A complete guide to the 33 species of frog found in the World Heritage rainforest of the Wet Tropics region of north-east Queensland. This field guide includes an easy to use key for identification and an up-to-date account for each species. All species are illustrated with at least two photos. A great companion for anyone wishing to know what that frog is and what it does.

Dr Conrad Hoskin (Australian National University) and Dr Jean-Marc Hero (Griffith University, Gold Coast) are both scientists who have conducted extensive research on Wet Tropics frogs.

Proceeds from the sale of this book go to frog research.

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Rainforest Frogs of the Wet Tropics, north-east Australia Conrad Hoskin & Jean-Marc Hero

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FRONT COVER: White-lipped Treefrog (*Litoria infrafrenata*) - Photo: Steve Williams.

ABOVE: Northern Orange-eyed Treefrog (*Litoria xanthomera*) - Photo: Mike Trenerry.

Map of the Wet Tropics, showing major areas of rainforest, rivers, the boundary of the Wet Tropics Bioregion, and localities referred to in the text.

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Litoria rheocola Steve Richards

Nyctimystes dayi Steve Richards

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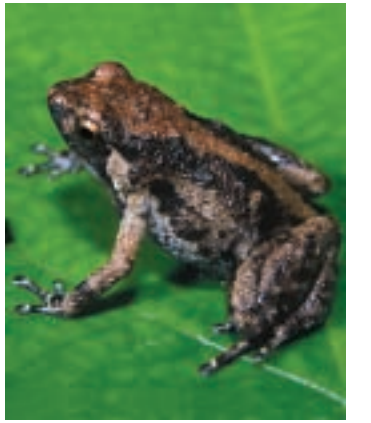


Cophixalus infacetus Ant Backer

Cophixalus saxatilis Mike Trenerry

Rana daemeli Megan Higgie

Introduction

This field guide summarises current knowledge on the rainforest frogs of the Wet Tropics region of north eastern Queensland. The Wet Tropics is a narrow, reasonably continuous band of rainforest running 450 km north to south between Cooktown and Townsville and extending up to 85 km inland from the coast.

The rainforest of the Wet Tropics is of outstanding biological interest and harbours a particularly diverse frog fauna. This book covers all 33 frog species restricted to, or commonly found in, rainforest habitat in the Wet Tropics. This area of rainforest has long been isolated from rainforest to the north and south by dry barriers and, as a result, 27 of the species covered in this book are found only in (i.e. are endemic to) the Wet Tropics. Rainforest habitat in the Wet Tropics ranges from the steamy lowlands to the cool, misty mountaintops of Queensland's highest mountains, and to the peripheral fragments growing amongst boulder fields. Several of the rainforest species included in this book can also be found in wet sclerophyll forest and other moist habitat types (e.g. swamps, gardens) in the vicinity of rainforest.

Many stream-dwelling frogs underwent alarming declines in the Wet Tropics during the late 1980's and early 1990's. This is part of an ongoing worldwide phenomenon of frog declines, often in apparently pristine environments. The observed declines in stream-dwelling frogs of the Wet Tropics include: the complete disappearance of *Taudactylus acutirostris* and *L. nyakalensis*; a dramatic decline of *Taudactylus rheophilus* and *Litoria lorica* to critically low levels; and the general disappearance of *Litoria nannotis, L. rheocola* and *Nyctimystes dayi* from altitudes over 500 m. It is increasingly apparent that 'chytrid' fungus disease has played a major role in these declines and this remains an active area of research.

Over 50% of the rainforest frogs of the Wet Tropics belong to the family Microhylidae. Although the microhylid frogs were not affected by the sudden declines described above, there is increasing concern that they will be heavily impacted by global climate change. Many of the *Cophixalus* species have tiny distributions on one or a few mountaintops. These mountaintops are cool, moist 'islands' surrounded by the hot lowlands. The warmer, drier conditions forecast with global climate change are predicted to lead to rapid reduction in the area of these upland 'islands' on which *Cophixalus* depend. In recognition of these predicted declines within currently small and fragmented distributions, *Cophixalus concinnus* has recently been listed as 'Critically Endangered', *C. mcdonaldi*, *C. monticola* and *C. neglectus* as 'Endangered', and *C. aenigma*, *C. hosmeri* and *C. saxatilis* as 'Vulnerable'.

This book aims to facilitate identification through a key and individual species accounts. We hope this book will help in the rediscovery of populations of the 'missing' frog species as well as in monitoring future declines. The back pages give details on what notes and photos to take and who to contact if you believe you have encountered one of the Critically Endangered or 'missing' frog species, or have found a population of any of the other species beyond its known range.

Rainforest stream (Thornton Peak). Conrad Hoskin

The frog families present in the Wet Tropics

Hylidae (Treefrogs)

Hylid frogs are found across much of the world but reach their greatest diversity in Central and South America, Australia and New Guinea. Members of this diverse family are found in all habitats throughout Australia. The family includes arboreal, ground dwelling, and burrowing species. Two genera are present in the rainforests of the Wet Tropics, *Litoria* (11 species) and *Nyctimystes* (1 species). Most of the Wet Tropics species are arboreal. The species all breed in streams or isolated pools and have an aquatic tadpole stage. The tadpoles of several stream-dwelling species (*Nyctimystes dayi*, *Litoria nannotis*, *L. rheocola*, *L. nyakalensis*, and probably *L. lorica*) have their mouthparts modified into a large suctorial disc which allows them to cling to, and forage on, rocks in the rushing water around cascades. These species are known as the 'torrent frogs' and all have undergone dramatic population declines over the last two decades.

Tadpole of *Litoria rheocola*, showing suctorial mouth disc. J-M Hero

Myobatrachidae (Southern Frogs)

Myobatrachid frogs are restricted to Australia and New Guinea. They are the most diverse frog family in Australia and occupy all habitats across the continent. Most species are ground dwellers. While several genera and a diverse array of species occupy the drier habitat types in the Wet Tropics, only five species, belonging to two genera (*Mixophyes* and *Taudactylus*), occur in the rainforest. The three *Mixophyes* species are large ground dwelling species that breed in streams, producing the very large, dark tadpoles commonly seen in rainforest stream pools. The loud 'wark' or 'worg' call of these species is a common rainforest sound at night. The two *Taudactylus* species are small, cryptic frogs found along small streams and associated seepage areas. The *Taudactylus* have undergone dramatic population declines over the last two decades.

Mixophyes coggeri eggs laid on rock overhanging stream. Conrad Hoskin

Microhylidae (Narrow-mouthed Frogs)

A worldwide (primarily tropical) family of frogs, which only occur in Australia in northern Queensland and on the northern tip of the Northern Territory. There is high diversity in the Wet Tropics region: 14 species (11 *Cophixalus* and 3 *Austrochaperina*). All 14 species are endemic to the Wet Tropics region and are found in rainforest or neighbouring wet sclerophyll forest or boulder fields. Microhylid frogs account for over 50% of the frog diversity in the Wet Tropics rainforest. Most species are restricted to one or a few neighbouring mountaintops and only a few species have broad geographical or altitudinal distributions. Most sites have just one species of *Cophixalus* and *Austrochaperina*; however, a few areas have several microhylid species (e.g. six on the Carbine Tableland and five on the Mt Bellenden Ker Range).

All the Wet Tropics microhylid frogs are small to very small in size and include Australia's smallest frog species – adults of several species can be just 11 mm!

All species lead cryptic lifestyles amongst leaf-litter, logs, rocks and low vegetation. Generally, microhylid frogs are only located when males call in the summer wet season (October-March) in response to rain. All are terrestrial breeders with direct development. Large (3-5 mm) unpigmented eggs (joined in a string by a strong mucilaginous cord) are laid in a sheltered place on land (e.g. amongst leaf-litter, logs, rocks or palm axils). There is no free-swimming tadpole stage and fully developed froglets emerge from the eggs. Egg clutches are almost always attended (and often straddled) by an adult male, who may attend up to three clutches at one time. The reason for this is unclear but the adult may be protecting the eggs from invertebrate predators, desiccation and/or fungal attack. The froglets (approx. 4 mm) appear to have little interaction with the adult frog and leave the nest area shortly after hatching.

Terrestrial egg clutch typical of Australian microhylid frogs (*Cophixalus ornatus*). Conrad Hoskin

Ranidae (True Frogs)

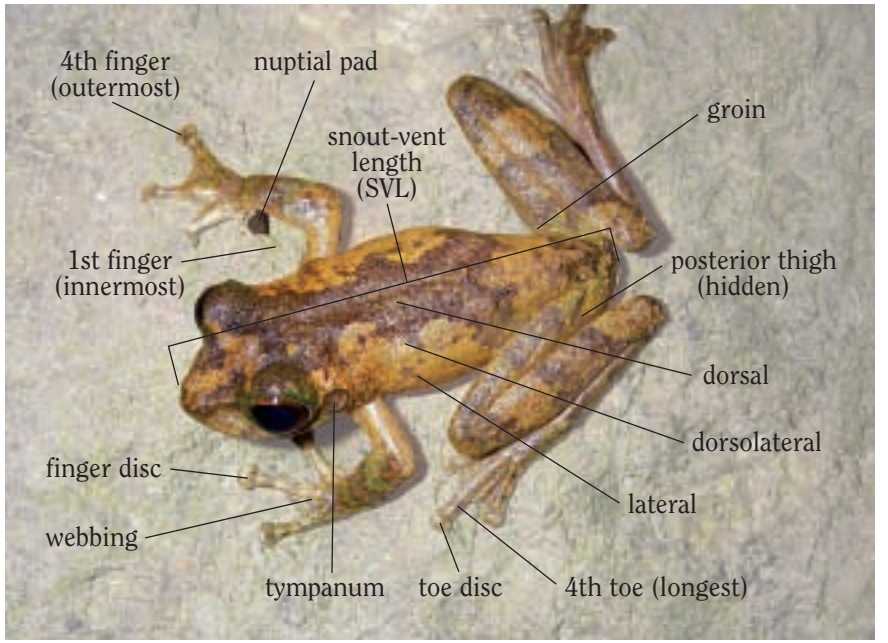
A worldwide family with just one species in Australia, the Wood Frog *Rana daemeli*. This species is found in lowland habitats in northern Queensland and north-east Northern Territory, and also in New Guinea. It is probable that this species colonised Australia from the north during a period of land connection across the Torres Strait.

Bufonidae (Toads)

A worldwide family represented in Australia by just one introduced species, the Cane Toad *Bufo marinus*. A native of Central and South America, the cane toad was first introduced into Australia in 1935 around Cairns, Gordonvale and Innisfail. The Cane Toad rapidly established itself and is now abundant in all habitats in eastern and northern Queensland, and is still spreading across northern Australia and northern New South Wales.

The key and species accounts

The key and species accounts refer primarily to adult frogs, particularly calling males, which are the most frequently encountered frogs. Males are the easiest to identify because even species which look very similar (e.g. microhylid frogs) usually have obviously different calls. Some sections of the key require callipers or a ruler, and magnification using a hand-lens, microscope, or digital camera. Some species are included twice in the key to allow for difficulty in scoring characters or determining the appropriate size (SVL) category. The microhylid frog section of the key is extracted from Hoskin (2008) with permission from the Queensland Museum. The species accounts are summarised from published literature, supplemented with our observations. Particularly useful sources for identification are: Barker *et al*. 1995; Cogger 2000; Cunningham 2002; Hoskin 2004, 2007, 2008; Mahony *et al*. 2006; McDonald 2000; Zweifel 1985. A list of references pertaining to Wet Tropics frogs is included at the back. The 'Status' of each species is the listing it is has under the international IUCN 2001 criteria (following the Global Amphibian Assessment 2004), ranging from currently secure categories (Least Concern, Near Threatened) to those threatened with extinction (Vulnerable, Endangered, Critically Endangered). 'Distribution' covers the known range of the species. 'Habitat and Habits' outlines where the species will most likely be found and their basic behaviour. 'Call' is a verbal description of the call. Calls for most species can be heard on the CD 'Australian Frog Calls: Tropical North-east' (Stewart 1998). The breeding biology of each species is described, and includes details for identifying tadpoles where available. Technical terms used in the text are defined in a glossary at the back.



Litoria serrata Steve Williams

KEY TO THE RAINFOREST FROGS OF THE WET TROPICS

1 (a) Toes with well developed webbing: *Litoria*, *Nyctimystes*, *Mixophyes*, *Rana*, *Bufo* **-- 2**

(b) Toes not webbed: *Taudactylus*, *Cophixalus*, *Austrochaperina* **-- 17**

2 (a) Fingers and toes without distinct disc at tip: *Mixophyes*, *Rana*, *Bufo* **-- 3**

(b) Fingers and toes with distinct disc at tip: *Litoria*, *Nyctimystes* **-- 7**

3 (a) Large parotoid (shoulder) glands; leathery, 'warty' skin; widespread. SVL 75-250 mm **-- *Bufo marinus***

(b) No parotoid glands; skin smooth, granular or with small lumps: *Rana*, *Mixophyes* **-- 4**

4 (a) Distinct dorsolateral fold; SVL 43-80 mm **-- *Rana daemeli***

(b) No dorsolateral fold **-- 5**

5 (a) Posterior of thigh uniformly dark, with numerous (9-35), small, round, pale spots uniformly spread along thigh; Carbine and Windsor Tablelands; SVL 59-78 mm **-- *Mixophyes carbinensis***

(b) Posterior of thigh similar colour to upper thigh, with few (0-13), generally large, pale spots or blotches, concentrated toward the knee **-- 6**

6 (a) Mid-dorsal pattern generally of irregular blotches; males large (> 80 mm); head broad (HW/SVL > 0.45); SVL 81-104 mm **-- *Mixophyes coggeri***

(b) Mid-dorsal pattern generally a continuous band, males smaller (< 80 mm); head narrower (HW/SVL < 0.45); SVL 57-92 mm **-- *Mixophyes schevilli***

7 (a) Dorsum evenly green **-- 8**

(b) Dorsum not evenly green **-- 9**

8 (a) Distinct white line along lower jaw; iris brownish orange; posterior of thigh green; large size, SVL 65-140 mm **-- *Litoria infrafrenata***

(b) No distinct white line along lower jaw; iris bright orange or red; posterior of thigh orange; medium size, SVL 45-65 mm **-- *Litoria xanthomera***

9 (a) Posterior of thigh black with cream or yellow spots or blotches; SVL 35-70 mm **-- *Litoria jungguy / Litoria wilcoxii***

(b) Posterior of thigh not black with cream or yellow spots or blotches **-- 10**

10 (a) Inner and outer thigh orange with one or more black spots; SVL 24-36 mm **-- *Litoria revelata***

(b) Thigh not orange with black spots **-- 11**

11 (a) Distinct serrated ridge along the outer edge of the arm and the leg; green tinge to upper iris **-- 12**

(b) No distinct serrated ridge along the arm and leg; no green tinge to upper iris **-- 13**

12 (a) Male SVL generally > 42 mm; moderate build; call a soft, slow-to medium-paced 'toc'-ing; widespread across Wet Tropics; SVL 37-80 mm **-- *Litoria serrata* (*L. genimaculata*)**

(b) Male SVL generally < 42 mm; slender build; call a soft, excited, fast-paced 'toc'-ing; restricted to Kuranda region; SVL 35-69 mm **-- *Litoria myola***

13 (a) Pupil vertical; iris very dark brown, appears black; vein-like network of golden lines on the lower eyelid; nuptial pad smooth and light brown; SVL 30-60 mm **-- *Nyctimystes dayi***

(b) Pupil horizontal; iris brown or orange, does not appear black; no vein-like network of lines on the lower eyelid; nuptial pad rough and dark **-- 14**

14 (a) Prominent prepollex (lump at base of thumb); dark accessory spines on chest in male; tympanum indistinct **-- 15**

(b) No prominent prepollex; no accessory spines on chest in male; tympanum distinct **-- 16**

15 (a) Adult size small, SVL 30-42 mm; only known from elevations above 600 m on Thornton Peak and the Carbine Tableland **-- *Litoria lorica***

(b) Adult size moderate, SVL 40-65 mm; widespread at low and mid elevations (formerly also high elevations) throughout the Wet Tropics **-- *Litoria nannotis***

16 (a) Forearms slender; nuptial pads small, with fine spines; call a fast creak 'reeeek' with individual pulses hard to distinguish; SVL 27-38 mm **-- *Litoria rheocola***

Forearm of *L. nyakalensis* (left) and *L. rheocola* (right)

(b) Forearms robust; nuptial pads large, with coarse spines; call a slow creak with distinguishable pulses; SVL 30-47 mm **-- *Litoria nyakalensis***

17 (a) Faint to conspicuous cross-bars on legs; toes very narrowly fringed, fringe width less than half width of toe: *Taudactylus* **-- 18**

(b) Legs not barred; toes not fringed: *Cophixalus*, *Austrochaperina* **-- 19**

18 (a) Snout blunt; interorbital bar usually present; pale glandular patch from the angle of the jaws to the base of the forearm; nocturnal; SVL 24-31 mm **-- *Taudactylus rheophilus***

(b) Snout extremely sharp; distinct pale ridge running along the side of the body from tip of snout to groin, brown above and dark below; diurnal; SVL 20-30 mm **-- *Taudactylus acutirostris***

19 (a) Small to medium body size (SVL 18-47 mm) **-- 20**

(b) Very small body size (SVL 12-18 mm) **-- 31**

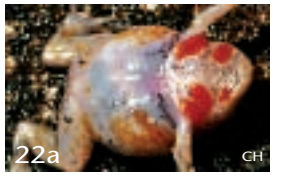
20 (a) Finger discs obviously expanded from finger width (although disc on first finger very small) **-- 21**

(b) Finger discs not obviously expanded **-- 27**

21 (a) Third finger disc obviously wider than disc of fourth toe, and more truncate than rounded **-- 22**

(b) Third finger disc about the same width as, or narrower than, disc of fourth toe, and more rounded than truncate **-- 24**

22 (a) Ventral pattern (particularly throat and chest) of red/orange blotches and black stippled areas on a white background; call a short creak; > 1100 m Thornton Peak **-- *Cophixalus concinnus***



(b) No obvious red and dark blotching on ventral surfaces; rather, evenly pale, yellow, orange or grey, or finely spotted or blotched with grey or brown **-- 23**

23 (a) SVL 18-28 mm; dorsal pattern of dark and cream markings on a pale, grey or brown background; call a short 'beep'; widespread in southern and central Wet Tropics, between Paluma and Carbine Tableland **-- *Cophixalus ornatus***

(b) SVL 29-47 mm; female dorsum yellow, male mottled grey or brown; call a slow tapping; boulder fields of Black Trevethan Range **-- *Cophixalus saxatilis***

24 (a) Found south of Cairns **-- 25**

(b) Found north of Cairns **-- 26**

25 (a) Prominent black dorsolateral dash above forelimb; fingers long; call a short creak; > 900 m Mt Elliot **-- *Cophixalus mcdonaldi***

(b) Dorsolateral surface may be blotched or smudged brown, but no prominent black dorsolateral dash above forelimb; fingers short; call a short buzz or squelch; > 1000 m Mt Bartle Frere and Mt Bellenden Ker **-- *Cophixalus neglectus***

26 (a) Call a short creak; generally calls from elevated position; > 1100 m Carbine Tableland **-- *Cophixalus monticola***

(b) Call a slow or medium-paced tapping; generally calls from ground or close to it; > 700 m Carbine and Thornton Uplands and Mt Finnigan **-- *Cophixalus aenigma***

27 (a) First finger about half length of second **-- 28**

(b) First finger short, obviously less than half length of second **-- 30**

28 (a) A well-defined pale line extends from nostril over eye; reddish flecked iris; in preserved specimens, reasonably sharp demarcation from darker throat and chest to lighter abdomen; call a rapid series of high-pitched notes; widespread in the Wet Tropics **-- *Austrochaperina pluvialis***

(b) No (or poorly defined) pale line extending from nostril over eye; golden flecked iris; in preserved specimens, gradual transition from darker throat and chest to lighter abdomen; call a series of brief, high-pitched whistles or whistle-like couplets **-- 29**

29 (a) Call a series of brief, high-pitched whistles/chirps uttered as couplets (in pairs); southern half of Wet Tropics north to northern Atherton Tableland, Lamb Range and Malbon Thompson Range **-- *Austrochaperina robusta***

(b) Call a series of brief, high-pitched whistles/chirps; northern half of Wet Tropics south to Lamb Range and northern Atherton Tableland **-- *Austrochaperina fryi***

30 (a) Prominent black dorsolateral dash above forelimb; fingers long; call a short creak; > 900 m Mt Elliot **-- *Cophixalus mcdonaldi***

(b) Dorsolateral surface may be blotched or smudged brown, but no prominent black dorsolateral dash above forelimb; fingers short; call a short buzz or squelch; > 1000 m Mt Bartle Frere and Mt Bellenden Ker **-- *Cophixalus neglectus***

31 (a) Found south of Cairns **-- 32**

(b) Found north of Cairns **-- 33**

32 (a) Large, slightly truncate finger discs; SVL > 17 mm; call a short 'beep', this small 'form' found on Hinchinbrook Is. and lowlands (< 500 m) of Mt Bartle Frere, Palmerston Valley, Tully Valley, Mission Beach **-- *Cophixalus ornatus***

(b) Distinct but small, rounded finger discs; SVL < 17 mm; a creaking call of finely pulsed clicks; between Cairns and Herbert River (Ingham) **-- *Cophixalus infacetus***

33 (a) First finger well formed, about half length of second; male SVL > 14 mm **-- 34**

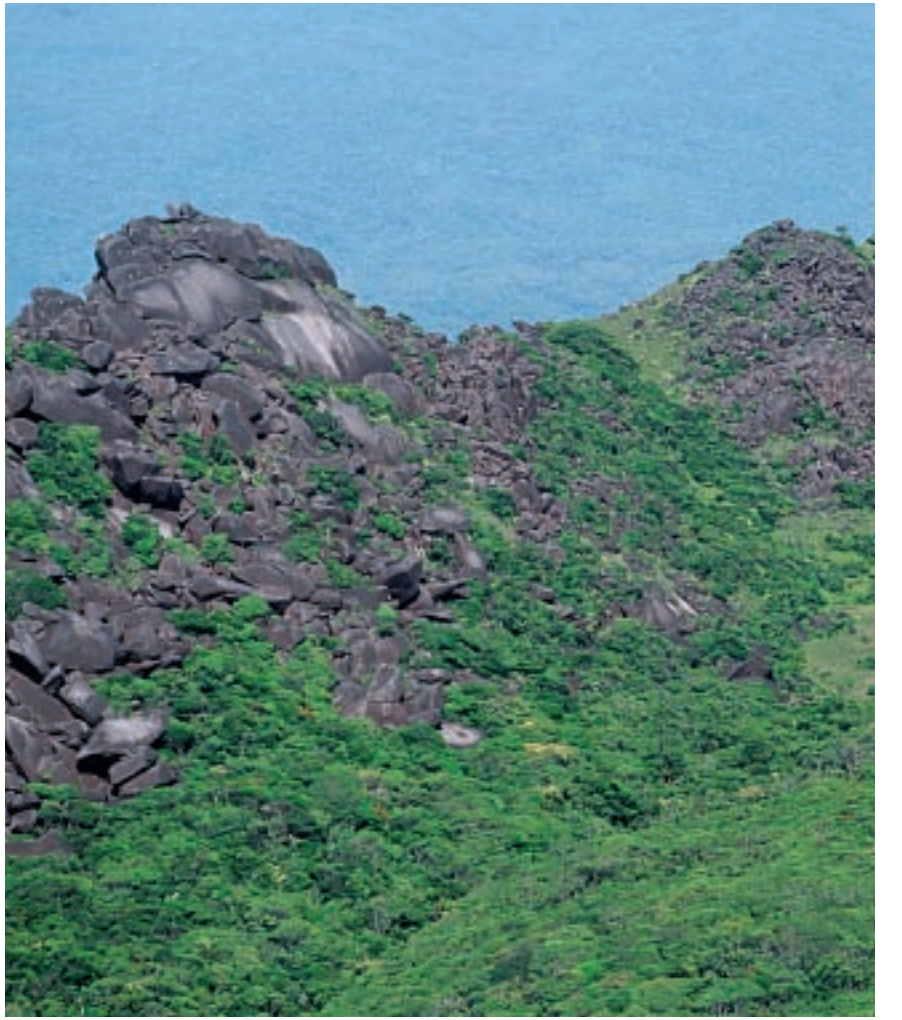
(b) First finger a short 'nubbin', about one-third length of second; male SVL < 14 m **-- 35**

34 (a) SVL > 17 mm; call a slow or medium-paced tapping; > 700 m Carbine and Thornton Uplands and Mt Finnigan **-- *Cophixalus aenigma***

(b) SVL < 17 mm; call a medium-paced tapping; Big Tableland, Mt Hartley and surrounding lower altitudes (including lower slopes of Mt Finnigan) **-- *Cophixalus exiguus***

35 (a) A broken or continuous series of prominent black dashes/blotches extending from behind the eye and down flank; call a short buzz 'bzzzip'; Windsor Tableland and scattered sites (primarily lowland) in northern Wet Tropics (e.g. Thornton Peak area, Shiptons Flat, Mossman Gorge) **-- *Cophixalus bombiens***

(b) Flank mottled or blotched but rarely prominently marked with black as above; call usually a fast-paced tapping/clicking (but occasionally a medium paced tapping or a buzz); > 800 m Carbine Tableland **-- *Cophixalus hosmeri***



Upland rainforest and boulder field (Thornton Peak). Conrad Hoskin

White-lipped Treefrog

Litoria infrafrenata

Status & Distribution: Least Concern. Found throughout coastal lowlands and foothills of the Wet Tropics. Restricted to lowlands, generally below 400 m altitude. Also distributed coastally on Cape York Peninsula, and widespread on New Guinea and associated islands.

Description: Large size; adult SVL 65-140 mm. Dorsal surface finely granular/smooth; uniformly bright green. Ventral surface and skin of sides coarsely granular. Ventral surfaces pale, merging with green on sides. Prominent white stripe along edge of lower jaw, extending below tympanum. Posterior surfaces of thighs green or yellowish. Thin white stripe along the trailing edges of the forearms and lower legs (including the outer fingers and toes), which may be salmon pink in breeding males. Large finger and toe discs. Fingers half webbed, toes almost fully webbed. Iris brownish orange. Tympanum distinct, brown with green centre.

Call: A loud, double noted 'che-deck', repeated continuously or irregularly.

Habitat & Habits: Coastal lowlands, particularly paperbark swamps, also open forest and rainforest. Generally rare in rainforest but reasonably common in rainforest in some areas, e.g. Kuranda, Cairns and Cape Tribulation. In rainforest, primarily encountered perched in vegetation along streams and in swampy areas. Nocturnal.

Breeding & Larvae: Breeds in permanent or temporary pools. Eggs brown, laid in a clump on water surface. Tadpoles dark brown with a pale strip down each side extending along the head, body and tail. Eyes dorsolateral. Labial Tooth Row Formula: 2 (2)/3. Total tadpole length up to 54 mm.

Notes: An endearing frog; very large, green and confiding. Frequently seen in disturbed areas and around gardens and houses. Occasionally parasitised by *Batrachomyia* flies, with the developing larva visible as a large lump under the skin on the dorsal surface. The parasite feeds on the frog's blood for a number of weeks and then emerges and drops to the ground to pupate. The parasite does not kill the frog.

Steve Williams

Michael Cermak

Stony-creek Frogs

Litoria jungguy & *Litoria wilcoxii*
(both formerly included in *Litoria lesueuri*)

Status & Distribution: Recently described and conservation status not assessed - Least Concern appears suitable for both species. *Litoria jungguy* (Northern Stony-creek Frog) occurs across the Wet Tropics and also at Eungella in mid-east Queensland. *Litoria wilcoxii* (Eastern Stony-creek Frog) is known from the central and southern Wet Tropics and south along the coast to mid New South Wales. Altitudinal range in the Wet Tropics: sea-level to at least 1200 m.

Description: Medium to large size; adult SVL: *L. jungguy* 39-71 mm, *L. wilcoxii* 35-69 mm. Females considerably larger than males. Dorsal surface smooth; pale fawn to dark brown (immaculate or with irregular blotching), males in breeding condition often bright yellow. A black head-stripe begins at the snout, passes through the eye and narrows to pass over the tympanum to the shoulder where it breaks into a series of spots on the flank. No dorsolateral skin fold. Ventral surface granular and white. Throat smooth and white in females, and mottled dark brown around the edges in breeding males. Groin yellow and blotched with black. Posterior of thigh black with small, round or irregular shaped, cream or yellow spots. Fingers without webbing; toes one-third webbed. Iris silver. Tympanum distinct.

Call: A long, soft purring trill/growl speeding up, rising and wavering towards the end 'crewww crewwwk crewwk crewk' repeated for two or three seconds. Heard at night and sometimes by day calling from stream rocks or from sand bars near the water's edge. Whether the call of the two species differs has not been assessed.

Habitat & Habits: Rainforest and sclerophyll forests. Terrestrial; commonly associated with rocky and sandy streams. Sometimes found on vegetation overhanging streams. Males generally encountered on streams, whereas females often found long distances from water. Nocturnal.

Breeding & Larvae: Stream breeder. Males call between August and May. Several hundred pigmented eggs laid on the edge of moving water, in stream-side pools, in stream backwaters, or in sandy depressions on sand bars. Eggs laid as a solid gelatinous clump adhering to gravel, rocks, vegetation or bottom sediment. Tadpoles have a light brown body. Tail musculature pale, covered in reticulated layer of stipples and venation. Fins yellowish with medium density of stippling on dorsal fin, sparse stippling on ventral fin. Tail tip pointed. Branchial region clearly visible. Intestinal coils visible mid ventrally through a dark pigment layer, coils less visible or not visible laterally. Eyes dorsolateral. Spiracle sinistral. Vent tube dextral. Oral disc completely surrounded by many small marginal and submarginal papillae. Labial Tooth Row Formula: 2/3. Total length of tadpole up to 45 mm.

Notes: Both species were recently described from *L. lesueuri* based on genetic data (Donnellan & Mahony 2004). *Litoria jungguy* and *L. wilcoxii* are morphologically very similar and cannot be reliably distinguished in the field. It has been suggested that *L. jungguy* generally inhabits rainforest, while *L. wilcoxii* generally occurs in sclerophyll forests; however, this is not always the case and habitat preferences remain unclear.

Male *Litoria jungguy* with three *Batrachomyia* fly larvae under skin on shoulders. Conrad Hoskin

Female. Conrad Hoskin

Armoured Mistfrog

Litoria lorica

Status & Distribution: Critically Endangered. Recently rediscovered on the Carbine Tableland. Previously not seen since 1991. Historically known from several sites in the Thornton Peak area (Alexandra Ck, Hilda Ck, Roaring Meg Ck) and from a tributary of the Mossman River. Former altitudinal range: 600-1000m. Endemic to the Wet Tropics.

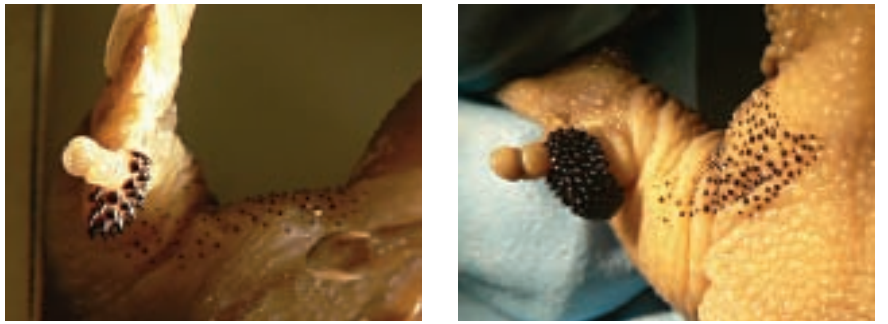
Description: Small to medium size; adult SVL 30-42 mm (average male 33 mm, average female 37 mm). Dorsal surface smooth with scattered small tubercles; pale brown, sandy or grey with darker blotches or mottling, or uniform grey-brown. Ventral surface granular on abdomen and back of thighs, throat smooth. Ventral surface white. Dorsolateral skin fold absent. Forearms robust. Finger and toe discs well developed. Fingers with only basal webbing; toes almost fully webbed. Small inner metatarsal tubercle; no outer metatarsal tubercle. Males have large prepollex with black spinulated nuptial pad on the base of thumbs and accessory black spinules on upper chest and chin. Females have prepollex but dark spinules much less distinct. Snout is truncate in shape when viewed from above or from the side. Vocal sac absent. Tympanum indistinct.

Call: Unknown.

Habitat & Habits: Similar to *L. nannotis*, with which it co-occurs. Adults observed around cascades and waterfalls, in splash-zone at night and rock cracks in the day. Fast flowing streams in rainforest or nearby open forest. Nocturnal.

Breeding & Larvae: Stream breeder. Eggs unpigmented. Tadpole unknown but probably similar to that of *L. nannotis* in having a large suctorial disc and being adapted to torrents.

Notes: *Litoria lorica* is morphologically similar to *L. nannotis*, but can be distinguished by its noticeably smaller size and more truncate snout shape. *Litoria lorica* was not seen for 16 years, despite searches of historic sites, but was recently rediscovered on the Carbine Tableland (Puschendorf & Hoskin, unpublished). Chytrid fungus disease is considered the major reason for decline.



Nuptial spines and chest spines of male *Litoria lorica* (left) and *Litoria nannotis* (right). Conrad Hoskin

Robert Puschendorf

Litoria lorica (smaller) and *Litoria nannotis* beside cascade. Conrad Hoskin

Kuranda Treefrog

Litoria myola

Status & Distribution: Nominated for Critically Endangered listing due to small distribution and population size, and poorly protected habitat. Restricted to a small area in the vicinity of Kuranda township (near Cairns). Altitudinal range: 300-400 m. Endemic to the Wet Tropics.

Description: Medium size; male SVL 36-44 mm (average 40 mm); female SVL 57-69 mm. Dorsal surface smooth to minutely granular or with scattered small tubercles. Dorsal colour and pattern highly variable; tan or brown with faint or distinct brown, orange or green blotches or mottling; sometimes a darker patch between the eyes. Indistinct skin fold from behind eye over tympanum. Ventral surface coarsely granular; cream or white with a faint to obvious light brown or grey wash on the throat and chin; dark speckling on chin and throat in some males. Male has a slender body and slender hindlimbs. Hindlimbs often with broad, irregular cross bands. Fine mottling along flank, under limbs and in groin and thigh. Prominent pale serrated ridge along outer edge of foot and slight pale serrated ridge on hind edge of forearm; pale pointed tubercles on heel. Large, rounded finger and toe discs. Fingers half webbed; toes nearly fully webbed. Fleshy, black or grey nuptial pad covers base of first finger in males. Oval inner metatarsal tubercle. Pupil edged by a horizontal brown strip; iris cream or grey with distinct green upper crescent. Tympanum distinct.

Call: A short, fast, excited 'toc'-ing call. Like *L. serrata* this species lacks a vocal sac so the call is relatively soft.

Habitat & Habits: Mature and regenerating rainforest along slow-moving permanent and ephemeral streams. Males call at night from elevated (0.3-5 m) positions in vegetation along streams, mostly near riffles. Females rarely encountered, appear to live in mid and upper levels of the forest. Nocturnal.

Breeding & Larvae: Stream breeder. Males call in summer wet season (September-March). Males have dark, fleshy nuptial pads on thumbs and amplexus is axillary. Breeding biology similar to that of *L. serrata*. Clutch of approximately 500 pigmented eggs (each of approx. 2 mm diameter) laid as a cohesive gelatinous clump in flowing water. Tadpole similar to that of *L. serrata*.

Notes: A recently described species (Hoskin 2007) that formed in the hybrid zone between two lineages of *L. serrata*. *Litoria myola* co-occurs with *L. serrata* and is difficult to distinguish from that species. Where they co-occur, *L. myola* is generally smaller than *L. serrata* and has a noticeably shorter, faster and higher pitched call. Like *L. serrata*, sexual dimorphism is pronounced (females much larger than males). Occasionally parasitized by *Batrachomyia* fly larvae.

Conrad Hoskin

Conrad Hoskin

Waterfall Frog

Litoria nannotis

Status & Distribution: Endangered. Found throughout the Wet Tropics. Formerly occurred across a wide altitudinal range (100-1300 m) but largely disappeared from uplands of Wet Tropics during late 1980s and early 1990s. Remains common below 700 m altitude, and occurs patchily up to 1000 m. Not recorded post-decline north of the Bloomfield River. Endemic to the Wet Tropics.

Description: Medium size; adult SVL 40-65 mm (average male 48 mm, average female 51 mm). Dorsal surface smooth with scattered small tubercles; dull brown, slate, yellowish olive or green with dark mottling. No dorsolateral skin fold present. Ventral surface granular. Ventral surface of males cream, throat dusty brown. Ventral surface of females cream, throat and ventral surface of thigh heavily pigmented with brown. Body and limbs robust; male forearm particularly robust. Finger and toe discs large. Fingers with basal webbing; toes nearly fully webbed. Males with large black spinulated nuptial pad on base of thumb and accessory black-tipped spinules on upper chest. Prominent inner metatarsal tubercle; outer metatarsal tubercle small. Snout is bluntly rounded in shape when viewed from above or from the side. Tympanum indistinct.

Call: A repeated 'crawk crawk crawk...'; or a gentle, popping, slow growl-like sound, rarely heard above the sound of rushing water.

Habitat & Habits: Fast flowing rocky streams in rainforest and adjacent sclerophyll forest. Some populations inhabit waterfalls that are a considerable distance from rainforest (e.g. Blencoe Falls, Davies Ck, Spurgeon Falls). Usually found at night on boulders beside or behind cascades and waterfalls. Sometimes found perched on trees or leaf litter near rocky streams. May be seen around cascades in the day. Alert, will jump into waterfall if disturbed. Nocturnal and partly diurnal.

Breeding & Larvae: Stream breeder. Eggs unpigmented, deposited in gelatinous egg mass under rocks in stream. Tadpoles grey/olive green. Tail musculature with scattered irregular dark or light grey flecks and blotches. Fins with slight dark and light grey flecks and blotches; faint venation. Sometimes dark pigmentation outlines posterior of tail fins. Intestine not visible, entirely covered by silver chromatophores. Branchial region partially visible. Silver chromatophores extend medially over branchial region covering half to two-thirds. Oral disc completely surrounded by marginal and submarginal papillae. Submarginal papillae on upper labium anterior to row A-1 in two or more complete, offset rows. Labial Tooth Row Formula: 2/3. Mouth suctorial, adapted for fast flowing water. Found predominantly in fast flowing sections of stream, attached to rocks. Total length of tadpole up to 39 mm

Notes: Remains 'missing' from the uplands following rapid, widespread decline from mid and high altitudes in the late 1980s and early 1990s. Chytrid fungus disease is considered the major reason for decline.

Steve Williams

Conrad Hoskin

Mountain Mistfrog

Litoria nyakalensis

Status & Distribution: Critically Endangered. Has not been located since 1990. Formerly known from sites between Thornton Peak in the north and Cardwell in the south. Former altitudinal range: 380-1020 m. Endemic to the Wet Tropics.

Description: Small to medium size; adult SVL 24-47 mm (average male 35 mm, average female 36 mm). Dorsal surface smooth with scattered small tubercles; olive-brown or grey-brown, with irregular darker markings. Dorsolateral skin fold absent. Ventral surface granular; cream with pink flush on limbs and chest, sometimes flecked with brown. Males have robust forearms. Fingers with slight basal webbing; toes nearly fully webbed. Finger and toe discs large. Inner metatarsal tubercle large; outer metatarsal tubercle minute or absent. Males have large nuptial pad of coarse black keratinous spinules at base of thumb. Tympanum small, reasonably distinct.

Call: A soft, slow creak with distinguishable pulses, rising towards the end, repeated slowly.

Habitat & Habits: Similar to *L. rheocola*. Fast flowing streams in rainforest and wet sclerophyll forest. Usually found near riffles or cascades, perched on rocks or low vegetation in or adjacent to the stream. Nocturnal.

Breeding & Larvae: Stream breeder. Males call from October to March. Eggs large and unpigmented (clutch size approx. 90 eggs), laid under rocks in riffles. Tadpoles light brown. Cream patch between eyes and nares, becoming less distinct in later stages. Tail musculature cream with discrete blotches of dark pigment and diffuse light brown pigment extending onto anterior portion of fins. Fins clear with discrete blotches of dark pigment. Oral disc large, suctorial, completely surrounded by marginal papillae. Marginal papillae on anterior margin larger than on lateral and posterior margin. Submarginal papillae present. Labial Tooth Row Formula: 2/2. Eyes dorsolateral. Spiracle sinistral. Vent tube medial. Total length of tadpole up to 45 mm at stage 38. Torrent adapted, found in fast flowing rainforest streams clinging to rocks in riffles and torrents.

Notes: This species is morphologically similar to *L. rheocola* but males can be distinguished by the following characters: robust (vs. slender) forearms, large (vs. small) nuptial pads with coarse (vs. fine) spines, and slow (vs. fast) creaking call. *Litoria nyakalensis* underwent a rapid decline in the late 1980s and has been 'missing' since 1990, despite searches of historic sites, and may now be extinct. Chytrid fungus disease is considered the major reason for decline.

Martin Cohen

Mike Trenerry

Whirring Treefrog

Litoria revelata

Status & Distribution: Least Concern. Occurs as three disjunct populations: Atherton Tableland and Bellenden Ker Range, north-east Qld; Eungella Plateau, mid-east Qld; and scattered sites in south-east Qld and north-east NSW. Highly localised in the Wet Tropics, primarily recorded from upland sites on the southern Atherton Tableland but also known from the adjacent Bellenden Ker Range.

Description: Small to medium size; adult SVL 16-36 mm. Dorsal surface smooth, except for a transverse row of raised tubercles between eyes. Dorsal surface yellowish (breeding males) or creamy brown to reddish brown. Irregular dark brown vertebral band usually extends from between eyes to vent. Black stripe from snout to eye continuing through tympanum and terminating above arm. Pale stripe along upper lip from snout to jaw. No dorsolateral skin fold. Ventral surface granular; cream, sometimes with brown flecks; throat of breeding male orange or yellow. Groin yellow or orange with one to several black spots; posterior of thigh bright orange with one to several black spots. Hindlimbs long. Fingers webbed basally; toes three-quarters webbed. Well developed finger and toe discs, noticeably wider than digits. Small inner and outer metatarsal tubercles. Snout blunt and rounded. Tympanum distinct, bordered above by skin fold.

Call: A high-pitched whirring, consisting of rapidly uttered notes 'ree-ree-ree-ree...'.

Habitat & Habits: In the Wet Tropics occupies upland rainforest and areas of fragmented rainforest and pasture land. Found on low vegetation in or bordering slow stream pools, isolated streamside pools, and dams. Males call from low vegetation. Females rarely found. Nocturnal.

Breeding & Larvae: Breeds in slow stream pools, isolated streamside pools, dams and swamps. Up to approx. 800 eggs deposited. Tadpoles darkly pigmented, lighter pigmentation around eyes. Dark interorbital patch extending posteriorly over intestine. Distinct broad vertical subdermal lines on dorsal side of each naris. Tail musculature an even shade of grey/brown, chromatophores concentrated dorsally. Dorsal and ventral fin colourless, lightly stippled with grey/brown chromatophores and light venation. Tail pointed. Branchial region visible. Intestinal coils not visible, intestinal mass visible. Spiracle paragyrinid (i.e. located well below the horizontal longitudinal axis but not on the midline so neither sinistral nor medioventral are entirely applicable). Vent tube dextral. Oral disc surrounded by marginal and submarginal pigmented papillae with an anterior gap. Labial Tooth Row Formula: 2 (2)/3 (1). Total length of tadpole up to 43 mm.

Notes: Most commonly found in disturbed areas of pasture and fragmented rainforest on the southern Atherton Tableland.

Jean-Marc Hero

Jean-Marc Hero

Common Mistfrog

Litoria rheocola

Status & Distribution: Endangered. Found through most of the Wet Tropics, from Big Tableland south to Herbert River. Formerly occurred across a wide altitudinal range (0-1200 m) but largely disappeared from uplands of Wet Tropics during the late 1980s and early 1990s. Remains common below 600 m altitude. Endemic to the Wet Tropics.

Description: Small to medium size; adult SVL 27-41 mm (average male 31 mm, average female 35 mm). Dorsal surface smooth or with scattered small tubercles; dull grey, brown or olive, often with irregular dark markings as a broad vertebral zone from between the eyes and along the back. Generally, a pale forehead triangle from between the eyes to the snout. An obscure dark band from the snout to the eye and continuing to some degree behind the eye, over the tympanum and towards the shoulder. Dorsolateral skin fold absent. Ventral surface granular; cream. Forearms slender. Fingers one-third webbed; toes almost fully webbed. Finger and toe discs large. Large, flat inner metatarsal tubercle; no outer metatarsal tubercle. Male nuptial pad small, consisting of small fine dark keratinous spinules at base of thumb. Tympanum small, reasonably distinct.

Call: A fast creak 'reeek', rising towards the end and with individual pulses hard to distinguish. Each call about half a second long; call loud and repeated regularly.

Habitat & Habits: Rocky, fast flowing rainforest streams. Males and females found near riffles and cascades, perched on rocks, logs and streamside vegetation. Nocturnal.

Breeding & Larvae: Stream breeder. Breeds throughout the year. Eggs are large and unpigmented and are laid as a compact gelatinous clump under rocks in fast-flowing water. Tadpoles creamy yellow with bold red mottling, may be inconspicuous in some individuals, otherwise grey/olive. Tail musculature and fins creamy yellow with or without dark flecks/spots. Intestine not visible, entirely covered by silver chromatophores extending medially over branchial region in some specimens. Spiracle sinistral. Vent tube medial. Oral disc suctorial, completely surrounded by marginal papillae. Submarginal papillae present. Labial Tooth Row Formula: 2/3. Total length of tadpole up to 29 mm at stage 25. Torrent adapted, found in fast flowing water currents clinging to rocks and other substrates.

Notes: Remains 'missing' from the uplands following rapid, widespread decline from mid and high altitudes in the late 1980s and early 1990s. Chytrid fungus disease is considered the major reason for decline.

Steve Richards

Steve Richards

Green-eyed Treefrog

Litoria serrata
(formerly included in *Litoria genimaculata*)

Status & Distribution: Least Concern. Widespread across the Wet Tropics. Wide altitudinal range (0-1300 m). Endemic to the Wet Tropics.

Description: Medium to large size; adult SVL, males 37-54 mm (average 46 mm), females 58-80 mm. Dorsal surface smooth to minutely granular or with scattered small tubercles. Dorsal colour and pattern highly variable; tan, grey, brown or orange with irregular brown, orange, green or white mottling and blotching. Often a dark patch between the eyes and a paler forehead triangle. Indistinct skin fold from behind eye over tympanum. Ventral surface coarsely granular; cream-white, throat may be peppered with brown. Hindlimbs often with broad, irregular cross bands, sometimes indistinct. Fine mottling along flank, under limbs and in groin and thigh. Prominent serrated ridge along outer edge of each foot and slight pale serrated ridge on hind edge of forearm; pale pointed tubercles on heel. Large finger and toe discs. Fingers half webbed; toes nearly fully webbed. Oval inner metatarsal tubercle; small outer metatarsal tubercle. Distinct green crescent across upper iris, remainder silvery-grey. Tympanum distinct.

Call: A slow to medium-paced series of 'tocs'. No vocal sac so the call is soft.

Habitat & Habits: Rainforest and neighbouring wet sclerophyll forest. Males found on low vegetation and rocks along streams. Females found on streams and also throughout the forest, sometimes high in canopy. Nocturnal.

Breeding & Larvae: Stream breeder. Breeds in summer wet season (Sept.-March). Eggs small and pigmented, clutch size large. Clutch laid as a gelatinous clump in slowly moving or still water. Tadpole light brown or grey. Tail musculature pigmented with a disrupted line of granules dorsally. Posterior portion of body darker, giving a dark stripe impression across the back of body. Dorsal fin scattered laterally with pigment. Ventral surface pale. Eyes dorsolateral. Spiracle sinistral. Vent tube dextral. Oral disc surrounded by marginal and submarginal papillae with an anterior gap wider than width of jaw. Labial Tooth Row Formula: 2 (2)/3 (1). Total length of tadpole up to 15 mm at stage 40.

Notes: Formerly included in *L. genimaculata* but Wet Tropics populations are *L. serrata*. True *L. genimaculata* are restricted to New Guinea. There are two genetic lineages of *L. serrata* in the Wet Tropics, which are morphologically similar but have slightly different calls. The two lineages overlap and hybridize in the central Wet Tropics. *Litoria myola* was formed by hybrid zone processes in this area of overlap. Adult male *L. serrata* are frequently parasitised by a species of *Batrachomyia* fly. The maggot is visible as a swollen lump beneath the skin (often on the head or shoulder) but appears to have little impact on the frog's health.

Martin Cohen

Steve Williams

Northern Orange-eyed Treefrog *Litoria xanthomera*

Status & Distribution: Least Concern. Found throughout the Wet Tropics. Wide altitudinal range (0-1300 m). Endemic to the Wet Tropics.

Description: Medium size; adult SVL 45-65 mm. Dorsal surface finely granular; uniformly bright green or lime-green. Reasonably distinct skin fold extends from behind eye over tympanum. Ventral surface granular, throat and chest smooth. Ventrolateral surface of body and throat orange or yellow; ventral surface off-white to lemon-yellow or orange. Edge of lower jaw green, yellow or cream. Posterior of thigh bright orange. Inner half of hand white or yellow, lower part of arm green, extending just beyond elbow on to upper arm. Large finger and toe discs. Fingers three-quarters webbed; toes almost fully webbed. Inner metatarsal tubercle prominent; no outer metatarsal tubercle. Iris bright orange with gold ring in centre. Tympanum distinct.

Call: A slow series of growls 'waaark waaark...' increasing in volume and ending in a series of trills 'pirrr pirrr pirrr'.

Habitat & Habits: Rainforest and wet sclerophyll forest. Found along creeks, forest edge, beside temporary pools, and in trees. Nocturnal.

Breeding & Larvae: Generally breeds in small pools (e.g. isolated stream-side pools, road-side ditches, small ponds). Eggs pigmented, laid singly or as floating raft in still water. Tadpoles indistinguishable from those of *Litoria chloris* from eastern Australia. Tadpoles pale brown, with darker interorbital patch and prominent dark intestinal mass visible dorsally; darkly pigmented ring surrounding nares. Tail musculature pale with dense stippling especially concentrated toward dorsal surface and tail end. Fins clear and colourless, with medium density of dark stippling on dorsal fin, sparse on ventral fin. Tail tip pointed. Branchial region clearly visible. Intestinal mass partially visible mid-ventrally through a layer of silver/golden metallic chromatophores (may be absent in preserved specimens). Eyes dorsolateral. Spiracle sinistral. Vent tube dextral. Oral disc surrounded by many small marginal and submarginal papillae, with a small anterior gap. Labial Tooth Row Formula: 2 (2)/3 (1). Total length of tadpole up to 60 mm.

Notes: An endearing frog that is often heard and seen after heavy summer rain. Forms dense, noisy choruses in road-side ditches and other temporary pools.

Male. Steve Williams

Female. Mike Trenerry

Australian Lace-lid

Nyctimystes dayi

Status & Distribution: Endangered. Found throughout the Wet Tropics. Formerly occurred across a wide altitudinal range (0-1200 m) but largely disappeared from uplands of Wet Tropics during the late 1980s and early 1990s. Remains common below 500 m altitude. Not recorded post-decline in Paluma Range. Endemic to the Wet Tropics.

Description: Small to medium size; adult SVL, males 30-42 mm, females 45-60 mm. Male appears slender and delicate with a large head and eyes. Females considerably bigger and more robust. Dorsal surface smooth or finely granular; orange, brown or grey with or without small to large cream or white lichen-like spots and blotches. Dorsal surface of limbs and body often with obscure mottling, sometimes distinct. Indistinct skin fold from behind eye over tympanum. Ventral surface granular; creamy white. Fingers half webbed; toes nearly fully webbed. Finger and toe discs large. Eye large; appears black due to very dark brown iris; vertically elliptical pupil; lower eyelid marked with fine, golden venation. Tympanum indistinct.

Call: A soft growl-like sound 'areeer' that is hard to hear over rushing water; repeated about every 5 seconds.

Habitat & Habits: Fast flowing rocky streams in rainforest, sometimes slow-moving sandy streams. Males found perched on rocks and vegetation along streams. Females rarely encountered and may be found some distance from stream. Nocturnal.

Breeding & Larvae: Stream breeder. Breeds from October to April. Eggs laid in cohesive clump under rocks in rapidly-flowing water. Eggs unpigmented, up to approx. 110 eggs may be laid. Tadpole grey/olive green, light pink in front of eyes. Head broad, blunt, almost circular. Distinct round, almost circular dark patch between eyes. Bold black pigmentation on dorsal side of tail musculature, dark midline on ventral surface. Dark venation entire on dorsal fin, incomplete venation towards posterior of ventral fin. Ventral surface with silver chromatophores covering entire intestine. Intestine not visible. Spiracle sinistral. Vent tube medial. Oral disc large, suctorial, completely surrounded by marginal and submarginal papillae. Submarginal papillae on lower labium posterior to row P-3 large, poorly defined, arranged as longitudinal bumps and ridges. Lower labium overlaps branchial region. Labial Tooth Row Formula: 2/3. Total length of tadpole up to 36 mm at stage 41. Torrent adapted, found on or under rocks in fast flowing sections of the stream.

Notes: Recently reassigned to *Litoria* but we have used *Nyctimystes* because the taxonony of the Australo-Papuan hylids is currently under review. The common name refers to the fine markings on the lower eyelid. The patterned eyelid is not visible when the frog is active at night but covers the eye (and may enhance camouflage) when the frog is resting during the day. *Nyctimystes dayi* remains 'missing' from the uplands following rapid, widespread decline from mid and high altitudes in the late 1980s and early 1990s. Chytrid fungus disease is considered the major reason for decline.

Male. Steve Richards

Pair in amplexus, with male showing 'lace-lid'. Martin Cohen

Carbine Barred-Frog

Mixophyes carbinensis
(formerly included in *Mixophyes schevilli*)

Status & Distribution: Recently described and conservation status requires assessment. Localised, only recorded from Carbine and Windsor Tablelands. Recorded from upland sites but details of altitudinal range not known. Endemic to the Wet Tropics.

Description: Large size; adult SVL 59-78 mm. Dorsal surface smooth; fawn to copper brown. Back pattern a dark interorbital T or Y continuing backwards as a continuous broad mid-dorsal stripe, and paler irregular blotches over remainder. Dark head stripe bordered by pale margin, broken on lower margin between nostril and eye. Dorsolateral skin fold absent. Ventral surface of body and thighs smooth; cream with diffuse grey mottling around chin, jaw corners and beneath shoulders. Limbs with narrow dark cross-bands merging on side of legs to form a dark horizontal band. Posterior surface of thigh uniformly very dark, with many (9-35), small (1-2 mm), rounded, pale spots evenly spread along thigh. Fingers not webbed; toes nearly fully webbed. No finger or toe discs. Inner metatarsal tubercle prominent, half as long as first toe, shovel shaped. Iris dark brown. Tympanum distinct.

Call: Not described, but appears to be similar to *M. schevilli*, a deep 'wark' or 'wark wark' repeated at regular intervals.

Habitat & Habits: Rainforest. Terrestrial; either found active on the surface or sheltering under leaf litter. Males found calling along streams; otherwise encountered foraging in the forest. Nocturnal.

Breeding & Larvae: Stream breeder. Egg laying behaviour not recorded. Tadpoles dark slaty grey/black. Tail musculature pigmented diffuse brown. Tail fins clear or light brown. Tail tip rounded. Eyes dorsolateral. Spiracle sinistral. Vent tube dextral, hidden in membranous sac. Oral disc completely surrounded by moderately fine marginal papillae; submarginal papillae present. Labial Tooth Row Formula: 6 (2-6)/3 (1). Five or six short tooth rows laterally. Tadpoles very large, total length up to 125 mm.

Notes: *Mixophyes schevilli* was recently split into three species: *M. schevilli*, *M. carbinensis* and *M. coggeri* (Mahony *et al*. 2006). *Mixophyes* are large, beautifully marked frogs whose large tadpoles are commonly seen in rainforest streams. Rather than hopping away, *Mixophyes* frogs tend to flatten themselves to the ground when approached, against which they are very well camouflaged.

Steve Richards

Variation in posterior thigh pattern.

Steve Donnellan

Mottled Barred-Frog

Mixophyes coggeri
(formerly included in *Mixophyes schevilli*)

Status & Distribution: Recently described and conservation status not assessed - Least Concern appears suitable. Found throughout the Wet Tropics. Occurs in uplands and lowlands but details of altitudinal range not known. Endemic to the Wet Tropics.

Description: Large size; adult SVL 81-104 mm. Dorsal surface smooth; light fawn to rich copper or dark brown. Back pattern a discontinuously linear series of large irregular shaped blotches, rarely appearing as a continuous band. Also irregular scattered blotches towards the sides. Dark head stripe sometimes bordered by pale margin, broken on lower margin between nostril and eye. Scattered dark spots on sides. Dorsolateral skin fold absent. Ventral surface of body and thighs smooth; cream, with lemon-yellow wash. Chin darker yellow, with grey wash on margins and jaw corners. Limbs with narrow dark cross-bands merging on side of legs to form a dark horizontal band. Posterior surface of thigh similar colour to upper thigh, with few (0-9), small to large (1-11 mm) pale spots or blotches concentrated toward the knee. Posterior thigh blotches irregularly shaped and bordered by dark margin. Head wide, HW/SVL > 0.45. Fingers not webbed; toes nearly fully webbed. No finger or toe discs. Inner metatarsal tubercle prominent, half as long as first toe, shovel shaped. Iris dark brown. Tympanum distinct.

Call: A deep, reverberating 'worg' repeated at regular intervals.

Habitat & Habits: Rainforest and neighbouring wet sclerophyll forest. Terrestrial; either found active on the surface or sheltering under leaf litter. Males found calling along streams; otherwise encountered foraging in the forest. Nocturnal.

Breeding & Larvae: Stream breeder. Pair in amplexus flicks eggs up out of water to stick on rock or earth bank overhanging water. One clutch counted, approx. 500 eggs. Egg diameter 4 mm. Eggs hatch after approx. 1 week and tadpoles fall or wriggle into stream. Tadpoles brown to black. Tail musculature and fins pigmented with small, discrete blotches. Tail tip rounded. Eyes dorsolateral. Spiracle sinistral. Vent tube dextral, hidden in membranous sac. Oral disc completely surrounded by moderately fine marginal papillae; submarginal papillae present. Labial Tooth Row Formula: 6 (2-6)/3 (1). Five or six short tooth rows laterally. Tadpole large, total length up to 90 mm.

Notes: *Mixophyes schevilli* was recently split into three species: *M. schevilli*, *M. carbinensis* and *M. coggeri* (Mahony *et al*. 2006). *Mixophyes* are large, beautifully marked frogs whose large tadpoles are commonly seen in rainforest streams. Rather than hopping away, *Mixophyes* frogs tend to flatten themselves to the ground when approached, against which they are very well camouflaged.

Pair in amplexus. Conrad Hoskin

Variation in posterior thigh pattern. Steve Donnellan

Northern Barred-Frog

Mixophyes schevilli

Status & Distribution: Least concern. Recorded from Big Tableland, Thornton Peak, Macalister Range, Lamb Range, Atherton Tableland and Cardwell Range. Occurs in uplands and lowlands but details of altitudinal range not known. Endemic to the Wet Tropics.

Description: Large size; adult SVL 57-92 mm. Dorsal surface smooth; pale yellow to copper brown to dark brown. Dorsal pattern generally a dark interorbital T or Y continuing backwards as a continuous or near-continuous broad mid-dorsal stripe, and paler irregular blotches over remainder. Dark head stripe bordered by pale margin, broken on lower margin between nostril and eye. Scattered dark spots on sides. Dorsolateral skin fold absent. Ventral surface of body and thighs smooth; cream with grey wash towards margin of jaw. Limbs with narrow dark cross-bands merging on side of legs to form a dark horizontal band. Posterior surface of thigh similar colour to upper thigh, with few (1-13), small to medium sized (1-6 mm) pale spots or blotches concentrated toward the knee. Posterior thigh blotches bordered by dark margin. Fingers not webbed; toes nearly fully webbed. No finger or toe discs. Inner metatarsal tubercle prominent, half as long as first toe, shovel shaped. Iris dark brown. Tympanum distinct.

Call: A deep 'wark' or 'wark wark' repeated at regular intervals.

Habitat & Habits: Rainforest and neighbouring wet sclerophyll forest. Terrestrial; either found active on the surface or sheltering under leaf litter. Males found calling along streams; otherwise encountered foraging in the forest. Nocturnal.

Breeding & Larvae: Stream breeder. Egg laying behaviour not described but believed to be similar to that recorded for *M. coggeri* - eggs flicked onto surfaces overhanging water with hatchlings dropping or wriggling into stream. Tadpoles brown to black. Tail musculature and fins pigmented with small, discrete blotches. Tail tip rounded. Eyes dorsolateral. Spiracle sinistral. Vent tube dextral, hidden in membranous sac. Oral disc completely surrounded by moderately fine marginal papillae; submarginal papillae present. Labial Tooth Row Formula: 6 (2-6)/3 (1). Five or six short tooth rows laterally. Tadpole large, total length up to 90 mm.

Notes: *Mixophyes schevilli* was recently split into three species: *M. schevilli*, *M. carbinensis* and *M. coggeri* (Mahony *et al*. 2006). *Mixophyes* are large, beautifully marked frogs whose large tadpoles are commonly seen in rainforest streams. Rather than hopping away, *Mixophyes* frogs tend to flatten themselves to the ground when approached, against which they are very well camouflaged.

Steve Richards

Variation in posterior thigh pattern.

Steve Donnellan

Sharp-snouted Dayfrog

Taudactylus acutirostris

Status & Distribution: Critically Endangered. Has not been located since 1997. Formerly widely distributed across the Wet Tropics, from Big Tableland south to Cardwell. Declined dramatically in late 1980s and early 1990s and was last seen at Big Tableland (1995), southern Atherton Tableland (1996), and Mt Hartley (1997). Former altitudinal range: 300-1300 m. Endemic to the Wet Tropics.

Description: Small size; adult SVL: males 20-25 mm, females 23-31 mm. Dorsal surface smooth with scattered tubercles. Dorsum pale to dark brown, with a yellowish, orange or olive tinge; often with scattered paler flecks and one or two V or W shaped markings on the back. A distinct, pale ridge (dorsolateral skin fold), bordered below by black, extends from the snout, over the eye and down the side of the body to the groin. Body colour brownish above the ridge (the dorsum) and black or grey below (the side of the frog). Fore and hindlimbs have faint to conspicuous dark cross-bands. Ventral surface smooth; cream, grey or pale brown with black flecks and blotches; distinct, dark-edged white patch at the base of each forelimb; underside of limbs olive-yellow. Groin often tinged orange. Fingers and toes without webbing. Toes very narrowly fringed. Finger and toe discs small. Snout acutely pointed. Tympanum concealed.

Call: A bout of short, high-pitched chirping calls 'chip chip chip...' repeated in quick succession. A high-pitched metallic call also reported 'tink tink tink...'.

Habitat & Habits: Rainforest streams. Found among rocks and leaf litter on the edge of streams and also sometimes on the rainforest floor long distances from water during wet weather. Forages and calls during the day and if disturbed will jump into stream. Diurnal.

Breeding & Larvae: Stream breeder. Breeds throughout the year. Eggs large and unpigmented, deposited as a gelatinous clump (clutch size 25-40 eggs) under rocks in shaded portions of stream. Tadpoles have rounded snout and broad body. Tadpole transparent and unpigmented on posterior portion of body. Lateral and dorsal side of head pigmented. Base of tail musculature and tail fins pigmented. Tail tip rounded. Intestine visible dorsally, laterally and ventrally. Spiracle sinistral. Vent tube dextral. Oral disc surrounded by marginal papillae with anterior gap. Rows of labial papillae are deeply indented posteriorly and to lesser extent laterally. Outer upper labial tooth row lies in alignment with the labial papillae. Labial Tooth Row Formula: 2 (2)/3 (1). Total length of tadpole at stage 25-26 is 16-36 mm.

Notes: The only truly diurnal frog in the Wet Tropics. *T. acutirostris* has been 'missing' since the mid 1990s, despite searches of historic sites, and may now be extinct. Chytrid fungus disease is considered the major reason for decline.

Mike Trenerry

Pair in amplexus

Steve Richards

Northern Tinkerfrog

Taudactylus rheophilus

Status & Distribution: Critically Endangered. Formerly found in four disjunct populations: Thornton Peak, Carbine Tableland, Lamb Range, and Bellenden Ker Range. Declined dramatically in late 1980s and early 1990s and thought to have disappeared in 1991. Small numbers rediscovered at Mt Lewis and Mt Bellenden Ker 1996-2000. Persistence uncertain. Former altitudinal range: 940-1500 m. Endemic to the Wet Tropics.

Description: Small size; adult SVL 24-31 mm. Dorsal surface smooth or finely granular; reddish-brown, yellowish-brown or dark brown with irregular black markings. Back pattern ranges from fairly uniform to an intricate mottling. Usually a pale transverse bar between the eyes. A broad black band runs from behind the eye to groin. The top side of the band is bordered by a diffuse, pale streak, the lower side breaks into a reticulate pattern on the flanks. Dark patch on upper lip below the eye. A pale granular patch from angle of jaw to base of forearm. Dorsolateral skin fold absent or may be slightly apparent. Ventral surface smooth; irregularly marked with cream and brown markings. Limbs with faint to conspicuous irregular, dark cross-bands. Brown bars on digits. Fingers and toes without webbing. Toes very narrowly fringed. Finger and toe discs small but distinct. Snout blunt and rounded. Tympanum indistinct.

Call: A soft, repeated metallic tapping 'tink tink tink...'. Also a gentle rattling sound.

Habitat & Habits: Rocky streams in upland rainforest. Secretive, found under rocks, stones, logs and roots, primarily in seepage and trickle areas near fast-flowing streams. Nocturnal, also some activity on overcast days.

Breeding & Larvae: Calls around streams and stream seepage areas. Eggs have not been found in the field but 35-50 large eggs have been found in gravid females. Tadpoles have not been identified.

Notes: *Taudactylus rheophilus* has only been recorded a few times since declines in the early 1990s, despite extensive surveys. The very small populations found in the late 1990s and 2000 have not been detected in recent years. The species appears to be perilously close to extinction. Chytrid fungus disease is considered the major reason for decline.

Martin Cohen

Mike Trenerry

Peeping Whistling-Frog

Austrochaperina fryi

Status & Distribution: Least Concern - widespread and abundant. Found in the northern half of the Wet Tropics, from Big Tableland south to southern Lamb Range (Mt Haig, Mt Edith, Gillies Highway) and northern Atherton Tableland (Lake Barrine). Wide altitudinal range (20-1340 m). Endemic to the Wet Tropics.

Description: Small size; adult SVL 23-35 mm (average male 26 mm). Dorsal surface smooth. Dorsal and lateral colour and pattern variable; usually brown, orange or grey and peppered or spotted evenly with dark markings; rarely a thin pale vertebral stripe; sometimes pale grey dusting on eyelids; no lumbar ocelli. Side of head often dark, giving a masked appearance. Small skin fold passes from behind eye over tympanum towards forelimb. Ventral surface smooth; evenly cream, or with yellow or orange wash; sometimes with darker mottling or flecking; in preserved specimens, throat and chest often darker than abdomen but no sharp demarcation. Hindlimbs short. First finger long, about half the length of the second. Fingers and toes unwebbed. Rounded finger discs small, scarcely wider than fingers and of lesser width than rounded toe discs. No nuptial pads. Pupil bordered by thin red line; iris heavily flecked with gold or brown. Head and body have a rather squat, rotund appearance. Tympanum indistinct.

Call: A series of brief, high-pitched whistles/chirps, lasting about 3 seconds.

Habitat & Habits: All types of rainforest and sometimes neighbouring sclerophyll forest. Males call at night from the ground hidden amongst leaf litter, rocks, roots, logs or other fallen debris. Females rarely encountered at night. Both sexes regularly found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call primarily in summer wet season (October-March) in response to rain or heavy mist. There are several clutch records, ranging from 9-12 eggs. Clutches have been found under leaf litter, logs or rocks and are usually attended by an adult male.

Notes: Overlaps with *A. robusta* in the southern Lamb Range and on the northern Atherton Tableland. It is not possible to distinguish between the two species based on morphology, colouration or pattern; the differences in mating call and the largely non-overlapping ranges are the best forms of identification.

Ant Backer

Steve Williams

Rain Whistling-Frog

Austrochaperina pluvialis

Status & Distribution: Least Concern - patchily distributed over wide area. Distributed over most of the Wet Tropics, except Paluma in the south. Recorded from wide altitudinal range (20-1300 m, generally < 900 m). Endemic to the Wet Tropics.

Description: Small size; adult SVL 21-29 mm (average male 24 mm). Dorsal surface smooth. Dorsal and lateral colour and pattern variable; usually grey, brown, orange or yellowish and mottled, spotted or peppered evenly with dark markings; often darker on flank; no lumbar ocelli. Distinct white or cream streak extends from nostril over eye, sometimes continues as a more diffuse pale band over tympanum and down dorsolateral surface. Side of head often dark, giving a masked appearance. Indistinct skin fold passes from eye over tympanum towards forelimb. Ventral surface smooth; cream, or with yellow, orange or brown wash; often with darker mottling or flecking; in preserved specimens there is usually a reasonably sharp demarcation from darker throat and chest to lighter abdomen (generally hard to see in live frogs). Hindlimbs short. First finger long, about half the length of the second. Fingers and toes unwebbed. Rounded finger discs small, scarcely wider than fingers and of lesser width than rounded toe discs. No nuptial pads. Pupil bordered by thin red line; iris heavily flecked with reddish-gold. Head and body have a rather squat, rotund appearance. Tympanum indistinct.

Call: A rapid, high-pitched, series of notes, lasting about 1.5 seconds. From a distance the call sounds like a single whistle.

Habitat & Habits: All types of rainforest, often in rocky areas and areas of steep slope. Males call at night from the ground hidden amongst leaf litter, rocks, roots, logs or other fallen debris. Males call mostly during and immediately following rainfall. Females rarely encountered at night. Both sexes occasionally found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: No clutch records but no doubt a terrestrial breeder with direct development like all other Australian microhylid frogs. Males call in summer wet season (October-March) in response to rain.

Notes: Co-occurs with both *A. robusta* and *A. fryi*, from which *A. pluvialis* is distinguished by having a pale streak extending from the tip of the nose and over the top of the eye, a red iris (versus golden), and by a call consisting of a very rapid series of high-pitched notes.

Ant Backer

Michael Cermak

Robust Whistling-Frog

Austrochaperina robusta

Status & Distribution: Least Concern - widespread and abundant. Found in the southern half of the Wet Tropics, from Paluma north to southern Lamb Range (Mt Haig, Mt Edith), northern Atherton Tableland (Lake Eacham), Mt Bellenden Ker Range, and Malbon Thompson Range. Mid and high altitudes (350-1550 m). Endemic to the Wet Tropics.

Description: Small size; adult SVL 20-33 mm (average male 24 mm). Dorsal surface smooth. Dorsal and lateral colour and pattern variable; usually brown, orange or grey and peppered or spotted evenly with dark markings; sometimes brown or grey mottled or with large orange and brown blotches; rarely a thin pale vertebral stripe; often pale grey dusting on eyelids; no lumbar ocelli. Side of head often dark, giving a masked appearance. Small skin fold passes from eye over tympanum towards forelimb. Ventral surface smooth; evenly cream, or with yellow or orange wash; sometimes with darker mottling or flecking; in preserved specimens, throat and chest often darker than abdomen but no sharp demarcation. Hindlimbs short. First finger long, about half the length of the second. Fingers and toes unwebbed. Rounded finger discs small, scarcely wider than fingers and of lesser width than rounded toe discs. No nuptial pads. Pupil bordered by thin red line; iris heavily flecked with gold or brown. Head and body have a rather squat, rotund appearance. Tympanum indistinct.

Call: A series of brief, high-pitched whistles/chirps uttered as couplets (in pairs), lasting about 3 seconds. Sounds like a cricket.

Habitat & Habits: All types of rainforest (including very small fragments) and sometimes neighbouring sclerophyll forest. Males call at night from the ground hidden amongst leaf litter, rocks, roots, logs or other fallen debris. Females rarely encountered at night. Both sexes regularly found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call primarily in summer wet season (October-March) in response to rain or heavy mist. One clutch record: 12 eggs found under a log near Millaa Millaa in November, attended by an adult of undetermined sex.

Notes: Overlaps with *A. fryi* in the southern Lamb Range and on the northern Atherton Tableland. It is not possible to distinguish between the two species based on morphology, colouration or pattern; the differences in mating call and the largely non-overlapping ranges are the best forms of identification.

Jean-Marc Hero

Jean-Marc Hero

Tapping Nursery-Frog

Cophixalus aenigma
(formerly included in *Cophixalus concinnus*)

Status & Distribution: Vulnerable - restricted distribution and predicted impacts from global climate change. Isolated montane populations (> 700 m altitude) on the Carbine Tableland, Thornton Uplands (including Thornton Peak, Mt Pieter Botte, Mt Hemmant, Mt Halcyon), Mt Finnigan, and possibly Mt Finlay. Endemic to the Wet Tropics.

Description: Small size; adult SVL 17-23 mm (average male 19 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern variable; even or uneven grey or brown, or mottled with black, brown or orange; sometimes a dark V or W mark between the shoulders; sometimes a thin or broad pale vertebral stripe; usually some indication of pale lumbar ocelli; some individuals with golden cap on forehead and golden elbows and ankles. Often a black bar behind eye, sometimes extending as dashes along dorsolateral and lateral surface. No dorsolateral skin fold. Ventral surface smooth; evenly cream, grey, or washed with orange or yellow; sometimes stippled; often flushed with orange, especially in axilla and groin. Hindlimbs short. First finger well formed, about half the length of the second. Fingers and toes unwebbed. Distinct, rounded finger and toe discs; finger and toe discs about the same size; discs often orange or red. No nuptial pads. Pupil bordered by thin red line; iris lime green or grey, especially in upper half. Prominent urostyle. Tympanum indistinct.

Call: A slow or medium-paced, mid-pitched tapping. Sounds like a marble dropping on a tile. The call of males from Mt Finnigan is noticeably shorter in duration. Also occasionally a higher pitched call of noticeably faster pulse rate.

Habitat & Habits: Montane rainforest and boulders fields. Males call at night from the ground or slightly elevated positions (< 0.3 m) amongst leaf litter, logs, rocks, fallen debris, or low vegetation. Females rarely encountered at night. Both sexes regularly found sheltering under logs and rocks during the day. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. Two clutch records: one of 12 eggs dissected from a female collected in January on Mt Lewis, and the other of a clutch of 13 eggs attended by an adult male found beneath a rock on Thornton Peak in December.

Notes: Recently described (Hoskin 2004), formerly included within *C. concinnus*. Often confused with *C. monticola* (with which it co-occurs on Carbine Tableland). Most easily diagnosed in the field by call: *C. aenigma* males utter a slow or medium-paced tapping call from on or near the ground, whereas *C. monticola* males utter a short creak from an elevated position (usually in a leaf axil of a small palm). *Cophixalus aenigma* could be confused with *C. exiguus* based on call (the two species may overlap in the Mt Finlay-Mt Finnigan area), but *C. aenigma* is larger (male SVL 17-21 mm vs. 14-16 mm).

Steve Richards

Steve Williams

Buzzing Nursery-Frog

Cophixalus bombiens

Status & Distribution: Near Threatened - restricted distribution and potential impacts from global climate change. Common in the uplands of Windsor Tableland and also being found at an increasing number of scattered lowland sites in the northern Wet Tropics, including Shiptons Flat, Mt Boolbun South, lower slopes of Thornton Peak, Cape Tribulation and Mossman Gorge. Wide altitudinal range (0-1300 m). Endemic to the Wet Tropics.

Description: Very small size; adult SVL 11-17 mm (average male 13 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern variable; brown, grey or beige, with brown and/or black mottling; distinct black V or W mark between the shoulders; occasionally a light mid-dorsal band; faint pale lumbar ocelli. A broken or continuous series of prominent black dashes or blotches extends from behind the eye along the flank, sometimes a continuous black line. Dark pigment on the lip below the eye. No dorsolateral skin fold. Ventral surface smooth; cream or grey, with light flecking or brown mottling, especially under chin and chest. Groin and thigh mottled. Hindlimbs short. First finger very short, a 'nubbin', about one-third the length of second. Fingers and toes unwebbed. Small, rounded discs, those on fingers smaller than those on toes. No nuptial pads. Dark iris flecked heavily with gold, especially in upper half. Head appears quite pointed when viewed from above or from the side. Tympanum indistinct.

Call: A short, high-pitched, insect-like buzz 'bzzzip'.

Habitat & Habits: Montane rainforest on Windsor Tableland, lowland rainforest elsewhere. Also found in thin strips of rainforest along gullies through open woodland. Males call at night from the ground or slightly elevated positions amongst leaf litter, rocks, roots, logs or other fallen debris. Females rarely encountered at night. Both sexes occasionally found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain. There are two clutch records, one of 6 eggs and one of 7 eggs. Each clutch was hidden beneath a log and attended by an adult of undetermined sex, and both were found in January on the Windsor Tableland.

Notes: A very small species, one of Australia's smallest frogs. Until recently thought to be the only vertebrate species endemic to Windsor Tableland but it is now known to be widely, but patchily, distributed through the lowlands of the northern Wet Tropics. Not recorded with other *Cophixalus* species: only *Cophixalus* on Windsor Tableland, and in other areas occurs at lower elevation than other *Cophixalus* species.

Conrad Hoskin

Conrad Hoskin

Beautiful Nursery-Frog

Cophixalus concinnus

Status & Distribution: Critically Endangered - very restricted distribution and predicted impacts from global climate change. Restricted to the summit region (> 1100 m altitude) of Thornton Peak. Endemic to the Wet Tropics.

Description: Small size; male SVL 18-23 mm (average male 21 mm), females up to 26 mm. Dorsal surface smooth; colour variable, usually evenly black, brown or grey in males (but sometimes uneven or pale), and pale (almost white) in some females; occasionally small orange/red blotches; usually no indication of pale lumbar ocelli; white bar on posterior thigh. No dorsolateral skin fold. Ventral surface smooth; distinctively patterned with red or orange blotches and dark stippled areas (often appearing as blotches) on a white background; red/orange is particularly bright under throat and chest; almost always a pair of dark blotches in armpits and a dark blotch extending from the chin and along the middle of the vocal sac; pattern and colour paler in females. Sharp transition between dorsal and ventral colouration. Hindlimbs short. First finger well formed, but less than half the length of second; other fingers long. Fingers and toes unwebbed. Large, slightly truncate finger discs obviously wider than the small rounded toe discs. No nuptial pads. Pupil often bordered by thin red line; dark iris flecked with blue or green, especially in upper half. Blunt ('snub-nosed') head shape. Body squat. Tympanum indistinct.

Call: A short, mid-pitched creak.

Habitat & Habits: Montane rainforest and boulder fields. Males call at night from elevated positions (0.5-2 m) on boulders, tree-trunks or amongst vegetation, or from within boulder piles. Particularly common where vegetation grows on and amongst boulders. Females rarely encountered, found perched amongst low vegetation. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. One record of a clutch: 17 eggs found in November beneath a rock and attended by an adult of undetermined sex.

Notes: This species has a 'snub-nosed' appearance, large finger discs and beautifully marked ventral surfaces. The bright orange/red markings on the vocal sac can be seen on calling males. Females are larger and paler than males. This species previously included two species but this was resolved with the description of *C. aenigma* and the redescription of *C. concinnus* as a Thornton Peak endemic (Hoskin 2004).

Conrad Hoskin

Steve Williams

Northern Tapping Nursery-Frog *Cophixalus exiguus*

Status & Distribution: Near Threatened - restricted distribution and potential impacts from global climate change. Found at medium and high altitudes (180-850 m) on the northernmost mountains of the Wet Tropics: Big Tableland, Mt Hartley, and the vicinity of Gap Creek. Endemic to the Wet Tropics.

Description: Very small size; adult SVL 14-18 mm (average male 15 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern variable; even or uneven grey, brown or beige, or mottled with black or brown; sometimes a dark V or W mark between the shoulders; sometimes a thin or broad pale vertebral stripe; usually some indication of pale lumbar ocelli. A dark bar behind the eye extends over the tympanum and sometimes extends as a broken line of prominent black dashes along the flank. Often dark pigment below the eye. No dorsolateral skin fold. Ventral surface smooth; cream, yellowish brown or brown, with stippling or spotting concentrated on throat, chest and under legs. Groin usually flushed orange or red. Hindlimbs short. First finger well formed, about half the length of the second. Fingers and toes unwebbed. Small, rounded discs, those on fingers smaller than those on toes. No nuptial pads. Small red mark at front and back of pupil; dark iris flecked heavily with gold or silver, especially in upper half. Tympanum indistinct.

Call: A medium-paced, high-pitched tapping. Sounds like a marble bouncing on a tile.

Habitat & Habits: Mid-altitude and montane rainforest. Males call at night from the ground or slightly elevated positions amongst leaf litter, rocks, logs or other fallen debris, or low vegetation. Females rarely encountered at night. Both sexes regularly found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain. There is one clutch record: 11 eggs, straddled by a male, found under a fallen epiphyte on Big Tableland in January.

Notes: Could be confused with *C. aenigma* based on call (the two species may overlap in the Mt Finlay-Mt Finnigan area), but *C. exiguus* is smaller (male SVL 14-16 mm vs. 17-21 mm).

Keith McDonald

Steve Williams

Rattling Nursery-Frog

Cophixalus hosmeri

Status & Distribution: Vulnerable - restricted distribution and predicted impacts from global climate change. Restricted to high altitude (> 800 m) areas of the Carbine Tableland. Endemic to the Wet Tropics.

Description: Very small size; adult SVL 11-17 mm (average male 13 mm). Dorsal surface smooth or granular with scattered tubercles; colour and pattern variable; grey, brown, beige or orange, with brown and black blotches, spots or mottling; usually a dark V or W mark between the shoulders; sometimes a dark bar between the eyes; occasionally a pale mid-dorsal band or stripe; faint pale lumbar ocelli. A short dark dash extends behind the eye above the tympanum. Flanks unmarked or mottled/blotched with brown or black. No dorsolateral skin fold. Ventral surface smooth; pale, grey or yellowish, with light flecking; sometimes darker on chest and throat. Groin and thigh mottled. Hindlimbs short. First finger very short, a 'nubbin', about one-third the length of second. Fingers and toes unwebbed. Small, rounded discs, those on fingers smaller than those on toes. No nuptial pads. Pupil often bordered by a thin red line; dark iris flecked heavily with gold, especially in upper half. Head appears quite blunt and rounded ('snub-nosed') when viewed from above or from the side. Body squat. Tympanum indistinct.

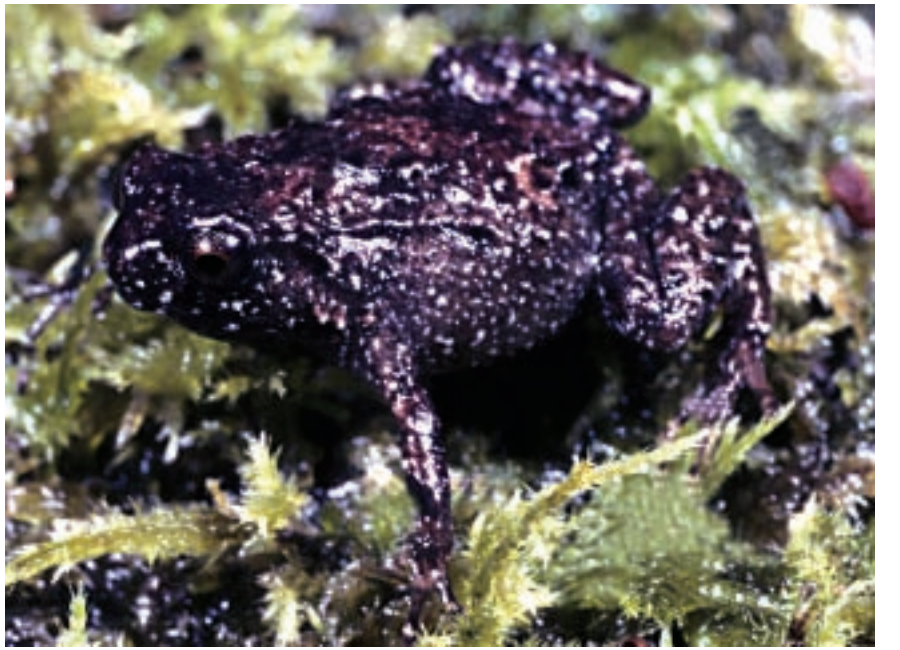
Call: Typically a fast-paced, high-pitched tapping/clicking (a rattle). However, call is highly variable, especially in the high density populations at higher elevations on Mt Lewis. Here the call ranges from a medium-paced tapping, through the typical fast-paced tapping, to a buzz resembling the call of *C. bombiens*.

Habitat and Habits: Montane rainforest. Males call at night, occasionally from leaf litter on the ground, but most commonly from elevated positions (mostly < 0.3 m but sometimes up to 1.5 m) such as leaf-litter trapped in low vegetation, palm leaf axils, logs, rocks, or steep embankments. Females rarely encountered. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. One breeding record: of an adult male found under leaf litter in January on Mt Lewis with 7 hatchlings.

Notes: A very small species, one of Australia's smallest frogs. Call is highly variable but genetic and morphological analyses suggest that this represents call variation within a single species. The reason for such call variation is not known. Could be confused with *C. bombiens* although records of that species in the vicinity of Carbine Tableland are at elevations well below the lower limit of *C. hosmeri*.

Mike Trenerry



Martin Cohen

Creaking Nursery-Frog

Cophixalus infacetus

Status & Distribution: Least Concern - patchily distributed over wide area. Found in lowlands and uplands (20-900 m altitude) between Cardwell and Cairns. Patchily distributed along the eastern escarpment of the Atherton Tableland and Kirrama Range, and through the Bellenden Ker, Lamb, Graham and Malbon Thompson Ranges. Endemic to the Wet Tropics.

Description: Very small size; adult SVL 14.5-17.5 mm (average male 15 mm). Dorsal surface generally smooth but with scattered tubercles; colour and pattern variable; grey, beige or brown, with dark brown, black or orange blotches or mottling; generally a dark W mark between the shoulders; usually some indication of pale lumbar ocelli; often a dark band between the eyes; forehead often pale; some individuals have a thin or broad cream, yellow or brown vertebral stripe. Often a black bar behind eye, sometimes extending as black dashes along dorsolateral and lateral surface. Often dark pigment on upper lip. No dorsolateral skin fold. Ventral surface smooth; grey or light brown; sometimes mottled; throat often darker. Groin sometimes pale yellow. Hindlimbs short. First finger short, less than half the length of the second. Fingers and toes unwebbed. Distinct, rounded finger discs of lesser or similar width to the rounded toe discs. No nuptial pads. Pupil sometimes bordered by thin red line; dark iris heavily flecked with gold. Head appears quite pointed when viewed from above or from the side. Tympanum indistinct.

Call: A creaking, high-pitched call of finely pulsed clicks, lasting about one second.

Habitat & Habits: Low and mid-altitude rainforest, particularly areas with a rocky substrate. Males call at night from the ground or slightly elevated positions amongst rocks, leaf litter, low vegetation, logs or other fallen debris. Females rarely encountered at night. Both sexes occasionally found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain. Several breeding records (all from the Palmerston Valley) involving clutches of 8-14 eggs found under leaf litter, fallen epiphytes or amongst rocks. All clutches were attended by an adult male. One record of multiple clutching: a calling male was found straddling a clutch of 14 eggs and was also surrounded by 8 hatchlings from an earlier clutch.

Notes: Particularly common around rocky slopes and gullies in lowland rainforest (e.g. Palmerston Valley, Crystal Cascades, Josephine Falls). Co-occurs with *C. ornatus*, a species of similar general appearance, pattern and colouration. However, *C. ornatus* is bigger, has larger and slightly truncate finger discs, and utters a call so finely pulsed it sounds like a 'beep'.

Michael Mahony

Mike Trenerry

Mt Elliot Nursery-Frog

Cophixalus mcdonaldi

Status & Distribution: Endangered - very restricted distribution and predicted impacts from global climate change. Restricted to the summit region (> 950 m altitude) of Mt Elliot, 30 km south-east of Townsville. Distribution just south of the Wet Tropics.

Description: Small size; adult SVL 17.5-26 mm (average male 19 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern fairly uniform; pale tan or light brown with scattered darker markings; sometimes a dark V mark between the shoulders; faint pale lumbar ocelli; often a dark band between the eyes; forehead often pale. Often a black bar behind eye extending over tympanum. Prominent black dorsolateral dash above forelimbs, sometimes extends to groin as a broken line. No dorsolateral skin fold. Ventral surface smooth; evenly cream or creamy yellow; sometimes flecked or mottled. Groin pale yellow or orange, with mottling. Hindlimbs short. First finger very short, a 'nubbin', obviously less than half the length of the second; other fingers long. Fingers and toes unwebbed. Small, rounded finger discs of lesser or similar width to the rounded toe discs. No nuptial pads. Dark iris heavily flecked with gold. Head and body have a rather squat appearance. Tympanum indistinct.

Call: A short, mid-pitched creak.

Habitat & Habits: Montane rainforest. Males call at night from the ground or slightly elevated positions amongst leaf litter, rocks, roots, logs or other fallen debris. Particularly common along rocky creek margins. Females rarely encountered at night. Both sexes regularly found sheltering during the day under logs and rocks, and inside fallen palm fronds. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. One clutch record: 17 eggs dissected from a female collected in October.

Notes: The most southerly distributed microhylid frog in Australia. Mt Elliot (1234 m) is an isolated southerly outlier to the Wet Tropics rainforest. The fauna on this mountain shows affinities to both the Wet Tropics (e.g. microhylid frogs) and to rainforest further south (e.g. *Phyllurus* geckos).

Conrad Hoskin

Conrad Hoskin

Mountain Nursery-Frog

Cophixalus monticola

Status & Distribution: Endangered - very restricted distribution and predicted impacts from global climate change. Known from a small, high altitude (> 1100 m) area of the southern Carbine Tableland in the vicinity of Mt Lewis. May be patchily distributed elsewhere in the uplands of the Carbine Tableland. Endemic to the Wet Tropics.

Description: Small size; adult SVL 17-20 mm (average male 18 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern variable; tan, orange, brown or dark, usually with dark blotching and mottling; sometimes a broad pale or brown vertebral band; pale lumbar ocelli usually obvious. Often a dark bar behind eye extending over tympanum. No dorsolateral skin fold. Ventral surface smooth; evenly cream, grey, orange or brown, or with brown speckles or smudges; throat darker. Hindlimbs short. First finger short, less than half the length of the second. Fingers and toes unwebbed. Distinct, rounded finger and toe discs; finger and toe discs about the same size. No nuptial pads. Dark iris flecked with grey, especially in upper half. Reasonably blunt ('snub-nosed') head shape. Body squat. Tympanum indistinct.

Call: A short, mid-pitched creak.

Habitat & Habits: Montane rainforest, particularly amongst clusters of *Linospadix* palms. Males call at night from elevated positions (0.2-1.5 m) in the leaf axils of palms, or on tree-trunks, low vegetation or fallen logs. Females rarely encountered. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. Two records of clutches, both in palm leaf axils: one of 8 eggs found in February and attended by an adult male, and one of 13 eggs not attended by an adult.

Notes: Often confused with *C. aenigma* (with which it co-occurs). Most easily diagnosed in the field by call: *C. monticola* males utter a short creak from an elevated position (usually in a leaf axil of a small palm), whereas *C. aenigma* males utter a slow or medium-paced tapping call from on or near the ground.

Mike Trenerry

Male with froglet.

Steve Williams

Bellenden Ker Nursery-Frog *Cophixalus neglectus*

Status & Distribution: Endangered - very restricted distribution and predicted impacts from global climate change. Restricted to high altitudes of the Bellenden Ker Range. Populations on Mt Bellenden Ker and Mt Bartle Frere are isolated from each other. Generally restricted to altitudes above 1200 m, but occurs patchily down to at least 975 m. Endemic to the Wet Tropics.

Description: Small size; adult SVL 20-29 mm (average male 22 mm). Dorsal surface smooth or with scattered tubercles; colour and pattern variable; usually brown, orange, dark red or black, with few markings; some individuals mottled brown, black or orange; others with thin or broad pale vertebral stripe; pale lumbar ocelli absent or faint. Sides of the head darker than the top. Often a black bar behind eye extending over tympanum. Dorsolateral and lateral surface unmarked or may be blotched or smudged brown. No dorsolateral skin fold, although small skin fold passing from behind eye over tympanum may be evident. Ventral surface smooth; evenly cream, yellow or orange. Axilla and groin often yellow or orange. Hindlimbs short. First finger very short, a 'nubbin', obviously less than half the length of the second; other fingers short. Fingers and toes unwebbed. Small, rounded finger discs of lesser or similar width to the rounded toe discs. No nuptial pads. Pupil sometimes bordered by thin red line; dark iris heavily flecked with grey or gold. Head and body have a rather squat appearance. Tympanum indistinct.

Call: A short, mid-pitched buzz or squelch. The call on Mt Bartle Frere (a squelch) is longer and of slower pulse rate than that on Mt Bellenden Ker (a buzz).

Habitat & Habits: Montane rainforest, heath and rocky areas. Males call at night and sometimes during the day from the ground or slightly elevated positions amongst leaf litter, rocks, roots, logs or other fallen debris. Females rarely encountered at night. Both sexes regularly found sheltering during the day under logs and rocks. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain or heavy mist. There are four clutch records. One was found on Mt Bartle Frere in February and consisted of 14 eggs attended by a male under a palm frond on a rock. Three clutches have been found on Mt Bellenden Ker, all in January: one of 14 eggs attended by a male under a branch on top of a log, one of 10 eggs attended by a female under a rock, and one of 19 eggs attended by a male in a dirt chamber beneath leaf litter.

Notes: Common at altitudes above 1200 m but very patchy below this. The lower altitudinal records (down to 975 m) are of males calling from amongst boulders, whereas at higher altitudes males call more uniformly from a variety of calling sites. A low elevation (320 m) gap separates the Mt Bartle Frere and Mt Bellenden Ker populations, which are genetically divergent and differ slightly in morphology and calls. Many adults are infested by the chigger mite *Vercammenia zweifelorum* (seen as obvious lumps on the lateral surfaces of the frog).

Keith McDonald

Male with egg clutch.

Keith McDonald

Ornate Nursery-Frog

Cophixalus ornatus

Status & Distribution: Least Concern - widespread and abundant. Distributed from Paluma Range in the south to Mt Spurgeon (Carbine Tableland) in the north. Only microhylid frog on Hinchinbrook Island. Absent from Seaview Range. Wide altitudinal range (0-1500 m) but lowland populations (< 500 m) generally restricted to the Mission Beach, Tully Gorge, Palmerston Valley, Mt Bartle Frere area. Endemic to the Wet Tropics.

Description: Small size; mid and high altitude populations SVL 20-30 mm (average male 23 mm); lowland populations (< 500 m) smaller SVL 17-21 mm (average male 19 mm). Dorsal surface generally smooth but with scattered tubercles; colour and pattern highly variable; usually cream, grey or brown and mottled with black, brown, yellow or orange; dark W mark between the shoulders; pale lumbar ocelli edged with black; often a dark band between the eyes; some individuals have a thin or broad cream or yellow/orange vertebral stripe. Often a black bar behind eye, sometimes extending as dashes along dorsolateral surface. No dorsolateral skin fold. Ventral surface smooth; evenly cream, grey or light brown; sometimes flecked or mottled. Often pale yellow axilla and groin. Hindlimbs short. First finger well formed, nearly half the length of the second. Fingers and toes unwebbed. Large, truncate finger discs obviously wider than the rounded toe discs; finger discs smaller and more rounded in lowland populations but still slightly truncate and usually wider than toe discs. No nuptial pads. Pupil often bordered by thin red line; dark iris heavily flecked with gold. Tympanum indistinct.

Call: A short, mid-pitched 'beep' of up to half a second duration. Call shorter and higher pitched in lowland populations.

Habitat & Habits: All rainforest types as well as neighbouring sclerophyll forest. Also montane heath and boulder areas. Males call at night from elevated positions (usually 0.3-1.5 m but sometimes up to 4 m) and rarely from ground level. Most commonly call from tree trunks, vines, low vegetation, clumps of fallen debris in vegetation, lawyer cane, rocks and logs. Females rarely encountered. Nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call primarily in summer wet season (October-March) in response to rain or heavy mist. Several breeding records from across range involving clutches of 7-22 eggs (average of 14 eggs). Clutches found under logs or rocks, or in small dirt chambers in embankments, or in small hollows in logs or standing trunks. Most clutches attended by an adult male. Males (uttering a distinctive creaking 'leading' call) have been observed leading females to nest sites. Multiple clutching has been recorded, with a calling male found attending a new clutch of 10 eggs, a clutch of 15 eggs of mid-development, and two hatchlings from a third clutch.

Notes: Most widespread and frequently encountered microhylid frog. 'Beep' call is a familiar rainforest sound following summer rains. Only microhylid commonly found in town gardens (e.g. Malanda, Atherton). Lowland frogs are noticeably smaller and have a shorter, higher pitched call.

Conrad Hoskin

Conrad Hoskin

Black Mountain Boulder-Frog *Cophixalus saxatilis*

Status & Distribution: Vulnerable - restricted distribution and predicted impacts from global climate change. Restricted to boulder fields of Black Trevethan Range, 20 km south of Cooktown. The altitudinal range available in the boulder fields is approx. 100-450 m. *Cophixalus saxatilis* is only known from the lower altitudes of this range. Endemic to the Wet Tropics.

Description: Medium size; male SVL 29-35 mm, female SVL 39-47 mm. Dorsal surface smooth or slightly granular; colour in females is a distinctive pale to canary yellow all over; males are grey or brown with darker grey or brown mottling; a faint W mark between the shoulders; faint pale lumbar ocelli. Eyelids marked with white or lime green. No dorsolateral skin fold. Ventral surface smooth; evenly pale or yellow; sometimes finely spotted with grey stippled. Orange in groin and posterior thigh. Limbs, toes and fingers long and slender. First finger well formed, at least half the length of the second. Fingers and toes unwebbed. Very large, truncate finger discs obviously wider than the rounded toe discs. No nuptial pads. Iris dark, flecked with silver. Tympanum indistinct.

Call: A slow, low-pitched tapping call lasting several seconds. Sounds like a marble dropping on a wooden board.

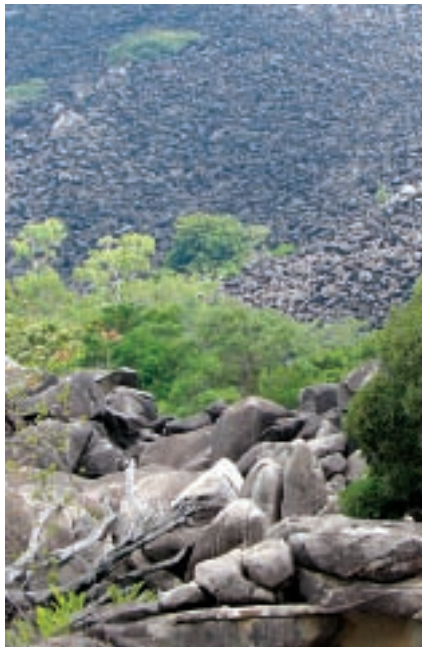
Habitat & Habits: Restricted to deep, jumbled piles of massive boulders. The exposed surfaces of the granite boulders are blackened by lichen. The boulder piles are generally devoid of vegetation but small thickets of rainforest grow in the gullies. Males call from amongst the boulders both night and day following summer rains. Following summer rains, females are regularly encountered at night sitting on surface boulders, or logs and vegetation amongst the boulders. Probably primarily nocturnal.

Breeding & Larvae: Terrestrial breeder with direct development. Males call in summer wet season (October-March) in response to rain. Only one record of a clutch: 13 eggs found in November in a rock crevice and attended by a male.

Notes: Very large compared to other Wet Tropics microhylid frogs and adapted to a boulder-dwelling existence. Obvious sexual dimorphism, with females being yellow and larger than the mottled grey males. Only readily observed following rainfall. Males have been found living up to 50 m deep in the boulder pile.

Female. Mike Trenerry

Female and male. Steve Williams



Black Mountain Conrad Hoskin

Wood Frog

Rana daemeli

Status & Distribution: Least Concern. Found throughout coastal lowlands and foothills of the Wet Tropics. Generally restricted to lowlands but also occurs at mid altitude (up to 600 m) in some areas. Also distributed on northern Cape York Peninsula and eastern tip of the Northern Territory, and widespread in New Guinea.

Description: Medium to large size; adult SVL 43-80 mm. Pointed, angular body shape. Dorsal surface smooth or slightly granular; pale to dark brown, with scattered darker flecks and blotches. Thin, dark stripe from snout to eye. Tympanum tawny to dark brown; enclosed in a dark area behind eye. Pale stripe from below eye to base of forelimb. Prominent dorsolateral skin fold. Scattered tubercles on lateral zone; upper sides generally darker than the dorsum; lower sides pale with grey mottling. Ventral surface smooth; pale and speckled. Lower arms and hindlimbs same colour as dorsum, with dark brown cross-bars. Fingers without webbing; toes fully webbed. Finger and toe discs small, scarcely wider than digits. Small inner and outer metatarsal tubercles. Tympanum large and distinct.

Call: A series of whining quacks 'weark weark weark weark'. Also a high-pitched 'tink'.

Habitat & Habits: Found in a wide range of forest types at lower altitudes: rainforest, seasonally dry monsoon forests and tropical woodlands. Found in or beside permanent streams, ponds, swamps and lagoons. Ground-dwelling and semi-aquatic. Nocturnal.

Breeding & Larvae: Breeds in slow moving or still water (e.g. stream pools, swamps). Eggs are laid in a clump and float on water surface. Tadpoles heavily pigmented with gold and black, green tinge along midline. Black pigmentation prominent laterally. Ventral surface dark grey on anterior portion, light grey with a purple tinge on posterior portion. Fins with small clumps of gold pigmentation. Spiracle sinistral. Vent tube dextral, attached to ventral fin. Oral disc surrounded by marginal papillae, with a wide anterior gap. Papillae on posterior margin extremely elongated, forming a fringe along the posterior margin of disc. Submarginal papillae present at corner of jaws. Labial Tooth Row Formula: 2 (2)/3 (1). Total length of tadpole at stage 36 is 60 mm.

Notes: The genus names *Papurana*, *Sylvirana* and *Hylarana* have all recently been used for this species. For simplicity, we have used *Rana* until the taxonomy is resolved. The unusual whining call is a distinctive sound in lowland swampy areas and slow, boggy stream pools. Only Australian frog with paired vocal sacs. Ranid frogs are a dominant frog group over much of the world but only one species occurs in Australia. This native species probably entered northern Australia from New Guinea during periods of land connection during the Pleistocene.

Steve Richards

Megan Higgie

Cane Toad

Bufo marinus

Status & Distribution: Not protected; abundant pest species. Introduced; native to Central and South America. Now established across much of eastern and northern Australia. Widespread throughout the Wet Tropics, from sea level to about 1100 m. Largely absent from undisturbed rainforest, particularly in the uplands.

Description: Large size; adult SVL 75-250 mm. Skin of dorsal surface, sides and legs dry, rough and 'warty'; brown or yellowish with irregular darker blotches. Large, obvious parotoid gland on each shoulder. A curved, bony ridge passes over each eye. Ventral surface granular and evenly pale or blotched/mottled with darker marking. Fingers without webbing; toes fully webbed. No finger or toe discs. Horizontal pupil; iris speckled black and gold. Tympanum distinct.

Call: A purring trill which sounds like a small motor or a stick rapidly rattled in a tin.

Habitat & Habits: Found in all habitat types. Abundant on rainforest edge and along roads, trails and open creeks through the rainforest, but relatively rare within the rainforest proper. Prefers more open habitats for foraging and breeding. Most individuals found deep in the rainforest are foraging females, which can be found considerable distances from breeding areas (e.g. 1000 m altitude on Mt Bartle Frere). Primarily active during the warmer, wetter summer months. Males call from the edge of still or slow moving bodies of water. Regularly found sheltering beneath debris. Nocturnal.

Breeding & Larvae: Breeds in still or slow moving water (e.g. dams, swamps, inundated areas). The egg clutch is unlike that of any other Wet Tropics frog in that the eggs are laid in strands rather than clumps. Each clutch consists of thousands of small, dark eggs. Tadpoles are small and pitch black with bulbous bodies and short tails. They tend to swim and feed in schools, unlike native tadpoles which generally live independently. Metamorphosis occurs after 1-2 months and huge numbers of small toads (SVL 10 mm) can sometimes be seen around the edge of water bodies.

Notes: The genus names *Chaunus* and *Rhinella* have recently been used, but we here use *Bufo* until the taxonomy is resolved. Adult Cane Toads are easily identified by the large parotoid (shoulder) glands and a bony ridge above each eye. The eggs and tadpoles of Cane Toads can be identified by the fact that the eggs are laid in strands rather than clumps, and the small, shiny black tadpoles move and feed in schools rather than independently. All life stages are toxic. The parotoid glands of adults contain potent toxin, which can kill predators that attempt to eat the toad. A serious environmental pest.

Male. Conrad Hoskin

Female. Conrad Hoskin

Glossary

Amplexus: the mating embrace in frogs; male clasps female from behind.
Anterior: towards the front.
Axillary amplexus: amplexus type where male clasps female near the shoulders.
Dextral: on the right-hand side.
Dorsolateral: between the dorsal and lateral surfaces.
Dorsum/Dorsal: the back/uppermost surface.
Endemic: species restricted to the region specified.
First finger: innermost finger (i.e. closest to the body) (= the thumb). The numbering of fingers and toes goes from inner-most to outer-most from the body.
HL (head length): measured from front of the tympanum to tip of the snout.
HW (head width): measured at the widest point of the head.
Inguinal amplexus: amplexus type where male clasps female around the waist.
Interorbital: between the eyes.
Labial teeth: keratinized structures occurring in transverse rows on each labium.
Labial tooth row formula (LTRF): a formula designating the number and position of rows of labial teeth. The numerator indicates the number of rows on the anterior labium, and the denominator indicates the rows on the posterior labium. Rows with median gaps are in parentheses. A range in the number of rows is hyphenated. For example, the formula 2 (2)/3-4 (1) indicates two rows on the anterior labium, the second with a median gap, and three or four rows on the posterior labium, the first with a medium gap.
Labium: a lip (plural = labia).
Lateral: on the side.
Marginal papillae: papillae attached to the margin of the oral disc.
Metacarpal tubercle: tubercle on the palm of the hand.
Metatarsal tubercle: tubercle on the underside (heel) of the foot.
Naris: nostril (plural = nares).
Nuptial pads: hard pad, patch or clump of spines, usually darkly coloured, on the innermost finger (thumbs) of breeding males.
Nuptial spines: spiny nuptial pads.
Papillae: small fleshy projections on the oral disk.
Posterior: towards the rear.
Prepollex: a prominent bony lump at the base of the thumb on males of some frog species; on breeding males covered by dark (and sometimes spiny) nuptial pad.
Sinistral: on the left-hand side.
Spiracle: external opening of the opercular chamber for the exit of respiratory water.
Submarginal papillae: papillae on the oral disc separate from the marginal papillae.
SVL (snout-vent length): frog length measured from tip of snout to vent.
Tubercle: small rounded lump on skin.
Tympanum: the eardrum.
Ventral: the underside/lower surface.

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Checklist of frogs of the Wet Tropics region

Habitat: B = boulder-fields, DF = dry forest, G = grassland, **R = rainforest (included in this book)**, WF = wet eucalyptus/sclerophyll forest

Breeding habitat: P = isolated pool, pond or swamp, S = stream, T = terrestrial

Scientific Name	Common Name	Habitat	Breeding
BUFONIDAE	**True toads**		
Bufo marinus	Cane Toad	DF/G/WF/**R**	P
HYLIDAE	**Treefrogs**		
Cyclorana brevipes	Superb Collared-Frog	DF	P
Cyclorana novaehollandiae	Eastern Snapping-Frog	DF	P
Litoria alboguttata	Green-striped Frog	DF	P
Litoria bicolor	Northern Sedgefrog	DF/G	P
Litoria caerulea	Green Treefrog	DF	P
Litoria fallax	Eastern Sedgefrog	DF/G	P
Litoria gracilenta	Graceful Treefrog	DF/WF	P
Litoria inermis	Bumpy Rocketfrog	DF/G	P
Litoria infrafrenata	White-lipped Treefrog	WF/**R**/DF	P
Litoria jungguy	Northern Stony-creek Frog	**R**/WF/DF	S
Litoria latopalmata	Broad-palmed Rocketfrog	WF/DF	P
Litoria lorica	Armoured Mistfrog	**R**/WF	S
Litoria microbelos	Pygmy Rocketfrog	DF	P
Litoria myola	Kuranda Treefrog	**R**	S
Litoria nannotis	Waterfall Frog	**R**/WF	S
Litoria nasuta	Striped Rocketfrog	DF/G	P
Litoria nigrofrenata	Tawny Rocketfrog	DF	P
Litoria nyakalensis	Mountain Mistfrog	**R**	S
Litoria pallida	Pale Rocketfrog	DF	P
Litoria revelata	Whirring Treefrog	**R**/WF	P/S
Litoria rheocola	Common Mistfrog	**R**	S
Litoria rothii	Northern Laughing Treefrog	DF	P
Litoria rubella	Naked Treefrog	DF	P
Litoria serrata (L. genimaculata)	Green-eyed Treefrog	**R**/WF	S
Litoria wilcoxii	Eastern Stony-creek Frog	**R**/WF/DF	S
Litoria xanthomera	Northern Orange-eyed Treefrog	**R**/WF	P
Nyctimystes dayi	Australian Lace-lid	**R**	S

MICROHYLIDAE	**Narrow-mouthed Frogs**		
Cophixalus aenigma	Tapping Nursery-Frog	**R**	T
Cophixalus bombiens	Buzzing Nursery-Frog	**R**	T
Cophixalus concinnus	Beautiful Nursery-Frog	**R**/B	T
Cophixalus exiguus	Northern Tapping Nursery-Frog	**R**	T
Cophixalus hosmeri	Rattling Nursery-Frog	**R**	T
Cophixalus infacetus	Creaking Nursery-Frog	**R**	T
Cophixalus mcdonaldi	Mt Elliot Nursery-Frog	**R**	T
Cophixalus monticola	Mountain Nursery-Frog	**R**	T
Cophixalus neglectus	Bellenden Ker Nursery-Frog	**R**	T
Cophixalus ornatus	Ornate Nursery-Frog	**R**/WF/B	T
Cophixalus saxatilis	Black Mountain Boulder-Frog	B	T
Austrochaperina fryi	Peeping Whistling-Frog	**R**	T
Austrochaperina pluvialis	Rain Whistling-Frog	**R**	T
Austrochaperina robusta	Robust Whistling-Frog	**R**/WF	T
MYOBATRACHIDAE	**Southern frogs**		
Crinia deserticola	Chirping Froglet	DF/G	P
Crinia remota	Torrid Froglet	DF/G	P
Limnodynastes convexiusculus	Marbled Frog	DF/G	P
Limnodynastes ornatus	Ornate Burrowing-Frog	DF/G	P
Limnodynastes peronii	Striped Marshfrog	DF/G/WF	P
Limnodynastes tasmaniensis	Spotted Marshfrog	DF/G	P
Limnodynastes terraereginae	Scarlet-sided Pobblebonk	DF	P
Mixophyes carbinensis	Carbine Barred-Frog	**R**	S
Mixophyes coggeri	Mottled Barred-Frog	**R**/WF	S
Mixophyes schevilli	Northern Barred-Frog	**R**/WF	S
Notaden melanoscaphus	Northern Spadefoot Toad	DF	P
Pseudophryne covacevichae	Magnificent Broodfrog	DF/WF	gully seepage
Taudactylus acutirostris	Sharp-snouted Dayfrog	**R**	S
Taudactylus rheophilus	Northern Tinkerfrog	**R**	S/seepage
Uperoleia altissima	Tableland Gungan	DF/WF	P
Uperoleia lithomoda	Stonemason Gungan	DF/G	P
Uperoleia littlejohni	Littlejohn's Gungan	DF	P
Uperoleia mimula	Mimic Gungan	DF/G	P
RANIDAE	**True frogs/Bullfrogs**		
Rana daemeli	Wood Frog	**R**/WF/DF	S/P

HOW YOU CAN HELP

If you find a Critically Endangered or 'Extinct' frog or a species outside its recognised range please forward the following information to Conrad Hoskin, Keith McDonald or Jean-Marc Hero (see below for details):

1 **The species encountered;**
2 **A detailed description, including size, the colour and texture of the back, belly and sides, the colour of the eyes, the shape and orientation of the pupil when constricted, the extent of webbing between the toes, presence/absence of distinct toe pads, the colouration of the thighs and groin;**
3 **The exact locality, date and time of day the frog was found;**
4 **Whether or not you photographed the frog and/or recorded its call;**
5 **Your contact details**.

Such frog records are important for understanding the distribution and conservation status of species.

For further information contact:

Dr Conrad Hoskin
School of Botany & Zoology
The Australian National University
Canberra ACT 0200

Keith McDonald
Queensland Parks & Wildlife Service
PO Box 975, Atherton Qld 4883

Dr Jean-Marc Hero
School of Environment
Griffith University, Gold Coast Campus
PMB 50, Gold Coast Mail Centre Qld 4222

COLLECTING FROGS OR TADPOLES WITHOUT A PERMIT IS ILLEGAL

DISEASES ARE A SERIOUS THREAT TO FROG POPULATIONS IN THE WET TROPICS. TO AVOID SPREADING FROG DISEASES:

1 **ONLY handle frogs or tadpoles when absolutely necessary;**
2 **ALWAYS use a new plastic bag, a new set of gloves, or clean and disinfected hands when handling a frog;**
3 **NEVER move frogs or tadpoles from where they were caught;**
4 **ALWAYS thoroughly clean and disinfect shoes, dip nets and any other gear between sites.**

Visit the Amphibian Diseases Home Page (JCU) for more detailed information on frog diseases in the Wet Tropics and how to limit their spread:

http://www.jcu.edu.au/school/phtm/PHTM/frogs/ampdis.htm

Cophixalus concinnus. Steve Williams

Notes

Date	Species	Location

Date	Species	Location

Date	Species	Location

Date	Species	Location

Date	Species	Location

Date	Species	Location

ABOVE: Mottled Barred-Frog (*Mixophyes coggeri*) - Photo: Conrad Hoskin.
BACK COVER: Upland rainforest stream - Photo: Mike Trenerry.