Tropical Topics

An interpretive newsletter for the tourism industry

Freshwater No. 44 December/January 1997/98

Notes from the Editor

Demands on water supplies are constantly increasing but the quality of that water depends on how well we look after our rivers and water supplies. If the flow of a river is interrupted or it becomes polluted its natural ecosystems will deteriorate and the river becomes unhealthy. This does not benefit any of its users, human or otherwise. We cannot dissociate ourselves from the health of our environment. Therefore, the needs of all water users, including the wildlife, must be catered for.

Where does the water go?
In 1995, in the region between Tully and the Douglas Shire, including the Tablelands, the major water consumption (excluding power generation) was:
Irrigation: 130 000 megalitres
Sugar mills: 110 000 megalitres
Urban and industry:
Cairns: 33 000 megalitres
Outside Cairns: 25 000 megalitres
Source: FNQ 2010

I would like to thank Mike Trenerry and John Clarkson (DoE), Brad Pusey and Nicola Wright (DPI), Ross Alford (JCU) and Chris Clague for their help with this issue.

The holistic approach to barramundi

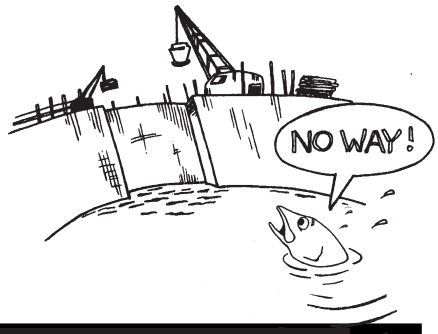
How fast does a baby barramundi swim? The idea of scientists with stopwatches timing the speed of diminutive fish may seem rather silly. However, their findings could have quite far-reaching impacts on future engineering projects.

Barramundi, like many river fish, can only breed in salt water; it is essential for the survival of eggs, sperm and larvae. However, within a month or two of spawning, many of the juvenile fish migrate upstream into fresh water where they grow to maturity. The little barramundi make their journeys in the wet season, when rivers have spread over their floodplains — the best time for them to take advantage of eddies around snags, such as tree trunks, where the current is not so strong, to make their way upstream. However, if a river has been artificially channelled, the fish are faced with a uniformly strong current and are not able to swim against it.

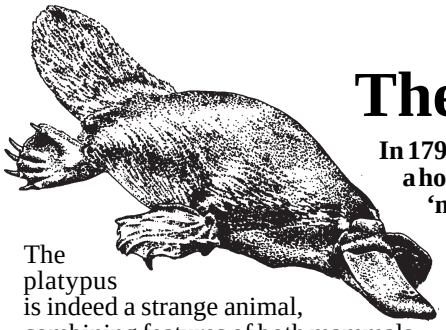
All too often people see rivers simply in terms of water flow. Levees, tidal gates, concrete channels, dams and weirs effectively control flooding and store water for irrigation and electricity generation, but they also interrupt the natural flows of a river, a process that can have far-reaching and often unforeseen effects. Periodic floods, while allowing fish to feed widely and travel easily, may also serve to enrich floodplain soils and maintain pastures and waterholes. In addition, they flush out organic material which, if it accumulates, can make a waterway too acidic for some wildlife. Sediments are also flushed out by floodwaters, eventually becoming sand on coastal beaches.Water which reaches the sea is not wasted — estuarine and marine fish and prawn catches are closely related to the volume of fresh water outflow.

Natural water systems and the environments around them, have evolved with water pulses — times of plenty and times of drought. These pulses supply cues to many animals, telling them when to reproduce and when to travel. Humans, however, tend to store water during the Wet and release it during dry times, the opposite of natural conditions. It may also be released at convenient times of the day, so that river levels rise and fall sharply within 24 hours. This interruption of natural flows is confusing for wildlife. Eggs may be laid at the water's edge only to be left high and dry or washed away soon afterwards, plants have difficulty becoming established and platypus nesting burrows may be flooded.

While needing to maintain water quality in our rivers, it is just as important to maintain their natural flows. Breaking the connection between a river and its floodplain or creating barriers between upper and lower catchments disrupts links which are vital for the health of the river and its inhabitants. River managers are becoming increasingly aware that a holistic approach is required.



WET TROPICS MANAGEMENT AUTHORITY
Department of Environment
QUEENSLAND GOVERNMENT



The very peculiar platypus

In 1799, when the dried skin of a platypus was sent to an English naturalist, he suspected a hoax, possibly created by the same clever Chinese taxidermists who had produced 'mermaids' by sewing monkey and carp parts together.

The platypus is indeed a strange animal, combining features of both mammals and reptiles. Like other mammals it is covered with fur, produces milk, and has a four-chambered heart. Its brain size and structure is also mammalian. However, like reptiles, the platypus lays eggs, produces vitamin C in its kidneys (not liver) and has similar shoulder bones. Only echidnas share these characteristics and are also classified as monotremes.

Platypuses have an ancient history and once swam around the legs of dinosaurs. Fossil remains found in Argentina prove that they existed at a time when the South American and Australian land masses were joined in the supercontinent, Gondwana. A fossilised 110-million-year-old jaw of a platypus prototype, found in NSW, has shown that, unlike the modern version, this animal had teeth. It was also almost twice as big, possibly making it the largest mammal in the world at that time.

The Wet Tropics is the northern limit of the platypus. It has been suggested that crocodile predation has prevented it from inhabiting Cape York. Wet Tropics platypuses are noticeably smaller (male average 1018g) than those elsewhere (male average in NSW, west of the divide, 2215g.)

Platypus fur is very fine and dense with about 800 hairs packed into each square millimetre — denser than the fur of river otters or polar bears. There are two layers, a woolly undercoat and a long shiny guard fur on top.These serve to trap air and thus keep the animal dry and warm even when in the water for long periods.

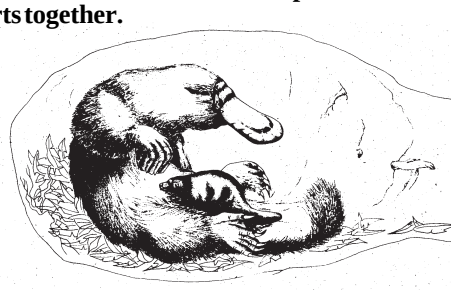
The bill of a platypus is not hard like that of a duck, but rubbery, very sensitive and covered with electro-receptors. A platypus dives with eyes, ears and nostrils closed. As it stirs up debris at the bottom of the river these receptors enable it to detect electrical fields created by the muscle movements of its fleeing prey. The bill also contains pressure sensors which may help it hunt and navigate under water.

The platypus's front legs propel it through the water while the webbed back feet help to steer and stabilise it. The front legs are also used for burrowing and the animal is quite a good climber. The tail is broad and paddle-like and is used to store a reserve of fat for times of food scarcity. Male platypuses have two conical spurs, 1.5cm long in adults, just above the heel of each hind leg. Slightly curved, like a dog's canine tooth, these spurs are hollow and are attached to a poison gland. They are probably used as weapons between competing males during the breeding season. The venom causes severe pain and swelling in humans but recent research has shown that it could also be beneficial. It apparently acts on pain receptor cells (a property unique among venoms, but shared with the active ingredient of chillies) and may be used to produce new painkillers.

Food for the platypus, which needs to eat about 15-30 percent of its body weight each day, consists of freshwater insects and their larvae, shrimps, yabbies, worms, tadpoles, small frogs and fish. The platypus feeds only in the water, usually at night, tucking goodies into cheek pouches to be eaten when it comes to the surface to breathe. Then the food is ground up between hard pads inside the bill. (Juvenile platypuses have proper teeth which fall out soon after they first enter the water.)

The platypus comes to the surface, to breathe, every two minutes or so but can remain submerged for up to 14 minutes. It has blood which is rich in oxygen-carrying haemoglobin and red cells and is able to reduce its need for oxygen by lowering its heart rate from more than 200 beats per minute to less than 10. Its body temperature is normally around 32deg. (compared with 37-38deg. for most mammals) — perhaps an energy-saving adaptation which reduces the rate at which body heat is lost in water; it is able to remain in near-freezing water for 12 hours or more. When not feeding, the platypus prefers to spend most of its time — up to 17 hours — in underground burrows.

Burrows are dug in the river banks, these expert excavators able to tunnel at the rate of one metre in two hours. A single platypus (and they are generally solitary) may use a dozen camping burrows. They are quite short (1-3m long) with inconspicuous entrances at or below the water surface. Nursery burrows are longer (3-20m) with entrances, well above the water line, presumably to prevent the young from being drowned in floods. When the mother leaves the nursery burrow she tends to plug the entrance with soil.



Usually two eggs are laid in late winter or spring. They have a thin white leathery skin, like that of a snake or lizard egg. The mother holds them between her curled-up tail and belly until they hatch, in about 10 days. The young are fed on milk produced not from nipples, but from two patches of skin, halfway along the mother's belly. Three to four months later, when the young have reached almost adult length, they emerge from their burrow and go for their first swim. Individuals have been recorded living for up to 17 years in captivity and at least 13 years in the wild.

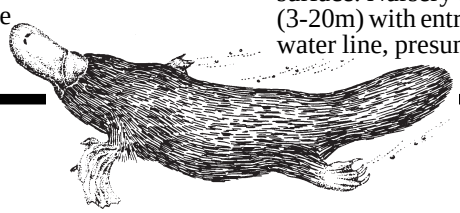
The platypus is classified as common but vulnerable. It has certainly declined and disappeared from some areas where habitat has been destroyed, but it is not a good indicator of water quality as some live in quite degraded waterways.

Platypus problems

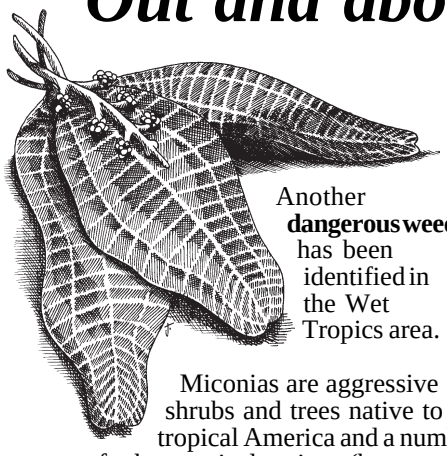
Humans are the platypus's worst enemy, unintentionally harming them in many ways.
Platypuses:

- drown when entangled in fishing line, nets and litter
- become caught on fish hooks
- damage their bills on broken glass, tin cans and other sharp litter
- lose the waterproof qualities of their fur when it is fouled with oil and other chemical pollutants
- get sucked into pumps and other machinery with intake pipes below water level
- have burrows destroyed through erosion, degradation of streamside vegetation, flood mitigation works and concrete channelisation.
- lose food when invertebrate prey is killed by insecticides and other chemicals
- are attacked by dogs and cats

For suggestions on how to make artificial water bodies and waterway work platypus-friendly consult The Remarkable Platypus (see Bookshelf, page 8).



Out and about



Another **dangerous weed** has been identified in the Wet Tropics area.

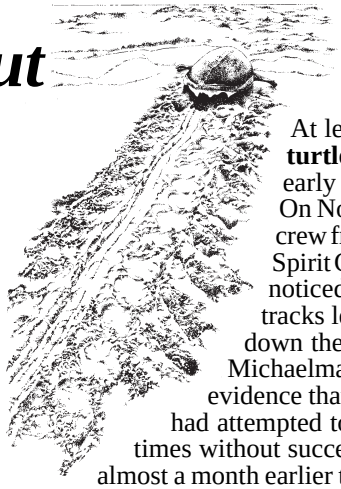
Miconias are aggressive shrubs and trees native to tropical America and a number of other tropical regions (but not Australia). They are grown in gardens for their large, attractive leaves which reach 60-70cm in length — roughly the length of an adult's arm. They have three prominent veins running lengthwise and can be purplish on the underside. Seeds are contained in numerous small black fruits which are attractive to birds and thus very easily spread.

Like other imported weeds, such as lantana, Miconias are capable of rampant growth and could replace our native plants and affect wildlife. The worst species, *Miconia calvescens*, has become a major pest in rainforests of Tahiti and Hawaii. Overseas authorities have warned that "no expense should be spared to hunt this plant down and destroy it before you have a hopeless problem".

Happily, Miconias are still quite rare in Queensland so we still have the opportunity to prevent it becoming a major problem. In May 1997, all species of Miconia were declared under the Qld Rural Lands Protection Act (categories P1 and P2). It is an offence to sell them anywhere in Queensland and to introduce the plants into the State.

A recent DPI weed-eradication exercise in Kuranda found the plant growing in at least three places in the heart of the village and there are fears that it has been spread in the area. If you think you have found these plants, please post a leaf, for identification, to Steve Csurhes, Qld Department of Natural Resources, Locked Bag 40, Coorparoo Delivery Centre, Qld 4151. If you see these plants in a nursery please phone Steve Csurhes on (07) 3406 2870.

For more information contact the Land Protection Branch in Atherton on (07) 4091 3222 or the council's environmental officer on (07) 4030 3900.



At least one **green turtle** tried to nest early in the season. On November 3 the crew from Ocean Spirit Cruises noticed green turtle tracks leading up and down the beach on Michaelmas Cay, with evidence that the animal had attempted to nest three times without success. This was almost a month earlier than last year. Green turtles nest in small numbers on Michaelmas Cay throughout the summer with activity concentrated in January.

Studies at Bramble Cay have shown that each green turtle female is likely to nest every two weeks, producing an average of 110 eggs per clutch. These take an average of 53 days to hatch, the little turtles emerging en masse at night. Unfortunately for the hatchlings, ghost crabs and predatory fish pick off most of them, only about 2 percent making it to the safety of deeper water.

Acknowledgments to Dave O'Brien.

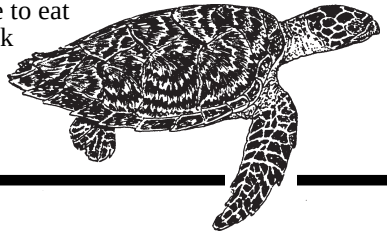
Cane toads seem to have gained a new predator. On three occasions, Lawrence Mason, of Mason's Tours, Cape Tribulation, has observed a Cape York rat attacking a toad. Although, on two of the occasions, the toad was puffed up and secreting large amounts of venom, the rat seemed to be unaffected. Since the third attack was observed within a few metres of the second (but a week later) it is thought to have been the same rat — in which case it was not killed by the venom.

A number of animals have learned to eat toads safely. Water rats, kookaburras and crows turn toads on their backs and eat poison-free parts such as the legs. Ibis seem able to eat the whole animal, while keelback snakes, freshwater turtles and crayfish can eat large numbers of toadlets.

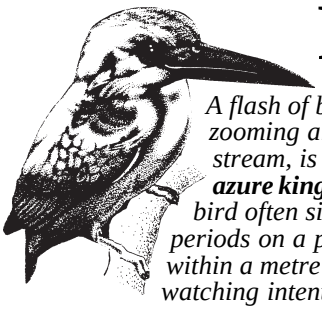
Drivers travelling the **Cape Tribulation road**, particularly at night, are urged to bear in mind that many rare species of native wildlife may be encountered on the road's surface. This issue was highlighted by the death of a spotted-tailed (tiger) quoll after being struck by a vehicle at Oliver Creek in October.

The spotted-tailed quoll is the largest surviving carnivorous marsupial on the Australian mainland, but populations have declined alarmingly in recent years. Knowledge of the species is scant and the death of any individual is a tragedy. Drivers should minimise road speeds, particularly at signed wildlife corridors and report sightings of rare or unusual animals to national park officers at Mossman (Tel: 4098 2188) or Cape Tribulation (Tel: 4098 0052).

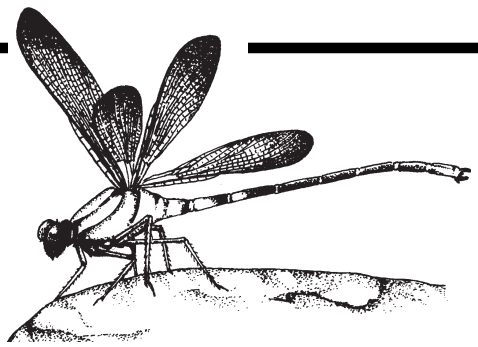
A **hawksbill turtle** which was tagged at Green Island in October 1988 turned up in September 1997 off the coast of Rabaul, in Papua New Guinea. The turtle, a female, had been caught by hunters but was purchased from them and released, with its tag still in position. Reports of tagged turtles are of particular importance in studies of long distance migration and information is always welcome.



River residents



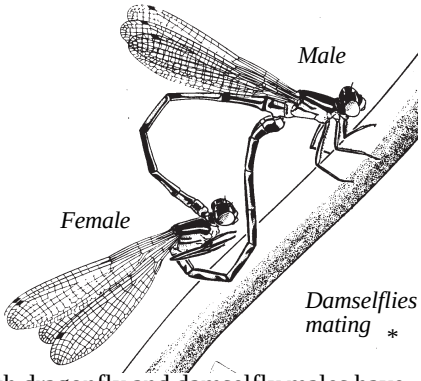
*A flash of bright blue, zooming along a forested stream, is likely to be an **azure kingfisher**. This bird often sits for lengthy periods on a perch, usually within a metre of the water, watching intently for fish, crustaceans or water insects.*



Dragonflies and damselflies are similar — but are easy to tell apart. At rest, a dragonfly holds its wings open, horizontally, while most damselflies rest with their wings more closed and upright. Damselflies are usually smaller and fly more slowly; dragonflies can reach 40kmh. Dragonflies have huge eyes with up to 30 000 facets.

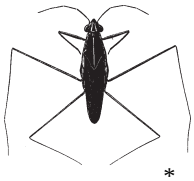
This **black and blue damselfly** is so large and heavy it is often mistaken for a dragonfly. Adults are a common sight as they flit around sunlit sections of streams.

Caddis-flies are more familiar as larvae than adults. Most of them live in a case constructed of silk covered with sand, reeds and other plant parts, depending on species. Water conditions such as temperature and oxygen, chemical and particle content are very important to the larvae so the presence of caddis-flies can be used as an indication of water quality. They are also an important food source for freshwater fish. Adults are much more short-lived. They resemble small moths but do not have a moth's curled proboscis

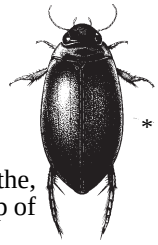


Both dragonfly and damselfly males have an intriguing method of ensuring paternity. Fertilisation of insect eggs takes place only as they are being laid, the female having stored sperm from various matings. The more males she mates with, the less chance an individual partner has of fathering her young. The penis of the male dragonfly or damselfly, however, is designed to either scoop out any sperm which had been previously deposited or to push it away from the oviduct, before the owner's is placed in prime position for fertilisation.

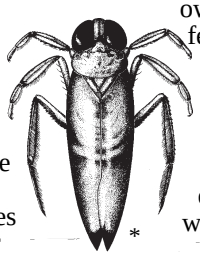
Mayflies belong to one of the most ancient orders of living winged insects. Adults have extremely long tail filaments, but this phase of their lives lasts no longer than a few days. Nymphs spend 6-12 months underwater. As they approach adulthood the alimentary canal fills with air, helping buoyancy when taking part in mass aerial mating flights.



Water striders live on the surface of the water, skating around on long, slender legs hunting and scavenging fallen insects. Although one species lives in the open ocean, most inhabit still fresh water. Similar **water measurers** have longer, thinner bodies and move more slowly.



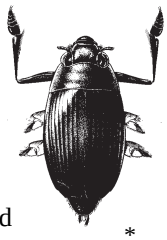
Predacious diving beetles, which are smooth and mostly oval, move rapidly underwater, using their long hairy legs as oars. These beetles must surface to breathe, drawing air in through the tip of the abdomen and storing a bubble underneath their hard wing covers.



Backswimmers swim upside down, using very long hind legs, which are held in a V position, and a keeled convex back. They are often seen near the surface although two parallel grooves on the abdomen can hold air when the bug is submerged.

Most dragonfly and damselfly larvae hunt under water ambushing or stalking small animals, including tadpoles. The larva captures prey by shooting out an extension of the lower lip at the end of which are two curved, moveable teeth.

Water beetles are similar, with shorter antennae. They store air on their abdomens.



Whirligig beetles spin around in tight circles on the water surface with the aid of a substance secreted by glands. Each eye is divided into two, one part looking above the water and the other below.

Water boatmen look rather like backswimmers but have flatter bodies and swim the right way up! They are less often seen because they feed on the bottom, mainly on algae, coming to the surface only for air which they store under folded wings.

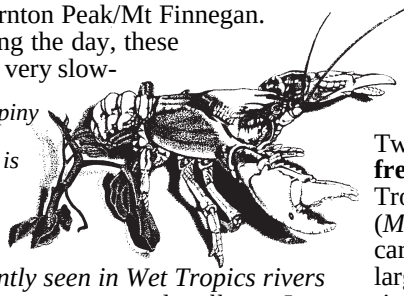
Both **water scorpions** which are slender with long legs, and **fishkiller bugs**, which are much stouter, have distinctive long tail-like snorkels which protrude through the water surface. They hunt tadpoles, insects and small fish. They have quite a painful bite.

Crustaceans

More than 20 species of freshwater crayfish occur in Queensland. In the Wet Tropics there are two main groups, the smooth and the spiny freshwater crayfish.

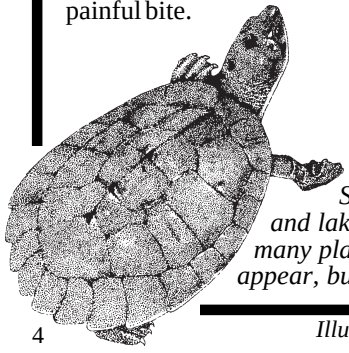
Spiny crayfish are found in cold high altitude streams, many mountain tops boasting their own species. Presumably these areas act as cold refuges — the further north they occur, the higher they are. They are found above 450m, at Lamington, above about 600m at Eungella, above 700m at Mt. Lewis and above 800m and on Thornton Peak/Mt Finnegan. Active during the day, these crayfish are very slow-growing but reach large sizes and are often bright blue and red.

Smooth crayfish like their spiny cousins, feed on rotting leaves and other plant detritus (not meat). In dry weather they shelter in burrows, which can be destructive to levee banks and dam walls. The female holds her young under her abdomen with special swimmerets as they develop.



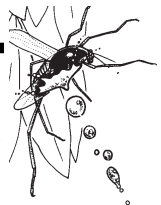
The Lamington spiny cray — the Mt. Lewis spiny cray is similar but more spiny.

Two particularly large, soft-bodied, **freshwater prawns** are found in the Wet Tropics. The giant Mitchell prawn (*Macrobrachium rosenbergii*), with a carapace up to 115mm long, is possibly the largest in the world. It is found in western rivers while the similar *M. lahs* is found in eastern rivers.

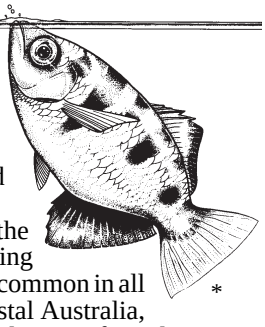


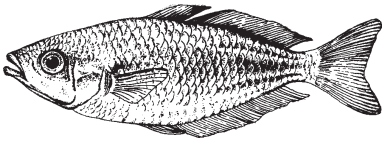
Sawshelled turtles are frequently seen in Wet Tropics rivers and lakes where they feed on fruit, crustaceans and molluscs. In many places they are very tame, paddling over to visitors as they appear, but it is not in their interest to feed them.

*Illustrations marked * courtesy CSIRO from* The Insects of Australia



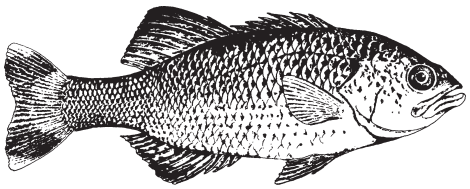
Archerfish have also earned the name riflefish because of their ability to shoot jets of water at insect prey above the water, knocking it to within reach. A ridged tongue fitting into a groove in the roof of the mouth form the squirting mechanism. They are common in all rivers in northern coastal Australia, including estuaries and areas of gentle flow, near banks. Six or seven large and small dark blotches along the upper sides are distinctive, although they may become almost completely dark at night or if alarmed. Populations introduced to Lakes Tinaroo and Eacham are thriving and breeding.





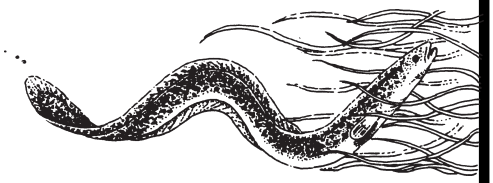
At least seven species of **rainbowfish**, each with many variations, are among the most abundant freshwater fish in the Wet Tropics. They are small — usually 5-8cm — inquisitive and active and are seen in schools. The Lake Eacham rainbowfish was thought to have become extinct in the lake within 10 years of its discovery, due to the introduction of other aggressive and predatory species. However, DNA testing has since revealed that this fish is alive and well, and living in disguise in many streams and rivers. These fish simply look different to the ones found in Lake Eacham. Rainbowfish are considered 'plastic', meaning that they will change form and even colour to suit their surroundings, the classic Lake Eacham rainbowfish being more suited to stream than lake-dwelling. Rainbowfish hybridise easily.

The eastern water dragon frequents branches overhanging the water, dropping in if disturbed, sometimes from quite a height. It feeds on a variety of insects and aquatic organisms, including frogs, as well as fruits. It is the largest dragon lizard in Australia, growing up to one metre in length.



The **jungle perch** has distinctive dark blotches on upper and lower lobes of the tail — hence its other name, flagtail. Found in clear, flowing rainforest streams these fish are often seen because of their active and inquisitive natures. They must breed in salt water, juveniles migrating upstream in January. Jungle perch eat mainly fallen insects on the water surface as well as fruits, such as figs, crustaceans and small fish.

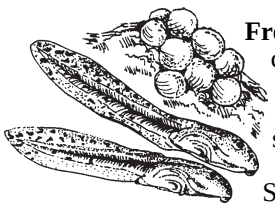
The **roman-nosed goby**, one of many goby species in the Wet Tropics, is common in clear, flowing streams, where they bury themselves in sand, in areas of gentle flow, with just their eyes showing. However, when disturbed, they can be seen darting away and burying themselves again within a few metres.



The **long-finned eel**, one of the world's largest freshwater eels, grows up to 2m in length. It is widespread in Australia and has close relatives in countries all around the Pacific.

Eels are extraordinary travellers. Adults gather to spawn in deep channels, at about 300m, in the Coral Sea, near New Caledonia, probably dying afterwards. The resulting larvae, which are transparent and leaf-like, float in ocean currents for up to three years before reaching coastal waters where they develop the adult shape. Masses of these elvers then move upstream, climbing up waterfalls and even concrete weirs. Eels breathe through their skin, so, as long as it stays wet, they can remain out of the water for hours and can also migrate overland through damp vegetation, thus reaching water bodies not connected to any watercourse.

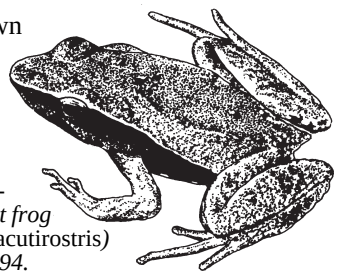
Once they have found a home the eels may stay there for 20 years or more before setting off to sea to spawn. A few may never leave land-locked lakes, reputedly growing to 3m or more, and as major predators may even eat ducks. Eels find food by smell and by using pressure sensors, seen as white dots along the sides of the body, to detect changes in water currents. Because of their climbing abilities they are often the only fish in upland streams.



Frogs and tadpoles are an important element of the fauna in upper catchments of our tropical rivers but this is where most frog extinctions have occurred, seven species having disappeared from rivers above 450m. Three of these still inhabit lowland streams but the other four seem to have vanished completely.

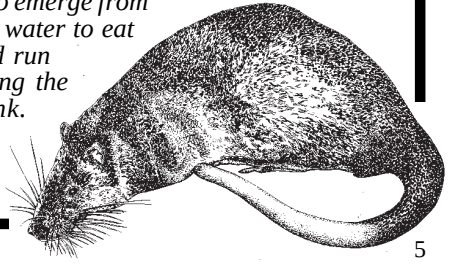
Some interesting trends have been recorded. It seems that when populations of frogs are under stress they become less symmetrical. Museum specimens of the frogs which had declined (taken beforehand) were measured and it was discovered that in the year before the event there were noticeable differences between the left and right sides of their bodies. One species has since recovered in numbers and measurements taken after this showed that the frogs also recovered their symmetry. Asymmetry has been linked to environmental stress — but what that stress might be in pristine upland streams is still baffling scientists.

Whatever the reason, the decline of frogs in upland streams is serious. In these areas, where relatively few fish are found, frogs and tadpoles play an important role in the food chain. Frogs feed on insects and in turn are eaten by snakes, goannas, birds and many mammals, while tadpoles, by feeding on leaves and detritus in the waterways, supply fine detritus and protein (themselves) for other animals (aquatic invertebrates, crayfish and fish, if present). It is not yet known what the effects of their disappearances will be. It is possible that the river nutrients, instead of being 'fixed' by the tadpoles, will simply be flushed out of the system, causing a long-term impoverishment of upper stream ecosystems and that the whole system of predators and prey will change.



*The last sharp-snouted torrent frog (*Taudactylus acutirostris*) was seen in 1994.*

*Apart from the platypus, the **water rat** is the only mammal inhabiting freshwater in Australia. The two can easily be mistaken in dim light at dusk when they are both active in the water. The best distinction is the white-tipped tail of the water rat. Unlike platypuses, water rats also emerge from the water to eat and run along the bank.*



Questions & Answers

Q Does the Great Barrier Reef have the palolo worm rising in November as in Western Samoa and Guam in July? I refer to the minute bluey-green reef worm, which is a delicacy.

A The name palolo originally referred to a Samoan species of eunicid worm (*Eunice viridis*) but is now applied to other species as well. The Samoan palolo worm occupies rock and coral crevices. In early summer it produces special reproductive segments (epitokes) which are released to swim to the surface, at the beginning of the last lunar quarter. After releasing sperm and eggs they then die. The inhabitants of Samoa can tell exactly which night the palolo worms will swarm and, considering them a great delicacy, scoop up great numbers of them from boats. Closely related species are found in the northern Great Barrier Reef where they swarm just after dusk in early summer. With a flash of light, the entire bodies of these nereid worms (ragworms) burst open, shedding eggs and sperm in a suicidal mating ritual.

Q How can I tell the difference between toad and frog eggs?

A That is quite simple. Toads lay their eggs in long strings of jelly up to 20 metres long. No Australian frogs do this. So, if you find strings of eggs, simply pull them out of the water and leave them in the sun to dry out and die. Toadpoles and tadpoles can also be distinguished. Toadpoles are completely black, while native frog tadpoles have some pale features, often lighter-coloured undersides with a range of colours and markings. Strangely, cane toadpoles are quite small and they are found in dense swarms. They have thin, whiplike tails and do not surface for air like native tadpoles.

Q Are fireflies and glow-worms related?

A Glow-worms are the larvae of the fungus gnat (*Arachnocampa luminosa*). They live in the roofs of caves, suspending fine threads of glowing droplets to act as a bait for small insects, the glow-worm's prey. The adult, which lives only for a few days, is also luminous.

Fireflies are actually beetles. Both males and females produce flashes of light from the underside of the abdomen, using these to attract mates. In some places this flashing is synchronised. Usually it is the males which fly, just after dusk. Firefly larvae also glow, and are common in leaf litter where they prey on snails.

Tourist talk

ENGLISH	GERMAN	JAPANESE	
dam	Staudamm	dam	ダム
flood	Flut	kouzui	洪水
dragonfly	Libelle	tonbo	とんぼ
crayfish	Flußkrebs	zarigani	ざりがに
platypus	Schnabeltier	kamonohashi	カモノハシ
burrow	Tunnelsystem	kakure ana	隠れ穴
bill	Schnabel	kuchibashi	くちばし
sensors	Sinnesorgane für Elektro- und Drucksignale	kankaku kikan	感覚器官
spur	Giftsporn	kezume	けずめ
to drown	ertrinken	oboreru	溺れる

Facts and stats

Only about 3 percent of the earth's water is not salty and much of that is tied up in great ice sheets at the poles.

Weedkillers containing glyphosate break down quickly after application and are considered relatively environmentally friendly. However, the surfactant, or wetting agent, used in many of them (not the actual glyphosate itself) can be fatal to frogs and tadpoles. Please do not use these near waterways.

Removal of snags may make a river less hazardous for navigation but deprives fish and other animals of habitat, refuges and spawning locations and makes upstream navigation more difficult. It is better to reposition than to remove snags.

While barramundi and other fish move downriver to spawn, in North America, salmon move upriver from salt to freshwater. Dam construction has made salmon extinct in some rivers.

Dragonflies and damselflies can fly forwards, sideways and backwards.

The giant petalurid dragonfly, one of the world's largest, lives in the Wet Tropics. It has a 18cm wingspan. About 250-300 million years ago there were giant dragonflies and damselflies with wingspans over 60cm.

In Australia there are at least 195 species of dragonflies and 107 species of damselflies. More than 150 species are found in north-east Queensland and Cape York — more than in any other part of Australia.

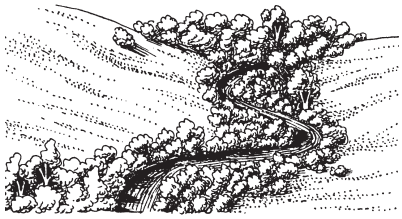
With over 7000 species known to date, caddis-flies are the one of the largest orders of aquatic insects.

The New Zealand long-finned eel spends up to 60 years in freshwater before migrating to spawn.

The world's largest freshwater crayfish lives in Tasmania. It reaches about 4.5kg in weight.

A platypus has been found within 15km of downtown Melbourne. In some waterways, up to 10 percent of platypuses have something caught around them. One was found wrapped in a loop of nylon line which had gradually sawn through the creature's ribs and opened up its lung cavity, with fatal results.

The human element



Apart from physically interfering with river flows, human impacts on the actual quality of water in freshwater ecosystems are so numerous and far-reaching, it is impossible to do more than touch on them on this page. Some of the issues include:

• Introduction of pathogens (disease-causing micro-organisms) from sewage as well as animal waste which can infect humans as well as farm animals and wildlife.

• Nutrient enhancement from sewage, fertilisers and animal waste can lead to excessive plant growth, including potentially toxic algal blooms, as well as affecting the marine environment, particularly coral reefs.

• Oxygen depletion can be caused by excessive plant and algal growth, high temperatures and low water volumes. Oxygen is needed by most aquatic animals and plants.

• Chemicals such as pesticides, herbicides, heavy metals and hydrocarbons (oils) introduced from agricultural, industrial and urban sources have the potential to poison aquatic life as well as reduce water quality for human and agricultural use and to damage irrigation equipment.

• Sediment from agricultural run-off, urban development, sand dredging, erosion and removal of native riverbank vegetation can clog gills and smother eggs of fish and invertebrates, reduce light levels needed by aquatic plants and reduce habitat and food availability for invertebrates. It also blocks irrigation equipment and is a threat to offshore coral reefs.

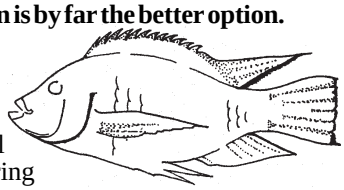
• Temperature fluctuations caused by water pollution and removal of streamside vegetation affect aquatic animals.

• Acid sulphate soils in coastal areas, when exposed to air, produce sulphuric acid causing fish deaths and decreasing land productivity.

• Litter can entangle and kill platypuses, fish and other wildlife.

Aggressive outsiders

The introduction of exotic plants and animals are one cause of a decline in the quality of our waterways. Unfortunately control of these invaders often involves the use of chemicals which can result in the death of most other aquatic fauna and flora in the affected waterway. Obviously prevention is by far the better option.



Tilapia (two species) are members of the Cichlid family, which originally came from Africa. They are also called mouthbrooders, because the female keeps the eggs and the hatchlings in her mouth until the fry are about five days old. She eats nothing during this time.

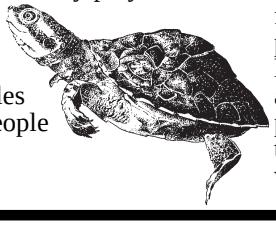
Commonly kept in aquaria, these fish have, at some stage, been introduced to waterways of Queensland. Unfortunately they are very aggressive, territorial fish which breed rapidly, with high survival rates, and eat almost everything, including invertebrates, other fish and their eggs. As a result they have a severe impact on native fish. Although edible, most tilapia are too small because they overcrowd their environment, individuals becoming stunted in the process.

Tilapia now occur in tributaries of Lake Tinaroo and there are concerns that they will move into the dam. Also, if they enter the headwaters of the Mitchell, they could reach the Gulf and keep going into the Northern Territory. They are able to survive in saltwater and are quite capable of moving along the coast from one river system to another.

The best defence against tilapia is to keep waterways and riverside vegetation in pristine condition, giving native fish a better chance to maintain their territories against the invaders. Tilapia move more rapidly into disturbed streams. Also, of course, they must be destroyed if caught, not used as live bait and NEVER dumped into waterways — a maximum fine of $60 000 exists for deliberately releasing a noxious fish like tilapia into any Queensland waters.

Tilapia are among the worst of a large number of fish introduced into our rivers. Guppies, swordtails, mosquito fish and platies, from Central and South America, are common in many creeks. Sometimes introduced to control mosquitoes, they are less effective than our native rainbowfish.

Even moving native Australian animals from one river system to another can cause problems. Freshwater crocodiles have turned up in water systems in the Wet Tropics, where they do not naturally occur, presumably dumped there by people. Although much less of a threat to humans than salties, they prey on platypus and fish, disrupting ecosystems which have evolved without this large predator.

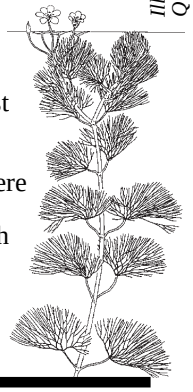


There has been an increase in numbers of Krefft's river turtles (right) in streams of the Wet Tropics. It is suspected that people are collecting them in westerly or sluggish rivers and then releasing them into local rivers.

Hymenachne is a plant version of the cane toad. Introduced in 1970, to benefit farmers, it has turned nasty. The cost of controlling its spread is likely to be much greater than the benefits for the cattle industry.

Hymenachne, a grass from South and Central America, can grow in water up to 1.5m deep, providing a store of fodder for cattle in dry times. While this has proved beneficial for farmers in central Queensland, in wetter areas it is proving fairly useless for this purpose because it doesn't dry out sufficiently and the cattle don't eat it. Instead it spreads, infesting drains, lagoons, creeks and the edges of mangroves. It is of particular concern to cane farmers who find their drains clogged and their sugar crops invaded. It also tends to stagnate water and reduce oxygen levels with detrimental effects on fish and other aquatic creatures, reduce access to waterways for recreation and wildlife, and displace native vegetation.

Hymenachne should never have been introduced to Australia and neither should pond apple, cabomba (right), water hyacinth, alligator weed, salvinia, and a host of other water plants. When introduced into a foreign environment, where pests and other natural limitations to their growth are absent, too many plants have the potential to become dangerous weeds.



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Bookshelf

The Remarkable Platypus
Australian Platypus Conservancy and Melbourne Water

A series of fact sheets, available in a bound booklet, full of information as well as practical advice on how to reduce human impacts, emergency care, hints on spotting and a sighting report sheet. Copies are available, for $3.50 to cover postage, from the Australian Platypus Conservancy, PO Box 84, Whittlesea, Vic. 3757; Tel: (03) 9716 1626;
Fax: (03) 9716 1664.

Wildlife Australia, Summer 1990
A sixth sense
Paul Manger

An article on electro-sensory perception in platypuses and echidnas.

Nature Australia Vol 25 No. 2 Spring 1995
Platypus pursuits
Melody Serena

Nature Australia Vol. 25 No. 6 Spring 1996
Metropolitan monotremes
Melody Serena

The author of these articles has been tracking platypus movements in the waterways of Victoria, including Melbourne's Yarra River.

Australian Natural History Vol. 22 No. 11 Summer 1988-89
Dragons and Damsels
David Thompson

This article is subtitled 'An in-depth penetration of their sexual strategies'.

Freshwater fishes of Far North Queensland
Brett Herbert & John Peeters
DPI Queensland (1995)

Covering the area from Cardwell to the tip of Cape York, this is field guide, with 84 photographs, has useful information on the biology and ecology of the fish as well as fishing and handling techniques.

Water Allocation and Management Planning
Department of Natural Resources (1997)

WAMP, an initiative of the Department of Natural Resources, aims to develop management plans for the main river basins in Queensland. The needs of all users, human and otherwise, are taken into account. Available from DNR, PO Box 2454, Brisbane, QLD 4001.

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WET TROPICS MANAGEMENT AUTHORITY

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service