NATURE TERRITORY

March 2009

Newsletter of the Northern Territory Field Naturalists Club Inc.
PO Box 39565, Winnellie, NT 0821

Meetings are *generally* held on the second Wednesday of every month, commencing at 7:45 PM, in Blue 1.03 (Business Faculty Building) on the Casuarina Campus of Charles Darwin University.
Subscriptions are on a financial-year basis and are: Families/Institutional - $30; Singles - $25; Concessions - $15. Part-year discounts are available for new members from January 1 each year.

The Brown Booby is one of three booby species that nests on Christmas Island (article page 7). Boobies nest on islands and feed at sea. The Brown Booby also breeds on islands off the Qld and WA coasts but is not known to breed in the Northern Territory. However, it is fairly often seen off the NT coast (e.g. near Darwin, see *Interesting bird sightings* in the February newsletter). This photo was taken on Christmas Island by Tida Nou.

Club activities

March meeting. Wednesday March 11, 7:45 PM. Blue 1.03 (Business Building), CDU.

Robyn Delaney

"In Darwin's footsteps – a recent trip to the Galapagos"

The name "Galapagos" conjures up visions of unique wildlife. These volcanic islands off the coast of Ecuador are irrevocably identified with Darwin's voyage on the Beagle in 1835 and his later theory of evolution. Today they are visited by tourists eager to see the fascinating wildlife for themselves. With the variety of habitats, endemic birds, lumbering tortoises and clear sparkling oceans teeming with life, the Galapagos is well worth the visit. It is also a microcosm of environmental problems elsewhere – human pressure on resources and weeds and feral animals.

Galapagos marine iguana. Photo: Robyn Delaney.

Robyn Delaney is the manager for the sustainable use of wildlife for the Department of Natural Resources, Environment, the Arts and Sport. She spends most of her holidays exploring some of the natural and wildlife paradises still left on earth. Her talk will be a photographic ramble through the Galapagos Islands.

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March field trip. Frogging @ Mickett Creek, Saturday 14th March.

Staff of the Darwin Amphibian Monitoring Project (DAMP) (Biodiversity Unit, NRETAS) will demonstrate some of their methods for monitoring wetland health using frogs as indicators. We will learn to recognise the distinctive calls of some of our wetland friends and how to locate and identify them in the field.

Meet at 7:00 PM at the corner of McMillans Rd and Stevens Rd (near Knuckey Lagoon). From there we will drive in behind Mickett Creek.

Bring a torch. Come prepared for wet weather and wet feet; gumboots are recommended. As frogs are sensitive to insect repellent, please keep your hands clean of repellent. For more information, phone Alistair Stewart - 8995 5022 (work) or e-mail *alistair.stewart@nt.gov.au*, or phone Louise Harrison on 0428 636835.

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April 2009 meeting. Wednesday April 8. Brian Thistleton: *Dragonflies*.

May 2009 meeting. Wednesday May 13. Paul Horner: *Lizards of the Top End*.

June 2009 meeting. Wednesday June 10. Iain Field: *Shark research in the Top End*.

July 2009 meeting. Wednesday July 8. Bob Wasson: *Sedimentary landscapes*.

August 2009 meeting. Wednesday August 12. Gay Crowley: *Getting excited about tropical grasses*.

Top End Native Plant Society activities

Meeting, Thursday March 19, 8 PM. Dave Liddle: *Management of* Boronia quadrilata *and* Boronia viridiflora*, two threatened species from western Arnhem Land*. Marrara Christian College.

Excursion, Sunday March 22. Charles Darwin National Park. Dave Liddle will lead a trip to continue monitoring the ground orchid *Nervilia peltata*. Meet at the main car park at 9 AM.

Excursion, Saturday March 28. Kakadu in the Wet. A walk to Koongarra Saddle, led by Ian Morris. For more information, contact Russell Dempster on 8983 2131.

Club notices

Welcome to new members: P. Holbery

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Thank you

The previous issue was proof-read by Christine Maas and collated and mailed by Susan Jacups. It was printed by Stuart Young and Don Franklin using equipment kindly made available by the Biodiversity Unit, Department of Natural Resources, Environment and the Arts, Berrimah and the School for Environmental Research at Charles Darwin University.

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Newsletter contributions welcome

Sightings, reports, travelogues, reviews, photographs, sketches, news, comments, opinions, theories ..... , anything relevant to natural history. Please forward material to *eucalypt@octa4.net.au* or the Club's postal address, or contact the editor on 8948 1293.

Deadline for the April newsletter: Friday March 20.

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Need an NTFNC membership form? Go to: http://www.geocities.com/ntfieldnaturalists/subscription.htm.

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Club library

Donated by Emma Woodward, CSIRO:

Woodward E, Jackson S, Straton A. 2008. *Water resources of the Howard River region, Northern Territory: a report on the social and cultural values and a stakeholder assessment of water use scenarios.* CSIRO Sustainable Ecosystems: Darwin. 175 pages.

The Club's journal, magazine and reference collection is available to members. Lists of holdings can be found on our web-site: http://www.geocities.com/ntfieldnaturalists. The library is housed in two sections:

Books, reports and CDs: at the medical clinic of Dr. Lyn Reid in the Rapid Creek Business Village. This can be accessed directly between 9 AM and 2:30 PM Tuesday to Thursday, and 4–6 PM on Tuesday, or indirectly by phoning Lyn at work on 8985 3250.

Journals: in the office of Don Franklin at CDU Casuarina (Red 1.2.34 = room 31.2.34). These can be accessed directly during working hours, or by ringing Don on 8946 6976 (w) or 8948 1293 (h).

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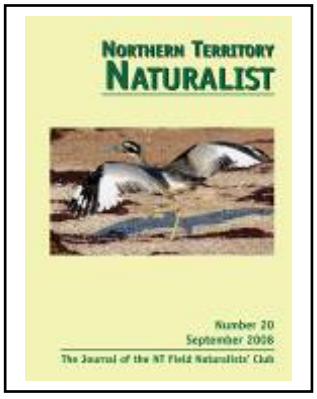
Northern Territory Naturalist



The Editorial Committee of the Club's journal, the *Northern Territory Naturalist*, is now calling for manuscripts for issue no. 21. The journal publishes works concerning any aspect of the natural history and ecology of the Northern Territory or adjacent areas of northern Australia. and may include Research Papers (Articles or Short Notes), Reviews and Species Profiles.

The *Northern Territory Naturalist* is a registered, peer-reviewed journal (ISSN 0155-4093). Author instructions may be downloaded from http://www.geocities.com/ntfieldnaturalists/journal.htm. If possible, manuscripts should be submitted in digital form by emailing to *lynda.prior@cdu.edu.au*. Editors of the journal are Dr Lynda Prior and Dr Michael Braby.

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Sewage Pond Keys - Leanyer and Alice Springs

NT Field Naturalists have access to this world-famous bird-watching spot. The key can be collected from Graham Brown (h) 8945 4745. A refundable $50.00 deposit is required at time of collecting the key, which is available only to members. Conditions imposed by PowerWater Corporation apply to all visitors to the ponds. These are not onerous and are made clear at time of picking up the keys.

Bryan Baker has keys for the Alice Springs Sewage Ponds, available for collection in Darwin by members before they head south. Bryan can be reached in Darwin on 8948 2196.

The Northern Death Adder (from *Recent Literature*, page 10)

The Northern Death Adder *Acanthophis praelongus* has a modified tail-tip which it waves, whilst otherwise remaining quite stationary and camouflaged, to attract prey, much like Rattlesnakes and other vipers to which they are not, however, closely related. The Death Adders are an Australo-Papuan lineage of elapid snakes, more closely related to other Australian venomous snakes. "Female adders have shorter tails than males, but longer terminal spines" (Hagman *et al.* 2008). They investigated the implications of this variation by videotaping captive Northern Death Adders in the presence of potential prey (lizards and frogs) and experimenting with tails obtained from dead Death Adders by attaching them to a "wagging machine" [eds. words]. "Death adders lured more vigorously to lizards than to frogs, and lizards were more likely to approach the lure. ... frogs (also an important dietary component in the field) must be caught another way." "Lure movement was essential to attract lizards, and small lures were more effective than larger ones; the greater effectiveness of small lures may explain why caudal luring tends to be more common in juvenile snakes than [adults]."

Tail modified to attract prey: the Northern Death Adder. Photo: Paul Horner.

How do death adders cope with the dry season when prey is less abundant? Christian *et al.* (2007) report that the Northern Death Adder remains active throughout the year but expends less energy in the dry than the wet. The saving comes from reduced activity including less movement between feeding sites, and lower digestion costs as they feed only every 2–3 weeks during the dry season.

Pregnant Death Adders expend even more energy. Schultz *et al.* (2008) estimated that, at its peak during late term pregnancy, energy requirements were elevated almost 3-fold over the baseline in the Northern Death Adder. Of this increase, 60% was attributable directly to the embryos and 40% to supporting them indirectly.

Darwin photographer wins international prize

With "Splash", local photographer Trevor Collins won the Silver Prize for excellence in the Nature Print section of the *Federation Internationale de l'Art Photographique* competition at the Maitland International Salon of Photography (*www.maitlandsalon.com*).

The Masked Lapwing was photographed at Knuckey's Lagoon.

Cane Toads (from *Recent Literature*, page 10)

Studies of Cane Toads are proliferating .... almost like Cane Toads.

How far will the species spread? A number of authors have had a go at this question, the most recent being an interesting study by Kearney *et al.* (2008). Often, predictions are based on a climatic summary of the species' current distribution, but this has an obvious problem - what if it has yet to fully occupy the range of environments possible? Kearney *et al.*'s solution is to examine the relationship between climate and specific traits of the Cane Toad - "the ability to move, survive and reproduce". They show that the Cane Toad could breed – eggs could hatch and "toadpoles" survive and grow – in southern Australia, but that adults would be limited in their ability to move and obtain food by cold weather. In inland areas, the distribution is limited, they argue, by the availability of water for "toadpoles". Using this information, they predict that the species will occupy the Kimberley but possibly also a narrow band in the Pilbara and as far inland as Alice Springs – but not south-west WA as some have predicted – under current climate conditions. Kearney *et al.* also evaluated climate change scenarios, with mixed findings: increased temperatures might render colonisation of Perth possible, but changes to rainfall are likely to further constrain the species in inland areas.

Alford *et al.* (2009) reinforce suggestions that Cane Toads have evolved to move faster during their time in Australia with a long-term (15-year) radio-tracking study of individual movements. Their "data reveal dramatic shifts in behavioural traits (proportion of nights when toads move from their existing retreat-site to a new one, and distance between those successive retreat-sites) associated with the rapid acceleration of toad invasion."

Young Cane Toads ("metamorphs"), i.e. those that have recently transformed from tadpoles, are particularly vulnerable to desiccation, a possible weak point in their life history that offers potential for control operations. Child *et al.* (2008) investigated the relationship between these metamorph Toads, water and other life needs. During the dry season and especially in the heat of the day, young Cane Toads "were concentrated close to the water's edge". However, the food supply was better elsewhere, and there was less risk of being eaten cannibalistically by larger Toads if they dispersed. So, as soon as rain permits, expect young Cane Toads to disperse across the landscape.

As pointed out by Letnic *et al.* (2008), there is still scant formal evidence that Cane Toads have the negative impacts on wildlife often attributed to them (?because few have been out there counting). They provide evidence that the population of Freshwater Crocodiles *Crocodylus johnstoni* in the Victoria River crashed by about 77% upon arrival of Cane Toads. Affected crocodiles spanned the size range of 0.6–2.1 m long, with those in the 0.6–1.5 m range being most affected. Grace & Sawyer (2008) provide good indirect evidence that a fish – the Spangled Perch *Leiopotherapon unicolor* – and frogs – Northern Waterfrog *Litoria dahlii* and Marbled Frog *Limnodynastes convexiusculus* – can and are poisoned upon consuming Cane Toad tadpoles.

Finally, work continues exploring the way in which Toads and other frogs respond to scent cues about each other's presence – with possible local-scale management implications. Previous work has demonstrated that Cane Toad tadpoles strongly avoid the scent of other Cane Toad tadpoles (crushed). Hagman & Shine (2008) have now shown that this is a unique response to their own kind - Cane Toad tadpoles did not respond to equivalent cues from the tadpoles of four native Australian frogs. Furthermore, Pizzatto & Shine (2009) have shown that native frogs avoid the scent of crushed Cane Toad tadpoles. This might be used to condition native frogs to the presence of Cane Toads, as the abundant availability of suitable alternative retreat sites during the wet season when Cane Toads are breeding "suggest that avoiding toad scent will have only a minor impact on the behaviour of native frogs."

More "thank yous"

The NT Field Naturalists Club is grateful to Michael Gunner MP for making his Parap office available free-of-charge monthly for meetings of the Committee.

We are also grateful to Charles Darwin University who make our monthly general meeting room available for the cost of air-conditioning only. They have requested that we take care to leave the room clean for future users.

Tropical cypress-pines

Text and photos by Lynda Prior

Tropical Cypress-pine *Callitris intratropica* is the only conifer found in monsoonal Australia, and one of the most distinctive and attractive trees in the region (but maybe I'm biased). The biggest threat to cypress-pine populations over much of this region is frequent or severe fire. While large trees develop thick, often fissured bark (centre left) which confers some fire protection, cypress-pine has a very limited capacity to resprout after fire. Individual fire-killed trees may stand for decades as a testament to changing fire regimes (bottom left). In many parts of the Top End, live cypress-pines are now largely confined to fire-protected refugia, such as atop the sandstone cliffs next to Tollmer Falls (lower right).

Under favourable conditions this species can produce dense stands of seedlings: the one at top left is about 3 years old, and is alive but severely drought-stressed at the end of the exceptionally long dry season of 2008. I hope that it survived to be resuscitated by the first rains of the wet season. With luck it will grow to become part of a healthy mature stand, such as the one at top right.

Christmas Island

Report of the February Meeting talk by Tida Nou ***Lyn Reid***

Tida Nou had to work on Christmas Island last year and shared some information about the Island and her trip. About 22 km long and mostly surrounded by limestone cliffs 10 to 20 m high, the Island is much closer to Indonesia than to Australia. Its inclusion in Australia is due to long-standing guano mining which still proceeds. National and marine parks have been declared and there is a RAMSAR site. The population of around 1500 is 60% Chinese origin, 30% Malay and the remainder other: Pet cats are not prohibited.

Christmas Island is an oceanic island that has never been connected to a large landmass and it has many endemic species – 24 plants, 5 reptiles, 4 seabirds, 2 crabs and 2 bats. Parks and Wildlife are running programs to protect these species but the terrain is difficult and cats and the introduced Yellow Crazy Ant (*Anoplolepsis gracilipes*) are notoriously hard to control. There's also mining, a new detention centre and the threat, probably abated, of the Asia Pacific Space Centre!

A well known inhabitant, the Red Crab (*Gecarcoidea natalis*), migrates in massive numbers from the central part of the Island to the beaches to burrow, mate and produce eggs. These go to sea and return as small crabs in very large numbers. The crabs are protected during their migrations by closing roads and building underpasses to protect them from traffic. The Yellow Crazy Ants can destroy the crabs in the forest and during migration and this has serious effects on the forest as well as the crabs. The Island is also the home of the Robber Crab (*Bingus latro)* – a large and fearless land crab. It's OK to eat this if you are an Islander (living there for 3 months gets you the right!).

Count the Red Crabs! Photo: Jodi Salmond.

Tida showed some photographs of the three Boobies that breed on the island – Abbott's (*Papasula abbotti*) which is threatened, Brown, and Red-footed (*Sula leucogater* and *S. sula*); also the Red-tailed Tropicbird (*Phaeton rubicauda*) and the Golden Bosunbird, now considered a race of the White-tailed Tropicbird (*P. lepturus*); a Frigatebird (*Frigata* sp.) with an unruly gular pouch. Ground nesting birds are threatened by rats and cats.

It is not clear why the populations of the Pipistrelle Bat (*?Pipistrellus* sp.) and several reptiles have declined in recent years but the former is expected to become extinct this year.

There is a lighter side – superb snorkeling and diving in the crystal clear waters, encounters with the Whale Sharks (*Rhinocodon typus)* which like crab eggs, and there is caving – for those who like it.

Thank you Tida for an entertaining and informative talk.

Red-tailed Tropicbird. Photo: Tida Nou.

Fogg Dam in the wet

Reporting back on the February excursion ***Text and photos by Sherry Prince***

On Saturday afternoon, February 14, six members together with several small children met at the car park at Fogg Dam. The weather was overcast and humid, but generally fine. During daylight hours, we wandered slowly around the area, although there really wasn't much to see. Unfortunately, both the Mangrove Boardwalk and Rainforest tracks were closed, so it limited our scope for discovery. We noted several Forest Kingfishers, a Black Kite, and what we thought was an Osprey, although we could not confirm this sighting.

Everyone had brought along an evening meal, and following this we met up with Mark, one of the Fogg Dam rangers. As daylight closed, Mark walked us along the causeway explaining the history of the Dam and pointed out plants of significance. Water was flowing across the causeway and some of us decided to brave the quite unpleasant smell of the water and wade to the other side. It was at this point that we thanked and said farewell to Mark, and the members with younger children and friends decided to call it an evening.

Just as the remaining members decided it was time to head back to the car park, we noticed a long trail of single lights approaching across the causeway. Needless to say, we had to investigate (being the intrepid Field Nats that we are), and to our delight we met up with a leader and group of students from the University of Sydney who were staying nearby on a field study trip. The leader of the group was Greg Brown, and he was more than happy for us to join his group and look and learn.

I have to say that at this point I was feeling quite despondent that we had not come across one snake during our time, but this was soon to change! Although we did not come across any pythons, Tom captured and showed us a Macleay's Water Snake, a Keelback and a Slaty-gray Snake. He was extremely interesting to listen to, and once again I would like to thank him for allowing us to join in with his study group.

As mentioned earlier, there was a lot of water lying around, a sharp contract to the scene that greeted me when I visited Fogg Dam with ANN in May last year. The camera that I recently purchased let me down and so I cannot append any photos of the outing, but a few of the Dam in drier conditions are included. Mark, our ranger, suggested we should return in the dry season if we wish to see pythons, so maybe we can coordinate a few keen people to come out again one evening.

In drier times: the floodplain below the Dam.

Lotus Lily Nelumbo nucifer *flower bud (presumably).*

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Hungry gecko

This recently-hatched Asian House Gecko *Hemidactylus frenatus* appears to be eyeing off more than it can possibly chew.
Photo: Don Franklin.

Interesting bird sightings

21 January to 20 February 2009

Compiled by Ian Hance

Sightings are as reported (unvetted, unconfirmed) and have been mostly compiled from the e-mail digest of the NT birder website (http://groups.yahoo.com/group/ntbirds) moderated by Niven McCrie.

Species	Date	Location	Observer/s	Nos./comments
Waterbirds				
Black Bittern	29/1/2009	Leanyer Sewage Ponds	Dave Percival *et al.*	2
~	8/2/2009	Humpty Doo	Clive Garland	1
~	12/2/2009	Leanyer Sewage Ponds	Marc & Vicki Gardner	1
~	12/2/2009	Stuart H'wy & Roystonea Ave	Mike Ashton	1 flying
Brolga	3/2/2009	Darwin Airport	Dicaeum	2
Chestnut Rail	11/2/2009	Tiger Brennan Drive	Clive Garland	2 adults & 2 young
Seabirds				
Lesser Frigatebird	31/1/2009	Kulaluk Bay, Nightcliff	Jeff, David & Fiona Douglas	4
Pomarine Jaeger	31/1/2009	Lee Point & Buffalo Creek	Fiona Douglas *et al.*	1 still present 5/2/09
Diurnal raptors				
Pacific Baza	27/1/2009	Buffalo Creek	Jeff Stenning	1
Grey Goshawk	11/2/2009	Murrimbibbi St. Leanyer	Nigel Adlam	1
Brown Falcon	3/2/2009	Darwin Airport	Dicaeum	2 dark morph
Australian Hobby	15/2/2009	Knuckey's Lagoon	Gavin & Meg O'Brien	1
Other non-passerines				
Varied Lorikeet	29/1/2009	Buffalo Creek	Jeff Stenning & David Percival	23 to 25
Hooded Parrot	19/2/2009	South of Katherine, from train	Jeff Stenning	6 or 7 @ south end of range
Channel-billed Cuckoo	12/2/2009	Holmes Jungle	Jeff Stenning per Fiona Douglas	3 or 4
Passerines				
Rainbow Pitta	15/2/2009	Channel Island / Wickham Pt Rds	Clive Garland	1 calling
Mangrove Golden Whistler	15/2/2009	Channel Island / Wickham Pt Rds	Clive Garland	2 (pair)
White-breasted Whistler	15/2/2009	Channel Island / Wickham Pt Rds	Clive Garland	2 (pair)
White-breasted W'dswallow	12/2/2009	Leanyer Sewage Ponds	Marc Gardner	20; unusual at this time
Mangrove Robin	15/2/2009	Channel Island / Wickham Pt Rds	Clive Garland	several seen, others heard
Zitting Cisticola	12/2/2009	Holmes Jungle	Jeff Stenning	several
Additional from last month				
Chestnut Rail	c.15./1/09	Charles Darwin National Park	Mohd-Azlan J.	see note below
Peregrine Falcon	c.7/1/09	Vesteys Beach	M. Ziembicki	hassling Little Corellas
Northern Rosella	15/1/09	CSIRO, Berrimah	M. Ziembicki & P. Dostine	rare at this site

Recent observation of a Chestnut Rail nest

Mohd Azlan J.

This nest was found in Charles Darwin National Park in middle January. It was situated less than 10 m from the edge of the large saltpan in the middle of the mangroves. The nest was built in-between clumps of *Ceriops* approximately 0.8 meters from the ground. It was supported by a dead *Avicennia* branch leaning on the *Ceriops* clumps. Foliage above the nest was estimated to be 60%. Nest materials mostly consisted of dead *Ceriops* twigs and leaves from *Ceriops* and *Avicennia*. The nearest creek to this spot is about 300 meters away and is dominated by a *Rhizophora* stand; it is there that most calls have been heard.

Recent literature about Top End natural history

REPTILES & AMPHIBIANS

Compiled by Don Franklin

Snakes

Christian K, Webb JK, Schultz T, Green B. 2007. Effects of seasonal variation in prey abundance on field metabolism, water flux, and activity of a tropical ambush foraging snake. *Physiological & Biochemical Zoology* 80: 522-533.

Hagman M, Phillips BL, Shine R. 2008. Tails of enticement: caudal luring by an ambush-foraging snake (*Acanthophis praelongus*, Elapidae). *Functional Ecology* 22: 1134-1139.

Lukoschek V, Waycott M, Keogh JS. 2008. Relative information content of polymorphic microsatellites and mitochondrial DNA for inferring dispersal and population genetic structure in the olive sea snake, *Aipysurus laevis*. *Molecular Ecology* 17: 3062-3077.

Schultz TJ, Webb JK, Christian KA. 2008. The physiological cost of pregnancy in a tropical viviparous snake. *Copeia* 3: 637-642.

Marine turtles

Chatto R, Baker B. 2008. *The distribution and status of marine turtle nesting in the Northern Territory*. Technical report 77-2008, Parks and Wildlife Commission of the Northern Territory: Darwin. 309 pp. Available at: http://www.nt.gov.au/nreta/publications/wildlife/science/pdf/marine_turtle_nesting.pdf.

Koch AU, Guinea ML, Whiting SD. 2008. Asynchronous emergence of Flatback Seaturtles, *Natator depressus*, from a beach hatchery in Northern Australia. *Journal of Herpetology* 42: 1-8.

Cane Toads

Alford RA, Brown GP, Schwarzkopf L, Phillips BL, Shine R. 2009. Comparisons through time and space suggest rapid evolution of dispersal behaviour in an invasive species. *Wildlife Research* 36: 23-28.

Child T, Phillips BL, Brown GP, Shine R. 2008. The spatial ecology of cane toads (*Bufo marinus*) in tropical Australia: Why do metamorph toads stay near the water? *Austral Ecology* 33: 630-640.

Grace BS, Sawyer G. 2008. Dead fish and frogs associated with Cane Toads near Darwin. *NT Naturalist* 20: 22-25.

Hagman M, Shine R. 2008. Tadpoles of invasive cane toads (*Bufo marinus*) do not respond behaviourally to chemical cues from tadpoles of four species of Australian frogs. *Australian Journal of Zoology* 56: 211-213.

Kearney M, Phillips BL, Tracy CR, Christian KA, Betts G, Porter WP. 2008. Modelling species distributions without using species distributions: the cane toad in Australia under current and future climates. *Ecography* 31: 423-434.

Letnic M, Webb JK, Shine R. 2008. Invasive cane toads (*Bufo marinus*) cause mass mortality of freshwater crocodiles (*Crocodylus johnstoni*) in tropical Australia. *Biological Conservation* 141: 1773-1782.

Pizzatto L, Shine R. 2009. Native Australian frogs avoid the scent of invasive cane toads. *Austral Ecology* 34: 77-82.

Miscellaneous

Letnic M. 2008. A comparison of saltwater crocodile (*Crocodylus porosus*) populations in freshwater-floodplain and tidal river habitats of the Adelaide River catchment, Northern Territory, Australia. *Applied Herpetology* 5: 243-252.

Smith JG, Christian K, Green B. 2008. Physiological ecology of the mangrove-dwelling varanid *Varanus indicus*. *Physiological and Biochemical Zoology* 81: 561-569.

Tracy CR, Christian KA, Betts G, Tracy CR. 2008. Body temperature and resistance to evaporative water loss in tropical Australian frogs. *Comparative Biochemistry and Physiology A-Molecular & Integrative Physiology* 150: 102-108.

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Saltwater Crocodiles in the Adelaide River

Mike Letnic (2008) analysed survey data for Saltwater Crocodiles *Crocodylus porosus* in the Adelaide River, comparing their size in tidal-estuarine waters and freshwater billabongs and floodplains. Those in tidal-estuarine areas were predominantly (62%) in the mid-range total lengths of 1.2 to 3.4 metres. In contrast, those in freshwaters (found up to 17.3 km from tidal waters) were much more likely to be either very small (less than 1.2 m) or very large (greater than 3.4 m).

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Heat and water in frogs and monitors

Frogs face a conundrum when it is hot, especially in the dry season: if they allow their body to lose water, they risk drying out, but if they don't evaporate water, they may overheat. Frog skin doesn't allow control of moisture loss, but skin secretions do in some species. This was investigated by Tracy *et al.* (2008). Some species that resist losing water at moderate temperatures abruptly cease resisting water loss at higher temperatures, but remain below critical temperatures because they are tolerant of high temperatures.

Whereas a land-dwelling lizard may be exposed to the full contrasts of the wet and dry seasons, the Mangrove Monitor *Varanus indicus* lives close to permanent water and presumably thus also a year-round supply of food. Smith *et al.* (2008) compared metabolic rates of the species in the wet and the dry. Mangrove Monitors were less active in the dry season and reduced their metabolic rate at that time by 38%, which isn't very much. Surprisingly, they made little effort to exploit the warmth of the midday sun.