







# Poison in paradise: cane toads hop west

Western Australians have long feared that cane toads will one day cross their border. As that day draws near, work is being done to monitor and document their progress, and the implications to the State's frog species.

by Tony Start and Chris Done

The time: August 2000.  
 The place: Esey Station, near Katherine (in the Northern Territory).  
 The scene: A bunch of scientists, loafing ducks, lotus flowers and a billabong.



While conference delegates discussed ponderous problems of pasture management, a few of us 'birdos' slipped over to the billabong. Close up, it had its share of blemishes, particularly a shoreline churned by cattle and pigs, but there were lots of birds and lotus flowers, and waterlilies too. As I picked my way between muddy holes made by sinking hooves, I spotted a strange little black frog sitting motionless in a particularly deep pig-print. Intrigued, I caught it. But, as I peered at the tiny amphibian in my hands, curiosity turned to horror. I'd caught my first 'wild' cane toad. Then we saw more, lots of them: juvenile toads and a few bigger ones too!

### WESTWARD HOP

So . . . they were this far west. The billabong was in the catchment of the Roper River, which flowed east to the Gulf of Carpentaria. For Western Australians, however, the concern was that the Katherine River, just a few kilometres up the road, joined the Daly River, which emptied into Bonaparte Gulf off the Kimberley coast. Reality sank in. Cane toads had all but reached the watershed that separated the rivers that flowed east, from those that flowed

towards Western Australia, towards home.

Two wet seasons later, in March 2002, national park ranger Lindsay Brown confirmed the rumours we'd heard. The toads were well west of Katherine. Indeed, he'd seen masses of them sitting on the road at most creek crossings in the first 75 kilometres travelling west from the town. Thereafter, numbers had thinned and the last cane toad he saw that night was 100 kilometres down the highway. Since then, there has been news that they have reached the Victoria River Bridge. The lead toads are now less than 300 kilometres from Kununurra and the Ord River.

Cane toads travel fast, following roads as well as rivers. On average they travel about 25 kilometres per year, but

#### Previous page

**Main:** An aerial view of the lower Ord River, Kununurra.

Photo – Col Roberts/Lochman Transparencies  
**Inset:** Cane toad (*Bufo marinus*).  
 Photo – Dennis Sarson/Lochman Transparencies

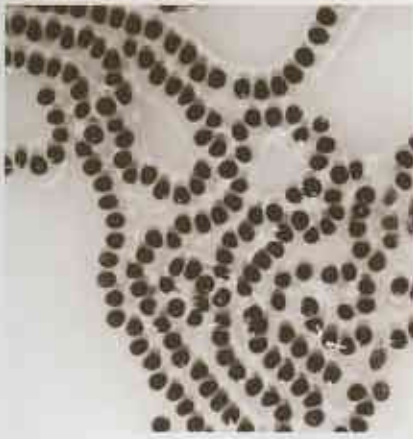
**Above:** Cane toads mate in still or slow moving waters and are sexually mature at one to two years.

Photo – Stephen Richards/Nature Focus

in some years they do much more. They are also adept at hitching rides. In fact, the first cane toad we saw in the Kimberley had come from Queensland in caravan comfort, snugly concealed in a flowerpot. Its cover was blown when quarantine officers pulled the illegally imported plant out of its container at the border checkpoint.







Above: Large females may lay more than 50,000 eggs at a time in distinct bead-like strings.

Photo – Deborah Pergolotti

## POISON PIONEERS

It doesn't take long for pioneers to populate new territory. A cane toad can lay thousands of eggs in long threads of mucous, which drift like tangled strings of black beads. While most frogspawn is the target of predatory fish and other creatures, cane toad eggs are safe. They are toxic. The tadpoles and the mature toads are poisonous. Merely mouthing toads is sufficient to kill dogs and quolls. There is only one short window in their lives when they can be safely eaten. That is the brief time it takes, after metamorphosing from tadpoles, for the poison glands to develop on their necks. It is a rare and sad irony that, in Australia, cane toads kill their would-be predators (fish, northern quolls, goannas, crocodiles and birds of prey, for example) as well as their prey. No wonder there were masses of tiny toads at the billabong on Eley Station or that they had travelled so much further west in just two short years.

While there are many accounts of the diet of cane toads, and of the susceptibility of carnivores to their poison, information on their effect on native wildlife is mostly anecdotal. No doubt there is truth in observations of frogs, goannas and quolls becoming rare following the arrival of toads in new areas, particularly in the first years. However, there are no proven accounts of extinctions (except locally) as a direct consequence of cane toads eating or poisoning indigenous animals. In fact, there are accounts of species becoming rare and, some years later, recovering to varying degrees. It seems that some

## WHAT ARE CANE TOADS?

Cane toads (*Bufo marinus*) are members of the family *Bufo*, the true toads. No toads are native to Australia despite the (misleading) use of names such as 'toadlet' for some of our native species. Toads occur naturally on every other continent—where one species or another can be found in tropical rainforests, temperate forests, savannas and even deserts—but the ancestral home of cane toads is Central and South America, where they live in fairly arid scrub forests and savannas.

Unlike all our native frog species, cane toads have:

- a very warty skin that is usually dark brown to black;
- a very short nose (the distance from the front of their eyes to the tip of their nose is less than the diameter of their eyes); and
- large, elongated swellings on either side of the neck at the back of their heads. These are the poison glands, from which they exude a milky toxic fluid if handled. **DO NOT LICK YOUR FINGERS OR RUB YOUR EYES AFTER TOUCHING THEM!**

They are tough!

- Adults can lose more than 50 per cent of their body water and absorb replenishment through their skin from damp soil or humid atmospheres.
- They tolerate temperatures between 6° and 41°C, although they are not very active at the extremes.
- They eat almost any animal, provided it's not more than half their own length (in Australia they'll eat mice, birds, lizards, frogs, crabs, earthworms and spiders, but beetles and ants are the staple items).

They are prolific breeders!

- A large female may lay more than 50,000 eggs at a time.
- Tadpoles can live in permanent lakes, temporary ponds and even brackish water (up to 15 per cent seawater).
- Provided they can get to water, they can breed all year round in northern Australia.
- In optimal conditions, eggs can hatch in two days and tadpoles can metamorphose into tiny toads, only six millimetres long, in 16 days. Thereafter, they can grow up to two millimetres per day and they are sexually mature within one to two years. (These growth rates depend on the availability of warm water and abundant food. In less perfect habitats, everything takes longer, but they still grow.)

Will we ever learn?

- On 22 June 1935, 101 cane toads were released in Queensland to control grey-backed cane beetles, despite the fact that the beetles lived on the cane stems and their larvae in the soil, where they were inaccessible to toads, and despite a long history of their ineffectiveness as bio-control agents.
- There is a long history of introductions, which started in Jamaica in the 1850s and other Caribbean Islands soon afterwards. Cane toads are now established in the Philippines, Japan, Hawaii (where the first toads to arrive in Australia came from), Fiji, New Guinea and other Pacific nations.
- Despite so many well-intentioned introductions, all attempts to use cane toads for controlling pests have been dismal failures that have invariably backfired. Here's just one more example. In the Philippines, cane toads were expected to kill rats. Instead, they poisoned the village cats and rat numbers soared.



Cane toads exude a poisonous secretion from the glands on their neck.

Photo – Jiri Lochman

species learn to avoid cane toads and a few—some birds of prey for example—even learn to roll toads over so that they can feed off the soft underside while avoiding the poison glands on the back of the toad's neck.

People in the Kimberley are understandably concerned. Questions range from conservation issues to the effect that toads may have on bush tucker, domestic pets, fish stocks and wildlife. Last year, many people brought

frogs to the Department of Conservation and Land Management's office in Kununurra, mistaking them for cane toads. So far, besides the one from the quarantine checkpoint, they have all been false alarms. Most of the suspects were giant frogs (*Cyclorana australis*). But it seems inevitable that in a year or two there will be toads in town and in the extensive habitats offered by Lake Argyle and Lake Kununurra, as well as the irrigated farm area.

## KUNUNURRA FROG WATCH RESULTS

Frogs recorded by Save Endangered East Kimberley Species (SEEKS)  
near Kununurra on 20 January 2002

The recordings were made at five sites: Lake Kununurra (site 1); a garden (site 2); seasonally flooded grassland (site 3); a flooded gravel pit (site 4); and a rocky creek line (site 5). The results show the total number of species recorded at each site and (in brackets) the number of species found only at that site.

Frog species	Site 1	Site 2	Site 3	Site 4	Site 5
bilingual frog ( <i>Crinia bilingua</i> )			•	•	•
giant frog ( <i>Cyclorana australis</i> )			•		
long-footed frog ( <i>Cyclorana longipes</i> )			•		
Daly Waters frog ( <i>Cyclorana maculosus</i> )			•		
marbled frog ( <i>Limnodynastes convexiusculus</i> )	•		•	•	•
ornate burrowing frog ( <i>Limnodynastes ornatus</i> )			•		
flat-headed frog ( <i>Limnodynastes depressus</i> )			•		
green tree frog ( <i>Litoria caerulea</i> )		•			
Copland's rock frog ( <i>Litoria coplandi</i> )					•
Peter's frog ( <i>Litoria inermis</i> )				•	
rocket frog ( <i>Litoria nasuta</i> )			•	•	
pale frog ( <i>Litoria pallida</i> )				•	•
Roth's tree frog ( <i>Litoria rothii</i> )			•	•	
desert tree frog ( <i>Litoria rubella</i> )			•		
Wotjulum frog ( <i>Litoria wotjulumensis</i> )					•
northern toadlet ( <i>Uperoleia borealis</i> )				•	•
stonemason toadlet ( <i>Uperoleia lithomoda</i> )				•	
<b>Total</b>	<b>1 (0)</b>	<b>1 (1)</b>	<b>9 (5)</b>	<b>8 (2)</b>	<b>6 (4)</b>

- The marbled frog was the most widespread, and the hardest to catch. It kept hidden under the grass.
- Only six of the 15 species were recorded at more than one site.
- Lake Kununurra was remarkable for the lack of frogs.
- The flooded grassland had the greatest diversity (nine species; five found only there).
- The gravel pit had nearly as many (eight species) but only two that were not seen elsewhere. It was the prime site for toadlets.
- Rock holes in Mirima National Park were home to some sandstone specialists.



Lily Creek lagoon, Lake Kununurra.  
Photo – Marie Lochman



## FROGWATCH

If you'd like to keep track of the westward hop of cane toads, you can visit the Frogwatch website at [www.frogwatch.org.au](http://www.frogwatch.org.au), where new sightings are recorded on an accessible database. In fact, the website contains information on the identity, habitat and distribution of all frogs found in the Kimberley or Top End. You will find maps and photos, and can even play recordings of the calls of all species.

If you visit the Kimberley or Top End and wish to record the frogs around your campsite, the calls will be particularly useful for identification, because each species has its own distinctive 'croak' or 'plonk'. One only has to look at the common names of frogs to see that. In Western Australia, we have (among others) banjo frogs, bell frogs, bleating frogs, moaning frogs and motorbike frogs. We even have humming frogs, wailing frogs and quacking frogs! Because frogs tend to be most active at night, and many live in dense vegetation or burrows where they're hard to find (they invoke an understandable but irritating code of silence as you approach!), it is much easier to listen for frog calls than to catch the animals themselves. If you're sure of your identifications, you can have your data added to the Frogwatch database (to find out how to do that, visit the site).

Frog-watching adds to our knowledge of the status and distribution of frogs (and the spread of cane toads). It can be great fun too. Last year, Ian Morris and Graeme Sawyer—the people behind the Frogwatch website—visited Kununurra. Ian and Graeme, together with members of our local naturalist group, Save Endangered East Kimberley Species (SEEKS), listened and hunted for frogs on the banks of Lake Kununurra, in flooded gravel pits, in rock holes and in seasonally flooded grasslands. Their results? Pretty good. They found 15 species, which is all but one of those known from the area (see the table above).

**Left:** The giant frog (*Cyclorana australis*) is sometimes mistaken for the cane toad.

Photo – Greg Harold





Although it was the wet season, when most frogs were out and about, there hadn't been rain for a week. Each habitat had its own suite of frogs. Surprisingly, Lake Kununurra—with its abundant water—had fewest species, while the flooded grassland was the richest site, closely followed by the gravel pit. Numbers were probably good because the frogs had large areas of shallow water, and damp banks with patches of open ground and dense vegetation.

## CALLING ALL FROGS

SEEKS hopes to repeat the survey each year, so that—when cane toads arrive—members will be able to record any impacts on local frog communities. There have been other attempts to document the effects of the cane toad's arrival in new areas, but they have to overcome considerable difficulties. For one thing, frogs and toads are most active in northern Australian savannas during the summer (wet season), when roads become impassable and fieldwork is most difficult. For another, it is difficult to document exactly when the first toads arrive.

Gordon Grigg, a Professor at The University of Queensland, and his colleagues have come up with a particularly clever approach, which they are using on the Roper River. They have developed computer software that compares frog calls detected through microphones against a library of recorded calls of every species in the region and those of cane toads. Solar panels, batteries, microphones and data-loggers have been set up on poles at 'froggy' places along the river (except in the lowest reaches in which cane toads



**Above left:** (left to right) Gordon Grigg and Les Fletcher from The University of Queensland, and Andrew Taylor from The University of New South Wales with the frog call monitoring equipment behind Nourlangie Rock in Kakadu National Park.

Photo – Marcos Coutinho

**Above:** Wotjulum frog (*Litoria wotjulumensis*).

**Right:** Green tree frog (*Litoria caerulea*).

Photos – Greg Harold

have already arrived) to record the identity and abundance of all frogs calling between eight o'clock and midnight each night. With this equipment, they can determine exactly when cane toads arrive, and also measure changes in the abundance of each frog species before and after cane toads get to each of their monitoring sites.

So what is in store for the Kimberley wildlife? We can be sure that cane toads will arrive, probably in the next two to three years. As no-one has been able to stop them in 70 years of dispersal from the canefields of coastal Queensland, it seems there is little we can do about it. We can't be sure how fast they will move through the landscape, because much of the Kimberley is rugged and harsh. Nor can we be sure how severely they will affect our native wildlife. There is good reason to expect that many species will be severely affected, but history elsewhere suggests that most, if not all, will be spared extinction. Finally, scientists are



still looking for biological control mechanisms for this pest. We must hope that they are successful and that our wildlife will ultimately recover.

Tony Start is a Principal Research Scientist and is based at the Department of Conservation and Land Management's Wildlife Research Centre, although he has lived and worked in the Pilbara and the Kimberley. He can be contacted on (08) 9405 5146 or by email (tonys@calm.wa.gov.au).

Chris Done is the department's Kimberley Regional Manager. He has been involved in managing the region's conservation estate for more than 20 years. Chris can be contacted on (08) 9168 4200 or by email (chrisd@calm.wa.gov.au).



Winner of the 1998 Alex Harris Medal for excellence in science and environment reporting.

# LANDSCOPE



VOLUME EIGHTEEN, NUMBER 3, AUTUMN 2003



*Cane toads are poisonous, prolific breeders and are getting closer to the WA border. Hop to page 10.*

*Once thought to be extinct, Gilbert's potoroo has overcome many obstacles. What is being done to improve its chances of survival? See page 28.*



*The tuart once typified the coastal strip north and south of Perth. Why should we cherish this majestic tree? See page 16.*



*Discover some of the prehistoric megafauna that once roamed the State in 'Walking with WA giants' on page 23.*



*Lichens decorate Lake Muir, near Manjimup, with varying colours and shapes. Turn to page 43 to learn more about these fascinating life forms.*

## FEATURES

**POISON IN PARADISE: CANE TOADS HOP WEST**  
TONY START AND CHRIS DONE .....10

**CHERISH THE TUARTS**  
ROBERT POWELL AND BRONWEN KEIGHERY.....16

**WALKING WITH WA GIANTS**  
JOHN LONG.....23

**GILBERT'S POTOROO—EIGHT YEARS ON**  
TONY FRIEND .....28

**BOTANIC GUARDIAN**  
NEVILLE MARCHANT .....36

**LICHENS—THE POOR LITTLE PEASANTS OF LAKE MUIR NATURE RESERVE**  
RAY CRANFIELD AND RICHARD ROBINSON .....43

**IN SEARCH OF THE WESTERN FLAT**  
ANDREW WILLIAMS AND MATTHEW WILLIAMS.....48

## REGULARS

**BUSH TELEGRAPH**.....4

**ENDANGERED**  
WESTERN GROUND PARROT .....35

**URBAN ANTICS**  
A SAUCERFUL OF SECRETS.....54

**Executive editor:** Ron Kawalilak.  
**Editors:** David Gough, Carolyn Thomson-Dans.  
**Bush Telegraph editor:** Verna Costello.  
**Story editor:** Rhianna Mooney.  
**Scientific/technical advice:** Keith Morris, Kevin Kenneally, Paul Jones, Alan Danks.  
**Design and production:** Tiffany Aberin, Maria Duthie, Gooitzen van der Meer.  
**Illustration:** Gooitzen van der Meer.  
**Cartography:** Promaco Geodraft.  
**Marketing:** Estelle de San Miguel ☎ (08) 9334 0296 Fax: (08) 9334 0498.  
**Subscription enquiries:** ☎ (08) 9334 0481 or (08) 9334 0437.

Colour Separation by Colourbox Digital.  
 Printed in Western Australia by Lamb Print.  
 © ISSN 0815-4465. All material copyright. No part of the contents of the publication may be reproduced without the consent of the publishers.  
 Please do not send unsolicited material to LANDSCOPE, but feel free to telephone the editors.  
 Visit NatureBase at [www.naturebase.net](http://www.naturebase.net)  
 Published by the Department of Conservation and Land Management, Dick Perry Avenue, Kensington, Western Australia.

## COVER

*Royal hakea rises above the surrounding heath, straight and column-like. When sunlit from above or below, its unusual large variegated leaves appear to glow like lanterns, so the shrub is also known as the Chinese lantern bush. Among the birds that obtain nectar from its flowers (hidden at the base of the leaves) is the western spinebill.*

*Royal hakea grows almost exclusively in Fitzgerald River National Park, an area that was reserved on the recommendation of then Government Botanist Charles Gardner (see 'Botanic Guardian' on page 36).*

*Cover illustration by Philippa Nikulinsky*

