ridged and wart-like. These frogs are very small, with a maximum length of just 2.4 centimetres long. Females always have black markings on their underside, and males have a black throat.

DISTRIBUTION: This species is found on the coastal plains and in the forests of south-western Australia, from near Jurien to the Fitzgerald River National Park.

PREFERRED HABITAT: Glauert's froglet inhabits permanently moist areas. During dry conditions in summer it burrows into the damp soil beneath the surface.

LIFE HISTORY: This frog will breed after rains at almost any time of year except for the height of summer. After being laid in pools, the eggs sink to the bottom. After the tadpoles emerge, they take longer than three months to metamorphose into frogs.

CALL: The call is a long, hollow rattle, rather like the sound of a pea in a can.

Photos – Babs & Bert Wells/Conservation and Land Management

SANDPLAIN FROGLET

(Crinia insignifera)

There is often a dark triangular patch on the top of the head, between the eyes, of the tiny sandplain froglet. Females can grow up to three centimetres long, but males reach no more than 2.3 centimetres in length.

DESCRIPTION: The sandplain froglet may be plain grey, brown or black, or a combination thereof. Its legs often have darker bars, and the abdomen is blotched with irregular markings. The fingers and toes are long and unwebbed. The belly has the texture of small uniform nodules.

OTHER NAMES: Little froglet, squelching froglet.

DISTRIBUTION: The sandplain froglet is found only on the coastal plain, from near Jurien to Busselton, and on Rottnest Island.

PREFERRED HABITAT: This frog inhabits temporary swamps, low-lying winter-wet areas, and permanent rivers and streams.

LIFE HISTORY: Sandplain froglets breed in winter, laying their eggs singly in still pools. The tadpoles take up to 150 days to develop into frogs.

CALL: The call has been described by eminent biologist Bert Main as a 'squelch, rather like drawing a wet finger over a balloon'.

Photos – Babs & Bert Wells/Conservation and Land Management

GRANITE FROGLET

(Crinia pseudinsignifera)

While the granite froglet is very hard to tell apart from the sandplain froglet, they occupy mutually exclusive areas. The granite froglet is completely absent from the Swan Coastal Plain, which is the only place the sandplain froglet is found.

DESCRIPTION: Granite froglets may be exquisitely patterned, with tonings closely resembling the appearance of layered rocks. Some individuals, however, have a simple colouring of grey, brown or black. There is often a dark triangle on the top of the head. Wart-like protuberances and ridges may or may not be present on the back, but the belly invariably has a granular texture. Fingers and toes are long and unwebbed. Granite froglets may reach 2.5 centimetres long.

OTHER NAMES: Bleating froglet.

DISTRIBUTION: Granite froglets are distributed across a fairly wide area of the south-west, from Kalbarri to east of Esperance, and also occur well inland. They are not, however, found on the Swan Coastal Plain, due to the lack of granite outcrops.

PREFERRED HABITAT: As their name suggests, these tiny creatures are restricted to areas of granite, living near the base of outcrops, which are well watered due to run-off.

LIFE HISTORY: The eggs are laid in water or waterlogged soil, one at a time. The tadpoles too may survive in waterlogged soil and take up to 130 days to develop into frogs.

CALL: The call, a 'baa... baa... baa', is high-pitched.

Photos – Jiri Lochman

WATER-HOLDING FROG

(Cyclorana platycephala)

This rotund creature is perfectly adapted to survive the long dry periods of the arid areas in which it lives. For most of the time, it dwells in a chamber, which it has excavated up to a metre deep in the desert soil. This chamber is filled with water, and has an impervious lining to hold the water in situ. The bladder of the frog is also filled with water.

DESCRIPTION: This burrowing frog has a rounded body and a flattened rounded head, with small eyes. Adults are between four and seven centimetres long, with females larger than males. It tends to be grey, brown or green above, with grey or green flecks on its upper body. It is pale beneath. The skin is fairly smooth, with a few flattened warts on its back. The toes are fully webbed. The tadpoles too are large, up to 7.5 centimetres long.

DISTRIBUTION: The water-holding frog is found in all of the mainland States except Victoria, across the arid centre of Australia. In WA, its distribution is centred in the Pilbara and Goldfields regions.

PREFERRED HABITAT: Temporary claypans, swamps and other water bodies in arid areas.

LIFE HISTORY: On the irregular occasions when it rains in the arid areas, usually when a cyclone pushes inland, the water-holding frog emerges to breed in temporary pools, claypans and watercourses. It lays large masses of up to 500 eggs. The development of the tadpoles can be extremely quick, as the water in which the spawn was laid will soon disappear.

CALL: This has been described as a snoring 'Maw-w-w-w...maw-w-w-w'.

Photo – Babs & Bert Wells/Conservation and Land Management

WHITE-BELLIED FROG

(Geocrinia alba)

The white-bellied frog was only discovered in 1983 by frog researchers Grant Wardell-Johnson and Dale Roberts in the jarrah forest of the Leeuwin-Naturaliste National Park. It is classed as threatened, and a recovery plan is under way to conserve its habitat and thence bring it back from the brink of extinction.

DESCRIPTION: The underside of this frog is white, or very faint yellow, and the skin is smooth. The back is light to dark brown, with a series of raised dark spots forming distinct rows. Adults reach no more than 2.4 centimetres long.

DISTRIBUTION: White-bellied frogs are confined to a few sites in the high-rainfall region between Margaret River and Augusta. Their entire habitat occurs over an area of about 130 square kilometres. However, within this area, the sites with suitable habitat cover just 1.9 square kilometres.

PREFERRED HABITAT: These tiny frogs shelter in damp peaty sites in tea tree swamps. Unfortunately, clearing of native vegetation for agriculture has left few frog swamps suitable for white-bellied frogs. Although some of the range of the frog still remains uncleared, much is privately owned and is therefore at risk of being cleared in the future. The protection of suitable sections of creek is essential to ensure the frog's survival. This includes protection of the habitat from summer and autumn fires. The recent purchase, by the Department of Conservation and Land Management, of a 1 570 hectare block of private land, south-east of Margaret River, has helped to improve the outlook for the frog. The land provides habitat for 30 per cent of its known populations.

LIFE HISTORY: The males call in spring to early summer, with peak activity in September and October.

CALL: Males make a series of short clicks, each click like the sound made by pulling your tongue from the roof of your mouth. There are about 15 clicks in each burst.

Above: *A male in its breeding burrow*

Photos – Grant Wardell-Johnson

GREEN-BELLIED FROGLET

(Geocrinia leai)

These minute frogs grow no more than 2.6 centimetres long. The males are considerably smaller than females, and reach a maximum length of just 2.1 centimetres. Unlike other members of the genus, the green-bellied froglet attaches its eggs to aquatic vegetation above the waterline, and the tadpoles fall into the water after hatching.

DESCRIPTION: This frog has an attractive brown to yellow pattern, usually featuring a darker patch on the back, which may be edged with white. The belly is a greenish colour. The tips of the toes are slightly expanded.

OTHER NAMES: Lea's frog.

DISTRIBUTION: Green-bellied froglets are found in areas within a reasonable distance of the coast, between Dandaragan and Two Peoples Bay, east of Albany. Near Perth, they are found only in the Darling Range.

PREFERRED HABITAT: This species inhabits cool, shady areas near swamps and streams.

LIFE HISTORY: These autumn breeders deposit a clump of eggs out of water, attaching it to vegetation above or near water. The tadpoles live in water and take four months or so to develop into frogs.

CALL: A 'tik tik tik tik' sound is made.

Photo – Brad Maryan

WALPOLE FROG

(Geocrinia lutea)

The Walpole frog was described in 1963, but until recently it was only known from a handful of specimens collected from near Walpole.

DESCRIPTION: Males of this species have a distinctive black chin. They are no bigger than a thumbnail. Walpole frogs have a yellow belly, hence the scientific name *lutea*.

OTHER NAMES: Nornalup frog.

DISTRIBUTION: The Walpole frog is found only at sites within a 12 kilometre radius of Walpole. It is common within this very narrow range.

PREFERRED HABITAT: Like all geocrinias, Walpole frogs are commonly associated with creek systems, particularly those having soil with a high organic content that do not readily dry out over summer.

LIFE HISTORY: The Walpole frog is one of a set of four related species of *Geocrinia* found across south-western Australia. They share a common breeding biology known as direct development. Eggs are deposited in a jelly mass in small hollows in moist soil, clay or mud. The eggs hatch and develop in the jelly, but live on yolk in the gut. They never feed, and metamorphose into frogs without ever entering water.

CALL: An incessant 'tick, tick, tick' is the call of the male Walpole frog trying to attract a female with which to mate.

Below: *Froglets developing in a jelly mass.*

Photos – Grant Wardell-Johnson

KARRI FROG

(Geocrinia rosea)

The karri frog was described in 1927, and has a range in the high-rainfall zone centred on the catchment of the Warren River.

DESCRIPTION: This frog is smooth skinned, above and below. Its back is grey or brown, with a darker stripe down the centre. This species is readily identified by examining its underside, which is pink, red or sometimes fawn. Males have a distinctive black chin. These tiny frogs are no bigger than a thumbnail (usually less than 2.5 centimetres long).

OTHER NAMES: Roseate frog.

DISTRIBUTION: This species is distributed over the western portion of the main karri belt.

PREFERRED HABITAT: Karri frogs conceal themselves beneath vegetation and rotten logs.

LIFE HISTORY: Karri frogs call from small depressions or tunnels just beneath ground cover. Up to 32 eggs are deposited in small depressions in moist soil, hidden under litter or dense vegetation. The tadpoles go through their entire development in the jelly surrounding the eggs. They do not feed, drawing on food reserves in the egg yolk. This type of life history is known as direct development. Although it is unusual, it is shared by several other WA frog species.

CALL: The call is a 'tk tk tk tk'.

Photos – Brad Maryan

ORANGE-BELLIED FROG

(Geocrinia vitellina)

The orange-bellied frog is a threatened species. In fact, it is the most restricted vertebrate known from mainland Australia. A recovery plan is under way to bring this species back from the brink of extinction.

DESCRIPTION: This species cannot be confused with any other. The front half to two thirds of the underside is bright yellowish-orange (hence the name *vitellina*, meaning the colour of an egg yolk). Like the other geocrinias, this species is no bigger than a thumbnail.

OTHER NAMES: Yellow-bellied frog.

DISTRIBUTION: The orange-bellied frog is confined to a very small area within State forest to the north of the Blackwood River, north-east of Augusta. Within the total range of only six square kilometres, there are few areas suitable for breeding - as little as 0.2 square kilometres!

PREFERRED HABITAT: The males call from moist ground that may be very close to streams. They are usually extremely well hidden among vegetation. The habitat of this frog harbours many unusual species, including the distinctive locally-endemic giant rush *(Reedia spathacea)* and a host of previously unknown aquatic invertebrates.

LIFE HISTORY: The males call in spring to early summer, with peak activity in September and October. Orange-bellied frogs do not have a free-swimming tadpole stage. Rather, the eggs are laid in moist depressions, hidden beneath litter or dense vegetation. After hatching, the tadpoles remain in the jelly surrounding the eggs until they metamorphose into frogs.

CALL: Males make a series of short clicks, like the sound made by pulling your tongue from the roof of your mouth. The call is similar to that of the white-bellied frog, but there are only about

Photo – Grant Wardell-Johnson

11 clicks in each burst (compared to about 15 in the white-bellied frog). The clicking is only just slow enough to count and changes with temperature; warmer frogs call faster.

SPOTTED BURROWING FROG

(Heleiporus albopunctatus)

The spotted burrowing frog was first described by Gray in 1841. It has a distinctive appearance and is easily recognised. The species is dark brown, with white, cream or pale yellow spots on its back, sides, arms and legs. The spots are regularly spaced.

DESCRIPTION: Spotted burrowing frogs are quite large and robust. The colouring on the limbs is quite muted, compared with that on the back. These frogs reach up to 8.5 centimetres long, with females larger than males.

OTHER NAMES: Western spotted frog.

DISTRIBUTION: This species is rare in the higher-rainfall extreme south-western corner of the State, and occurs well inland. It is found throughout the Wheatbelt and does well in low-rainfall areas. It occurs north to near Kalbarri and almost as far east as Esperance. Near Perth, spotted burrowing frogs are confined to the Darling Range.

PREFERRED HABITAT: Spotted burrowing frogs burrow along swamps, temporary watercourses and the edges of claypans.

LIFE HISTORY: Up to 700 eggs are laid in a burrow within a foam nest. The tadpoles emerge in 10 days to a month, when the burrow is flooded. They have an iridescent gold colouring on their upper bodies, with a smattering of tiny black spots.

CALL: Spotted burrowing frogs make a rapid, high-pitched, repeated 'coo'. This has been compared with the call of an owl.

Below: *The tadpole*

Photos – Babs & Bert Wells/Conservation and Land Management

YELLOW-FLANKED BURROWING FROG

(Heleioporus barycragus)

As its name suggests, this frog has numerous yellow spots on its sides, which have a wart-like texture. In some cases, the frog has black tubercles in the middle of each spot. The rest of the body is greyish or brown. The yellow-flanked burrowing frog was only recognised in relatively recent times, being described by Lee in 1967.

DESCRIPTION: These frogs are also distinguished by a rounded body, prominent eyes and a blunt snout. When they are breeding, adult males have a black spine on their first finger and smaller spines on the first and second finger. Adults may reach 8.6 centimetres long. Like other members of the genus *Heleioporus*, the limbs are quite short and have unwebbed fingers and partially webbed toes.

OTHER NAMES: Western marsh frog, hooting frog.

DISTRIBUTION: Yellow-flanked burrowing frogs are largely confined to the Darling Range, inland of Perth. However, they also occur at Dryandra in the Wheatbelt.

PREFERRED HABITAT: This species lives close to rivers and streams that are turbulent in winter, in granite or clay soils.

LIFE HISTORY: Large eggs are deposited out of water in a burrow tunnelled by the male in a near-vertical bank. The tadpoles emerge after the nest is flooded.

CALL: The call is said to resemble the hoot of an owl. This is low-pitched and repeated slowly.

Photo – Babs & Bert Wells/Conservation and Land Management

MOANING FROG

(Heleioporus eyrei)

The moaning frog is common around Perth, and is widespread in the lower South-West. It tends to make itself unpopular, when it calls from beneath the houses of people trying to sleep. Its calls, however, are welcome to gardeners in the autumn dry, for they herald the winter rains after the long summer.

DESCRIPTION: This rotund animal has large eyes and relatively slender limbs. Its flanks are spattered with numerous small white spots. The back is either dark grey or brown in colour, interspersed with patches of yellow. Its throat is white. Unlike other members of this genus, breeding males have no spines on the first or second fingers. Moaning frogs grow up to 6.6 centimetres long.

DISTRIBUTION: Moaning frogs are found in the South-West between Geraldton and Cape Arid National Park, but are rarely found far inland. Near Perth, they are common in the Darling Range and also occur on Rottnest Island.

PREFERRED HABITAT: This species likes sandy soils near streams and swamps. It lives in suburban gardens with appropriate habitat.

LIFE HISTORY: Moaning frogs lay their spawn in burrows, outside water, as a foam nest. Once the burrows flood with the early winter rains, the free-swimming tadpoles emerge.

CALL: The males call from their burrows in autumn, making a loud, low moan.

Below: *The tadpole*

Photos – Babs & Bert Wells/Conservation and Land Management

WHOOPING FROG

(Heleioporus inornatus)

The whooping frog is stout, with short muscular limbs. Its body has a rich brown background colouring, which is frequently mottled with white, yellow or grey.

DESCRIPTION: The fingers of this species are not webbed, whereas its toes are only partially webbed. The first finger is longer than the second. Breeding males have one or two small black spines on the first finger. Adults reach up to 7.3 centimetres long.

OTHER NAMES: Plain frog, chocolate burrowing frog.

DISTRIBUTION: Near Perth, whooping frogs are confined to the Darling Range, extending south to the Leeuwin-Naturaliste region and around the southern coast to Albany.

PREFERRED HABITAT: The burrows of this frog are generally in boggy sites.

LIFE HISTORY: Relatively large, pale yellow eggs are laid in a foam nest within a burrow excavated in a steeply-sloping bank. Tadpoles emerge when the burrow becomes flooded.

CALL: Its call is a repetitive 'woop woop'.

Photos – Grant Wardell-Johnson

SAND FROG

(Heleioporus psammophilus)

Known as the sand frog, because it is confined to sandy areas, or as the marbled burrowing frog, because of the attractive pattern on its back, this species is recognised quite easily because it always has numerous small white spots on its flanks.

DESCRIPTION: The light brown, dark brown or grey back is mottled with grey, white or light brown, and the pattern is often quite regular. Some males may have a black spine on their first finger. Adults are about four to six centimetres long.

OTHER NAMES: Marbled burrowing frog.

DISTRIBUTION: Sand frogs are found from near Geraldton to Jerramungup. Near Perth, they inhabit the Swan Coastal Plain and the western fringe of the Darling Range.

PREFERRED HABITAT: This species is found only in areas with fine sands or sandy clays.

LIFE HISTORY: These frogs deposit their eggs in burrows, outside water, in a foam nest. Once the burrows flood with the early winter rains, the free-swimming tadpoles emerge.

CALL: The call, a 'put put', is said to resemble the noise made by a small outboard motor.

Photo – Babs & Bert Wells/Conservation and Land Management

WESTERN BANJO FROG

(Limnodynastes dorsalis)

The western banjo frog lives throughout the South-West, is very robust and has a bright crimson groin. *Limnodynastes* is Latin for 'Lord of the marshes'.

DESCRIPTION: This frog is distinguished from all other Western Australian species by the large, oval, bulbous gland on the top of each hind limb. There is almost always a narrow, pale stripe down its back, hence the name *dorsalis* for dorsal stripe. A dark stripe runs through the eye to the top of the short arms. The mottled markings on the rest of the upper body are a variable mixture of pale to dark brown, olive green and cream. Adults can reach up 7.3 centimetres long, with females larger than males.

OTHER NAMES: Pobblebonk, bull frog, banjo frog.

DISTRIBUTION: The western banjo frog is found across the south-western corner of WA, from near Kalbarri to well east of Esperance. It is confined to the State.

PREFERRED HABITAT: These frogs call from vegetation alongside swamps and dams in winter and spring. In summer they shelter in burrows away from water. They are often found on roads during wet summer nights, or may be dug up when turning garden soil.

LIFE HISTORY: The males have been seen fighting for calling sites during the breeding season, with the bouts resembling those of 'sumo wrestlers'. The eggs are laid on a body of still or slowly flowing water in a foam nest. The large black tadpoles are up to 6.5 centimetres long and have deep tail fins.

CALL: This frog makes an unmistakable loud, deep, explosive 'bonk'.

Photo – Babs & Bert Wells/Conservation and Land Management

SLENDER TREE FROG

(Litoria adelaidensis)

Smaller and more elongated than the western green tree frog, the slender tree frog is often found in gardens, where it sometimes clasps onto window panes on warm, wet nights.

DESCRIPTION: This long, slender frog can be brown, green, or brown with large green patches. Small red, orange or yellow spots are sprinkled across the back of the thigh. On each side of the body there is usually a broad dark stripe, with a narrower white stripe below. The skin is smooth. The fingers have no webs, while the toes are webbed. Adults attain lengths up to 4.7 centimetres long.

DISTRIBUTION: Slender tree frogs have been recorded in the south-western corner, between Port Gregory and Bremer Bay, and also from Esperance to Mt Ragged in near-coastal areas.

PREFERRED HABITAT: This species lives in areas with still or slow-moving water adjacent to dense vegetation. They can sometimes be seen in the day time, clinging to sedges or bulrushes.

LIFE HISTORY: These frogs are spring breeders, calling from sites in or close to water. The mass of eggs has an irregular shape, and is attached to vegetation growing in water. Distinctive tadpoles (dark brown with two paler stripes extending from the nostrils) hatch and subsequently develop in the water.

CALL: Slender tree frogs emit a harsh grating screech, incorporating grunts.

Photo – Babs & Bert Wells/Conservation and Land Management

GREEN TREE FROG

(Litoria caerulea)

Visitors to the Kimberley are likely to see the large green tree frog, which often enters houses, outside toilets and other structures made by people. They are large, with females reaching up to 11 centimetres long. Prominent glands on the rear of the head and upper back partly cover the tympanum (external ear), creating a thick ridge that gives the frog a distinctive appearance.

DESCRIPTION: Green tree frogs have smooth, light green skin on the upper surface, sometimes with inconspicuous white markings. A series of white spots may lead from the mouth to the forearms, and may join to create a ragged stripe. Parts of the limbs and flanks, which cannot be seen when the frog is resting, are usually pale yellow. The underside is white. There are large discs on the ends of the fingers and toes. Both the fingers and toes are partially webbed.

DISTRIBUTION: In Western Australia, green tree frogs are largely confined to the Kimberley region. However, they are found in most other mainland States, including most of the Northern Territory, Queensland and New South Wales. They occur in southern New Guinea.

PREFERRED HABITAT: Green tree frogs are adapted to a wide variety of habitats, including dry areas of the interior. They frequently enter houses and toilets. Otherwise, look on rocks and trees near streams.

LIFE HISTORY: This frog congregates to breed in grassy, rain-filled areas. Females lay up to 2000 eggs in still water from November to February. Large mottled green and brown tadpoles are the result.

CALL: 'Wark-wark-wark'. The call is very deep.

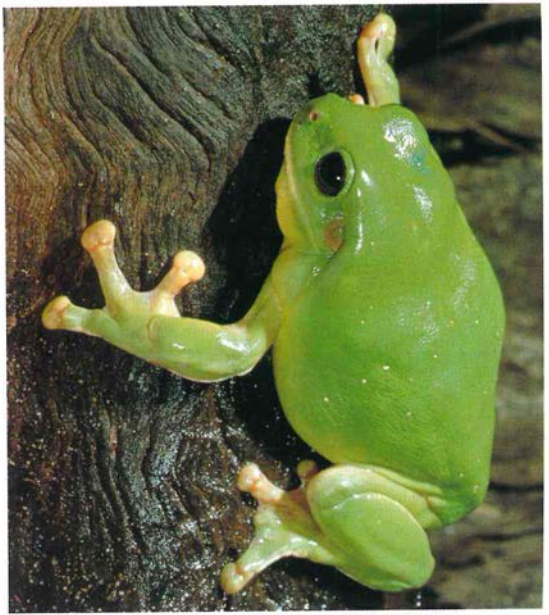

Photo – Babs & Bert Wells/Conservation and Land Management

SPOTTED-THIGHED FROG

(Litoria cyclorhyncha)

Where the motorbike frog disappears, the spotted-thighed frog takes over to the east of its range. This is a very distinctive and attractively-patterned frog, with a series of bright green blotches edged in gold or bronze on a cream body.

DESCRIPTION: Frogs of this species are approximately 5.5 to 7.5 centimetres in length. The fingers are not webbed and have prominent discs, whereas the toes are webbed. The skin has large flat warts. The back of the thighs, groin and the armpits are black, with white or yellow spots.

DISTRIBUTION: The spotted-thighed frog is found along the southern coast of Western Australia, from Albany to Israelite Bay. It extends inland for some distance to Broomehill and Ravensthorpe.

PREFERRED HABITAT: This species lives near swamps and permanent water bodies.

LIFE HISTORY: Very little is known about the breeding biology of this frog, although calling has been reported in December and January.

CALL: The call has been described by well-known biologist Bert Main as 'like the distant sound of wood being sawn'.

Photos – Babs & Bert Wells/Conservation and Land Management

MOTORBIKE FROG

(Litoria moorei)

Living as it does in the most populated part of Western Australia, the motorbike frog is frequently encountered by people, and often inhabits gardens with ponds, greenhouses or ferneries. It is one of the tree frogs.

DESCRIPTION: This large and robust frog has a triangular head, bulging eyes and a prominent eardrum (known as a tympanum). Colours are generally quite striking, but vary considerably from brown through green and gold. There are usually very distinct dark patches on the back, along with a paler stripe down the centre of the back and a dark stripe through each eye to the top of the arm. The fingers are long and unwebbed, whereas the toes are distinctly webbed, but all digits have small discs on the ends. Hind legs are large and strong. Males reach 6.4 centimetres long and females up to 7.4 centimetres long.

OTHER NAMES: Bull frog, bell frog, western green tree frog, western green and golden bell frog.

DISTRIBUTION: The motorbike frog has a range from Kalbarri through to Cape Riche. It is found on Rottnest Island.

PREFERRED HABITAT: This species requires sites with permanent water. It is sometimes found in backyard ponds and often shelters beneath bark on trees, underneath rocks or beneath other objects.

LIFE HISTORY: Breeding takes place in late spring through to summer. A floating clump of eggs is attached to waterborne vegetation. Large black tadpoles, with a pointed tail, emerge to develop in water. They are often caught and raised by children.

CALL: In spring, this species calls from water, making a sound like a motorbike changing gears: 'grr, grr, grr'.

Photos – Babs & Bert Wells/Conservation and Land Management

DESERT TREE FROG

(Litoria rubella)

The desert tree frog is one of the most widespread frog species in Australia. In Western Australia, it is found from Shark Bay north to the tropics and across the central deserts. In the deserts, however, it is confined to ranges and to larger rivers and lakes.

DESCRIPTION: The desert tree frog is not particularly colourful. An obvious black stripe runs along the side of the head and body of this frog species. The upper body and the limbs may be grey to brown in colour, with dark brown or black flecks. The thighs usually have a smattering of fine white spots. It is white, cream or yellow beneath. The discs on the fingers and toes are large, and the second finger is longer than the first. This frog is small – only about three or four centimetres long.

OTHER NAMES: Red tree frog.

DISTRIBUTION: This frog occurs throughout the arid zone and the Pilbara and Kimberley regions of Western Australia. It is present in most of the rest of the country, apart from southern areas and Tasmania. It also occurs in New Guinea.

PREFERRED HABITAT: The desert tree frog has a liking for trees and shrubs alongside bodies of water, where it may be heard calling.

LIFE HISTORY: In the far north, and on the eastern coast, breeding takes place after rains in summer time. However, in arid regions, breeding is more opportunistic and the frogs will breed whenever conditions are suitable. Males call from ground near water. The eggs form a film that floats on the water surface. Pale brown tadpoles may develop into frogs in only 14 days (depending on water temperature).

CALL: This frog makes a cackling call.

Photos – Babs & Bert Wells/Conservation and Land Management

MAGNIFICENT TREE FROG

(Litoria splendida)

The magnificent tree frog *(Litoria splendida)* is another Kimberley tree frog with a striking appearance. It is commonly seen, looks similar to the green tree frog (see pages 42-43) and inhabits similar areas.

DESCRIPTION: The magnificent tree frog is around 10 centimetres long. It can be distinguished from the green tree frog by the larger gland that covers the entire top of the head, and by the cream patches on its back.

DISTRIBUTION: The magnificent tree frog is found across most of the Kimberley to the north and east of Derby.

PREFERRED HABITAT: The magnificent tree frog is frequently encountered in houses and other buildings, and also lives in caves and rock holes.

LIFE HISTORY: Eggs are laid on or beneath the surface of the water. The tadpoles hatch in water and undergo their development there.

CALL: The magnificent tree frog has a slow, deep barking call.

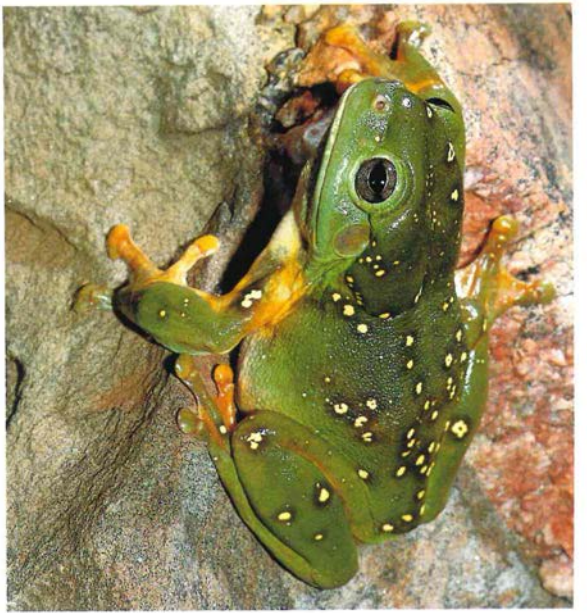

Photo – Hans & Judy Beste/Lochman Transparencies

ROCKET FROG

(Litoria nasuta)

The rocket frog is easily recognised by its slender, elongated body and long, triangular snout. As well as being somewhat rocket-shaped, it is an expert jumper.

DESCRIPTION: The rocket frog has large, bulbous eyes and a large, very obvious eardrum. The back has a pattern of light to very dark brown bars and blotches. The fingers have no webs, and the long toes have very reduced webs. The frogs are about 3.5 to 5.5 centimetres long, with females being larger than males.

DISTRIBUTION: The rocket frog occurs across much of the Kimberley, north from Beagle Bay, then eastwards to across the Northern Territory and Queensland and then south to New South Wales.

PREFERRED HABITAT: This species may be seen in areas of open forest, especially those adjacent to swamps and mudflats.

LIFE HISTORY: Eggs are laid in clumps of 50 to 100 in soaks, waterholes and swamps.

CALL: After one or two short notes, a long series of 'wick, wick, wick' sounds are made.

Photos – Babs & Bert Wells/Conservation and Land Management

ROTH'S TREE FROG

(Litoria rothi)

Roth's tree frogs are widespread and reasonably common in northern Australia.

DESCRIPTION: Roth's tree frog is less than five centimetres long. It is generally rich grey or brown on its upper surface, with a black stripe along its side, near the forearm. However, it can change colour to appear pale cream all over. There are also usually black markings on the groin, and black and yellow patches on the thigh. The upper half of the iris is a distinctive rich red.

DISTRIBUTION: Roth's tree frog occurs along the coast and near large rivers from near Broome in the Kimberley through to most of coastal Queensland. It has a similar distribution to the northern dwarf tree frog (see pages 56-57).

PREFERRED HABITAT: This species can be found in houses and other buildings. It is common on branches overhanging water.

LIFE HISTORY: Eggs are laid at the beginning of the wet season, in small clumps on or beneath the surface of the water, in temporarily flooded areas. The tadpoles hatch in water and undergo their development there.

CALL: Roth's tree frog makes a call similar to raucous laughter.

Photo – Babs & Bert Wells/Conservation and Land Management

NORTHERN DWARF TREE FROG

(Litoria bicolor)

With its moist, tropical climate, the Kimberley region is ideal for tree frogs.

Other members of the genus that are also found in the Kimberley include the wotjulum frog *(L. wotjulumensis)*, the rockhole frog *(L. meiriana)*, the cave-dwelling frog (*L. cavernicola*), Peters' frog (*L. inermis*), the pale frog *(L. pallida)*, Tornier's frog *(L. tornieri)*, the javelin frog *(L. microbelos)*, Dahl's aquatic frog *(L. dahlii)* and Copland's rock frog *(L. coplandi)*. Many of these live in restricted habitats and are rarely seen by visitors to the Kimberley.

DESCRIPTION: The northern dwarf tree frog is less than three centimetres long. It is pale green above, and has slender limbs with almost translucent forearms and a dark side stripe. The parts of the limbs that are usually hidden are orange.

DISTRIBUTION: The northern dwarf tree frog occurs along the coast and near large rivers from near Derby in the Kimberley through to most of coastal Queensland.

PREFERRED HABITAT: The species can be found in houses and other buildings. It is most common in marshy areas prone to flooding. It is sometimes found in screw pine *(Pandanus)* leaves and other vegetation during the dry season.

LIFE HISTORY: Eggs are laid on or beneath the surface of the water. The tadpoles hatch in water and undergo their development there.

CALL: The call of the northern dwarf tree frog is a 'reek, reek, reek'.

Photo – Babs & Bert Wells/Conservation and Land Management

TURTLE FROG

(Myobatrachus gouldii)

One species common around Perth is frequently sent to the museum as an oddity. The turtle frog has a bizarre appearance and lifestyle, and is an example of extreme ecological specialisation. It is the only member of the genus *Myobatrachus* (although current studies will probably result in breaking the genus into a number of different species). It spends almost all of its life beneath the ground, and lacks the bulging eyes of most other frog species.

DESCRIPTION: This frog reaches up to five centimetres long. It has a swollen body that looks out of proportion to its small head with tiny eyes and its short, muscular limbs. The fingers and toes are unwebbed and stubby. Colour varies from a pale yellowish-brown to dark brown.

DISTRIBUTION: Turtle frogs are found from Geraldton to Esperance, excluding a large area of the South-West. Near Perth, they inhabit the Swan Coastal Plain. They are not found in the Darling Range.

PREFERRED HABITAT: This species inhabits sandy areas and is often found near termite colonies, on which it feeds almost exclusively.

LIFE HISTORY: The turtle frog lives, feeds and breeds entirely underground, but during summer thunderstorms it calls from near the surface of its burrow. It is one of many species in the South-West that does not have a free-living tadpole stage. This is known as direct development. Eggs of this species have been found more than a metre below the surface in moist sand. The eggs are five to seven millimetres in diameter, and there are up to 40 of them in each clump.

CALL: Abrupt, deep croaks are made.

Photo – Babs & Bert Wells/Conservation and Land Management

HUMMING FROG

(Neobatrachus pelobatoides)

The humming frog has a yellowish, blackish-brown or greenish back, with irregular paler or darker patches. There is usually a fine yellow or red stripe running down the centre of the head and back. This is the only member of the genus that is found in the Perth region, where it is common in the Darling Range.

DESCRIPTION: The fingers are webbed and the toes are partially webbed. Adults reach a maximum length of 4.4 centimetres.

DISTRIBUTION: The humming frog is distributed in a broad band across the South-West of Western Australia, from north of Kalbarri through to Israelite Bay, east of Esperance. It is absent from the lower South-West from Bunbury to Fitzgerald River National Park.

PREFERRED HABITAT: Humming frogs mostly inhabit temporary claypans and loamy soils. Near Perth, they are most common in the Darling Range.

LIFE HISTORY: Humming frogs breed in temporary claypans between May and July. The eggs are laid in long strings and develop into tadpoles.

CALL: The low hum made by these frogs is only audible from close by.

Photo – Babs & Bert Wells/Conservation and Land Management

GUENTHER'S TOADLET

(Pseudophryne guentheri)

Guenther's toadlets usually walk rather than hop. This frog can be recognised by its relatively small eyes and head, its fairly flattened body shape and its distinctive mottled colouring of grey, brown and orange.

DESCRIPTION: In contrast to its colourful back, this species has a white belly with black patches. Neither its fingers or toes are webbed. Fully grown adults generally reach only about three millimetres long.

DISTRIBUTION: Guenther's toadlet is distributed throughout south-western Australia, from north of Kalbarri to east of Esperance.

PREFERRED HABITAT: This species is fairly adaptable, and lives in moist areas under fallen timber and other vegetation, rocks, and even rubbish.

LIFE HISTORY: Guenther's toadlets breed in autumn and deposit their eggs out of water, but they are flooded weeks, or months, later by winter rain. The tadpoles are at a fairly advanced stage of development when they finally hatch.

CALL: The call is a grating squelch.

Photos – Babs & Bert Wells/Conservation and Land Management

ORANGE-CROWNED TOADLET

(Pseudophryne occidentalis)

The orange-crowned toadlet looks similar to other *Pseudophryne* species and has similar markings, but the body of this frog has a more bloated appearance, with relatively short legs and arms.

DESCRIPTION: The common name of this frog is derived from the orange, yellow or coppery triangle on its snout. Orange patches also occur on the base of each forearm, the posterior and elsewhere. The rest of the body is dark brown or grey. The underside is black and white. It grows up to 2.6 centimetres long.

OTHER NAMES: Western toadlet.

DISTRIBUTION: The orange-crowned toadlet lives in drier areas of the Western Australian Wheatbelt and into pastoral country near Shark Bay and the Goldfields. A small population also occurs in a locality in South Australia.

PREFERRED HABITAT: Orange-crowned toadlets live within granite outcrops, and also shelter under rocks or logs near claypans and waterholes. When claypans dry up, they may burrow into the wet mud underneath.

LIFE HISTORY: The eggs are laid in tunnels excavated in damp soils, after late summer, autumn or early winter rains. An adult usually stays with the eggs, in which the tadpoles undergo the early stages of their development, until the tunnel is flooded.

CALL: A short, harsh 'ark' is emitted.

Photo – Babs & Bert Wells/Conservation and Land Management

SUNSET FROG

(Spicospina flammocaerulea)

The Walpole-Nornalup region is a special area for frogs, including two species found nowhere else. One of these, the sunset frog, may have evolved 30 to 40 million years ago! As well as its distinctive appearance, this species has a call like no other, and is not closely related to any other frogs found in southern Western Australia. Because of the remote area in which it lives, the frog was only discovered in January 1994 by Pierre Horwitz and described in 1997.

DESCRIPTION: The sunset frog is one of the world's most recognisable frogs. It has a brownish-black back with knobbly skin and bright orange hands and feet, but the belly is even more dramatic. Half of the belly is orange and the other half is covered with striking light blue spots. It reaches about 35 millimetres long.

OTHER NAMES: Harlequin frog.

DISTRIBUTION: The sunset frog is known from only 14 swamps east of Mount Frankland. All have deep peat beds and could therefore be prone to fire damage. It is also important to protect the vegetation surrounding the swamps from dieback, to ensure water tables stay at current levels.

LIFE HISTORY: Eggs are deposited in water, but the breeding season is unusual, with most observations of calling and egg laying occurring in the heat of November. The eggs are laid one at a time.

CALL: 'Duk-duk'. Calling is strongest on the hottest days – totally unlike any other frog species in Western Australia!

Photos – Grant Wardell-Johnson

NORTHERN TOADLETS

(Uperoleia species*)*

Members of this genus of small frogs are replacements of *Pseudophryne* species in northern areas of Western Australia. At least 12 species of *Uperoleia* (of about 24 found throughout Australia) are found in the State. They are the Derby toadlet *(U. aspera)*, northern toadlet *(U. borealis)*, fat toadlet *(U. crassa)*, glandular toadlet *(U. glandulosa)*, stonemason's toadlet *(U. mjoberji)*, Russell's toadlet *(U. russelli)*, mole toadlet *(U. talpa)* and the blacksoil toadlet *(U. trachyderma)*.

DESCRIPTION: Frogs in this genus tend to have small heads, squat bodies and short limbs. The fat toadlet is especially stout. All the toadlets have rough, warty skin. Fingers are unwebbed and the first finger is always shorter than the second. Toes may or may not be webbed. The eardrums (tympanum) are not visible. There are usually large glands, particularly behind the head. Most species are two to three centimetres in length, although the mole toadlet can reach four centimetres.

DISTRIBUTION AND PREFERRED HABITAT: Nine species are found in the Kimberley region, two in the north-west arid zone (the glandular toadlet and Russell's toadlet) and one in the northern central arid zone (the Tanami toadlet). They are often found in areas subject to flooding.

LIFE HISTORY: Many species live in isolated areas, so little is known about their breeding biology. Males of some species (such as the blacksoil toadlet) have been recorded calling away from water. However, those whose life history has been studied lay their eggs in shallow water and produce free-swimming tadpoles.

CALL: Some species have a call consisting of one or more clicks. Others will make a squelching call.

Photo – Babs & Bert Wells/Conservation and Land

Above: *Russell's toadlet*

SIGHTING RECORD			
SPECIES	**DATE**	**LOCALITY**	**REMARKS**
sandhill frog			
quacking frog			
Glauert's froglet			
sandplain froglet			
granite froglet			
water-holding frog			
white-bellied frog			
green-bellied froglet			
Walpole frog			
karri frog			
orange-bellied frog			
spotted burrowing frog			
yellow-flanked burrowing frog			
moaning frog			
whooping frog			
sand frog			

White-bellied frogs

SIGHTING RECORD

SPECIES	DATE	LOCALITY	REMARKS
western banjo frog			
slender tree frog			
green tree frog			
spotted-thighed frog			
motorbike frog			
desert tree frog			
magnificent tree frog			
rocket frog			
Roth's tree frog			
northern dwarf tree frog			
turtle frog			
humming frog			
Guenther's toadlet			
orange-crowned toadlet			
sunset frog			
northern toadlets			

Eggs of the spotted burrowing frog

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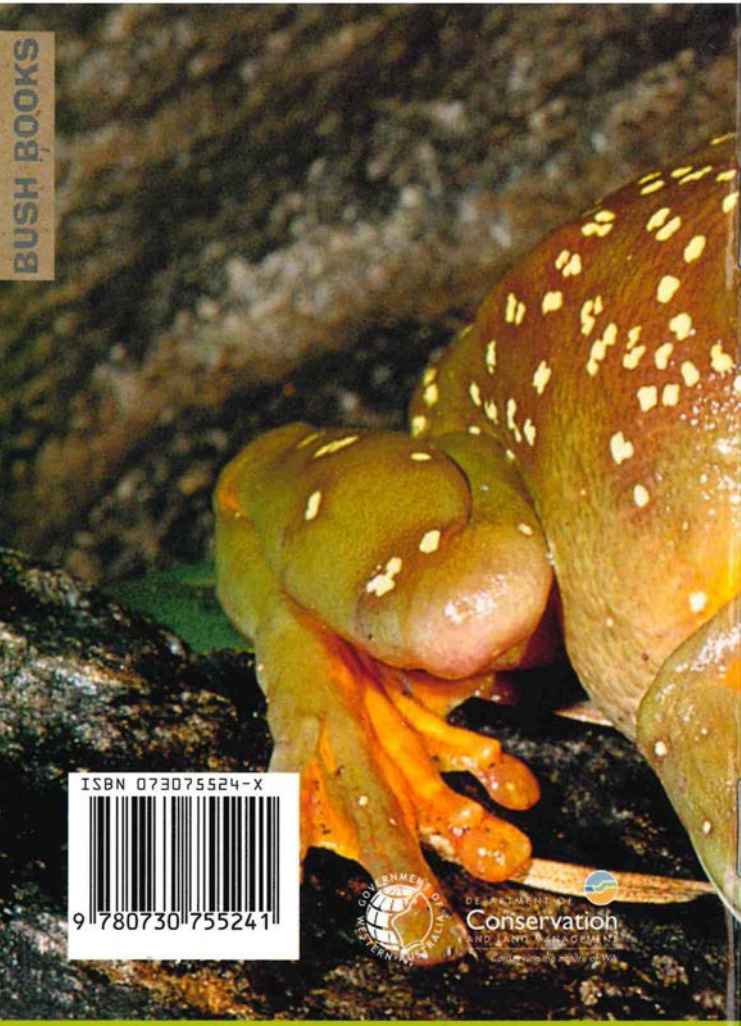

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