

TROPICAL TOPICS

AN INFORMATIVE NEWSLETTER ABOUT THE ENVIRONMENT



Frogs croak



Notes from the Editor

The Wet Tropics is a very special area for frogs. Representatives of all five Australian frog families are found in the area (including the introduced cane toad as the only, but numerous, example of the Bufonidae family).

Many are endemic to the region - about 20 species are found in the rainforests of the Wet Tropics and nowhere else. Of those, many are limited to very small areas. The little waterfall frog (*Litoria lorica*) apparently occurs only between 640-690m on Thornton Peak.

Our knowledge of rainforest frogs is very recent. About half of them have been studied and given scientific names since 1970 and more are being found. However, faster than they are being discovered, the frogs seem to be disappearing.

Frogs are important. In areas of the world where frog numbers have been seriously depleted, people have discovered, too late, the value of their free insect-control service. Rainforest frogs are an important part of the ecosystem. Tadpoles, in particular, feed on leaves and convert them into protein (themselves) forming a vital link in the food chain. Frogs are eaten by a wide range of other animals. Frogs have been around much longer than us. They were tough enough to survive the dinosaurs so what is happening to them now?

In 1991 the streams on the Mount Carbine Tablelands were quiet. In previous seasons they had resounded to the calls of frogs but in the space of one year, researchers discovered, five species of frogs had apparently disappeared. For example, the sharp-snouted day frog (*Taudactylus acutirostris*) previously found at densities of up to 100 in 100m of stream, had completely vanished. It is now known that between 1989 and 1994 six stream-dwelling frog species disappeared from the Wet Tropics uplands. What happened? Where did they go?

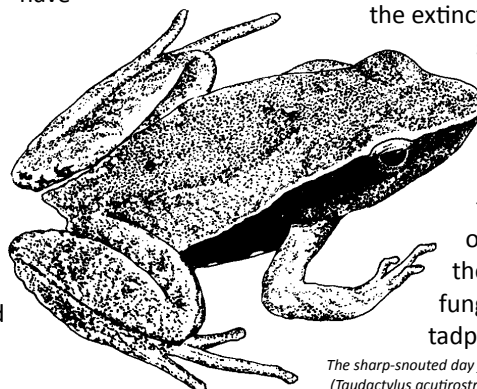
Those questions are being asked worldwide. In many countries the reasons are obvious — pollution (especially acid rain), insecticides, herbicides (frogs are especially vulnerable because they absorb moisture through their skin), land clearance and channelisation of rivers not to mention the catching of large numbers of frogs for the dinner table. But what about amphibians vanishing from apparently pristine environments — the high mountain lakes in North America, the forests of Costa Rica and the tablelands of the Wet Tropics?

The Australian wave of disappearances was first detected in southern Queensland in the late 1970s and has been working its way north. It devastated frogs of the Atherton Tablelands a year before moving on to the Carbine Tablelands. Generally those frogs which breed in upland rainforest streams — ideal frog habitats — have been affected. Interestingly, some species which also occur in lowland areas have vanished only in their upland habitats.

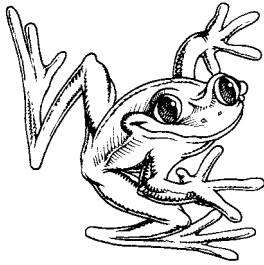
Is the frogs' disappearance an early warning of environmental degradation? It has been suggested that they may be victims of ozone depletion over Australia, although it seems unlikely that nocturnal forest dwellers would be the first to suffer. Is a disease responsible? Perhaps the disappearances are a natural part of frogs' life cycles and they will just as suddenly reappear — although rainforest creatures don't normally go through boom-bust cycles common in other less 'stable' habitats.

Chytrid (pronounced kit-rid) fungus (*Batrachochytrium dendrobatidis*) causes the disease known as chytridiomycosis or chytrid infection. Chytrid fungus has been identified as a primary cause of massive mortality of stream dwelling frogs in the region. The highly infectious chytridiomycosis was first discovered in dead and dying frogs in the Wet Tropics in 1993. The fungus is now widespread across Australia.

Worldwide, chytrid fungus has caused the extinction of up to 122 frog species, eight in Australia. Chytrid fungus feeds on keratin, a component of a frog's skin that makes it sturdy and tough. Tadpoles have only a little keratin around their mouths. So while the fungus doesn't usually affect tadpoles, it can kill adult frogs.



The sharp-snouted day frog (*Taudactylus acutirostris*)



Froggy facts

Australia's mini-frog

Cophixalus hosmeri is the smallest frog in Australia. The adult male frog is a mere 11-14mm in length — half the length of a standard paperclip — and the newly hatched froglets are even tinier. It lives in a small area, in the cool wet rainforests of the Carbine Tablelands above 940m.

Loudmouths

Only male frogs can call. They have an inflatable vocal sac below their lower jaw. This does not make the sound, but acts as a resonance chamber to increase the volume of the frog's call. Some sacs inflate externally but others inflate internally making the whole frog blow up.



Some frogs have two-part calls which, roughly translated, mean, 'Come here female' and 'Get lost other males'.

Little *C. hosmeri* is commonly known as the rattling nursery frog because of the short, fast, rattling call of the males heard on moist summer nights. There is also a creaking nurseryfrog. As no two frog species' calls are alike scientists who use the calls to locate and identify them sometimes name the frogs after their calls.

These frogs, like others in the same microhylid group, don't spawn in water and there are no free-swimming tadpoles! The female lays her eggs in a shallow burrow beneath logs or fallen epiphyte clumps. She produces only seven to 11 eggs (compared with up to 30 000 for the cane toad) but they are relatively big because each has a large yolk to supply the developing frog with plenty of food. The parents stay close to the eggs and may even spread an anti bacterial and anti-fungal substance on them. The embryo does become a tadpole — but safely inside the egg. It doesn't hatch until it is a fully developed, but tiny frog.

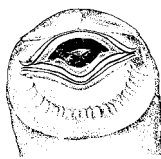


These tiny, newly-hatched froglets, beside a one cent coin, belong to the same Microhylid family as the rattling nursery frogs. They could well be the smallest fully -formed frogs in the world.

Sweetlips

Some tadpoles which live in fast-flowing water have suckers around their mouths to help them hang on to rocks. Within the suckers there are two parts to the mouth. Thin black lines (there can be up to 15) are rows of fine teeth which scrape algae off rocks. Inside these is a thick black horny beak which can chop up large items.

This tadpole, of *Nyctimytes dayi*, lives in upland and lowland rainforest streams between Cooktown and



Sticky toes

Why don't tree frogs fall off? Climbing frogs have large flat discs on the tips of their toes and fingers. A close look, with electron microscopes, shows that the skin on the bottom of these pads consists of a pattern of interlocking irregularly-shaped cells with narrow gaps between them. These gaps can catch on tiny irregularities on rough surfaces. On smooth surfaces extra moisture drains away into the gaps leaving a thin even film which allows the pad to stick. Similar skin on the lower side of many frogs enables them to hang on with their stomachs too.



Frog spotting

Frog fauna in rainforests on a warm, wet night can be the subject of a fascinating spotlighting walk. As frogs' eyes are not particularly reflective, the best way to find them is by careful searching in undergrowth along tracks (especially on lawyer cane leaves) and along streams and by listening for calls. With the onset of the wet season rains, the frog chorus provides an excellent opportunity to track down the callers. However, you don't have to wait until then to see frogs on a night walk as some can be found in cooler months, especially on the lowlands. Some of the larger species of tree frogs, such as the white lipped tree frog (*Litoria infrafrenata*) with its prominent white lower lip, and the Tapping green-eyed tree frog (*Litoria serrata*) with its fringed back legs, are still active at night along creeks, tracks and roadsides. During the day, frogs can also be

found under rocks and logs, where they will remain until the weather warms up. (Don't forget to replace their shelter after you've looked at them). One of the most common frogs found between Mt Spec and the Carbine Tablelands, the ornate nursery frog (*Cophixalus ornatus*), has a call like a 'squeaky wheel bearing'. Calling frogs can be found anywhere from the leaf litter on the forest floor to perches 2m above the ground, on tree trunks or leaf blades. While they are commonly found in the same spot every night, finding them can be difficult as they seem to throw their voices. The easiest way to locate this frog is to triangulate its position using two people with torches standing a few metres apart. When the frog calls, both people should shine their torches at the position from which they think the frog is calling. A thorough search of the area where the torch beams intersect will usually find the animal — a small, pale blotched frog less than 3cm long. Another frog commonly found

calling on warm nights by streams is the northern barred frog (*Mixophyes schevilli*). Again this species is almost impossible to find unless it is calling as it blends well with the leaf litter on the forest floor. With its guttural 'warrk' call, prominent barred thighs and large size (up to 13cm in length) this frog is easy to identify.



Northern Barred Frog



Building a frog pond

A good way to help frogs is to build a breeding pond in your garden. Anything, from a garden pond to a broccoli box, is suitable as long as it is shaded and the froglets can eventually climb out.

Your pond should be filled with rainwater or pondwater and, if possible, be above ground level to prevent cane toads from breeding in it. Otherwise, surround it with a 50cm high bird-wire fence with 1 cm holes. Put the fence as far away from the pond as practical.



Cane toads are a risk to tadpoles and mature frogs. Whether or not you have a pond, it is a good idea to collect them at night and freeze them in a plastic bag. Beware the poison glands on their backs. Another humane method for killing them (there is no reason to be cruel — they didn't ask to come here) is to squirt them with Dettol or Toadex — but not salt. The bodies can be composted. Toad eggs should be removed from your pond, or they will poison your water and the 'toadpoles' will eat your tadpoles. It is easy to distinguish frogs' eggs and tadpoles from those of toads. Toad eggs are the only ones laid in long clear strands, the eggs appearing as a row of little black dots. They can be destroyed by being taken out of the water and left to dry.

Toad tadpoles are the only pure black ones in Australia — native frog tadpoles have light-coloured undersides. Surprisingly, toad tadpoles tend to be smaller and are usually found in dense swarms. Mosquito larvae can be controlled by introducing suitable fish. Be careful, however, as some species also eat tadpoles and young frogs. Suitable native fish for the job are McCulloch's rainbowfish, splendid rainbowfish, Pacific blue eye, fly speckled hardyhead and fire-tail gudgeon. Exotic white cloud mountain minnows can be bought at pet shops. Given the correct environment, the tadpoles more or less look after themselves, although they do like a feed of boiled lettuce and fish food.

Readers might be interested in joining the Tablelands Frog Club. More information: www.tablelandfrogclub.com.

Weedkillers can be frog killers


Children in a Cairns pre-school were upset one morning to find 'their' green tree frogs dead. Gardeners had recently been spraying with a glyphosate weedkiller and this was thought to have caused the casualties. Frog skin is permeable. It allows water and oxygen as well as less benign substances to penetrate.


Weedkillers containing glyphosate are used widely in agriculture, industrial situations and in home gardens. They break down quickly after application and are considered relatively


environmentally friendly. However, the surfactant, or wetting agent, used in them (not the actual glyphosate itself) can be fatal to frogs and tadpoles.


Please avoid using these products in or near aquatic environments or in other areas frequented by frogs. Cool, dry weather is the safest (and most effective) time to use them but be careful — a warm damp night in winter may entice frogs to leave their hiding spots and make contact with the sprayed vegetation.


Facts and stats on frogs


 Frogs appeared on Earth about 200 million years ago. (We arrived about two million years ago.) There are over 4000 species in the world and over 200 species in Australia.


 The tadpole of the northern barred frog (*Mixophyes schevilli*) is the largest in Australia growing up to 16cm long (longer than a standard ball-point pen). Adults are 8-13cm long and are widely distributed throughout the Wet Tropics. These tadpoles are particularly important in the forest because they eat, and recycle, very large quantities of leaves.

 The frog with the longest leap in Australia lives in the Wet Tropics. The wood frog (*Hylarana daemeli*), a frog of 75mm, can cover a distance of about 2.5m in a single bound.

 The time taken for tadpoles to change into mature frogs varies from one week, for those in arid zones which have to take advantage of water quickly when it is available, to over one year for some in rainforest streams.

 All eggs laid in open ponds have a black patch at the top. This is a filter which cuts out the harmful ultraviolet rays in sunlight which would harm the developing frogs.

 Frogs' eyes bulge out giving them all round vision. They also may help the frog swallow. When the frog has caught a mouthful of food the eyes sink through an opening in the skull and probably force food down its throat.

 Many frogs produce chemicals on their skin which seem to protect them from bacteria and fungi. Frogs have been used in traditional folk medicine all round the world and now modern scientists are using them to develop medicines. A chemical compound which comes from the skin of green tree frogs is used as a gut stimulant after abdominal surgery and also to block schizophrenia symptoms. One Ecuadorian frog produces a painkiller 200 times more powerful than morphine while other frog compounds contract and dilate blood vessels, make hearts beat more strongly, aid food absorption, combat viruses and may eventually be used to repel mosquitoes and act as sunscreen.

Want to know more about frogs go to:

<http://www.environment.gov.au/biodiversity/threatened/publications/frogs2.html>
<http://www.frogsaustralia.net.au/>, <http://frogs.org.au/frogs/>
http://www.publish.csiro.au/samples/FG_Frogs_of_Aust.pdf
<http://www.qm.qld.gov.au/Find+out+about/Animals+of+Queensland/Frogs>

Nature notes

A diary of natural events creates a pleasing journal which grows richer with the passage of time. Watching for the recurrence of an event after noting it in a previous year, and trying to understand what could have caused changes in timing, is intriguing.

Readers will, inevitably, note variations between their observations and those appearing here. If you do not keep a nature diary perhaps this will inspire you to begin one.

Honeyeaters will feed and squabble around the white flowers of a rare tree known as the Mossman quandong which can be expected to bloom in July. Spent flowers, the petals of which have serrated edges, will litter the road to Mossman Gorge.

A large tree of this species can be seen near the traffic counter in the national park. This tree (*Peripentadenia phelpsii*) is in the quandong family (*Elaeocarpaceae*) but distinctive enough to rate a genus of its own.

Fewer than 50 individual trees are known, none of them growing outside the Mossman region. About December, green-shelled fruits will split open to reveal one or more nuts concealed within bright red, deliciously acid flesh. The sweettasting kernels within the nuts are eaten by native rodents.



Another tree in bloom during July is *Idiospermum australiense*, sometimes called ribbonwood (picture above). The red flowers - close to 2cm in diameter - fade to white as they age. Each flower has numerous petals and a large number of stamens, some of which are infertile. Production of numerous petals and stamens are two features commonly found in flowers classified as having 'primitive' characteristics. The fruit, which is as big as a billiard ball, matures in about nine months. No modern animal is known to eat *Idiospermum* fruit which suggests that, whatever agent helped spread the seed in pre-history, dispersal now depends on gravity, water and luck.



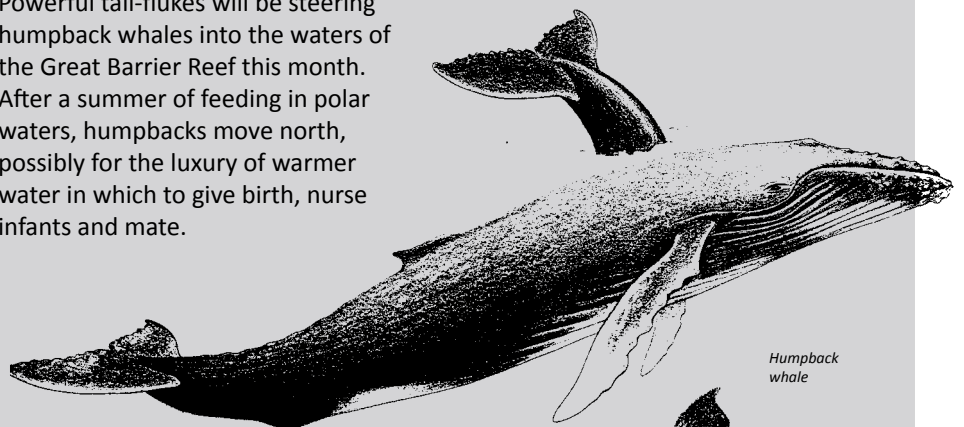
During early mornings in the cool months day-flying or zodiac moths can be seen fluttering southward from the Daintree region. These moths are heading back to the Bartle Frere - Johnstone River region where they will mate and lay eggs on a vine, *Omphalea queenslandiae*. This host plant will be eaten by the caterpillars. In summer the nectar-feeding adults will disperse widely. (Acknowledgments to Garry Gankowski.)

Winter and early spring may be the mating season for tube-nosed bats. These small fruit-eating bats are usually solitary when roosting, occasionally two animals of apparently equal size can spend the day hanging upside down in close company, their bodies occasionally in contact. These intriguing bats, which resemble dry, curled leaves when roosting, have been recorded with new-born young from October to December.

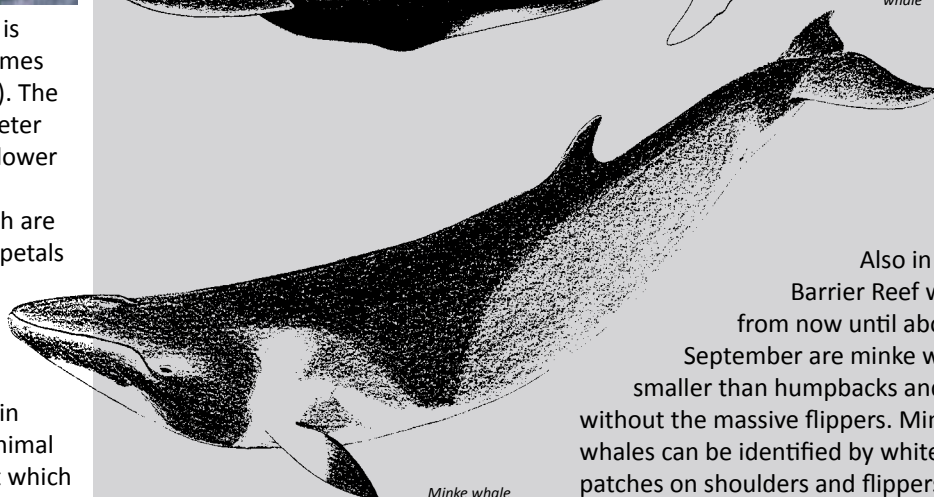


Whales on the reef

Powerful tail-flukes will be steering humpback whales into the waters of the Great Barrier Reef this month. After a summer of feeding in polar waters, humpbacks move north, possibly for the luxury of warmer water in which to give birth, nurse infants and mate.



Humpback whale



Minke whale

Also in Barrier Reef waters from now until about September are minke whales, smaller than humpbacks and without the massive flippers. Minke whales can be identified by white patches on shoulders and flippers. (Acknowledgments to Dr Peter Arnold.)