



NATURE TERRITORY

April 2008

Newsletter of the Northern Territory Field Naturalists Club Inc.
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Club web-site: <http://www.geocities.com/ntfieldnaturalists>

Meetings are generally held on the second Wednesday of every month, commencing at 7:45 PM, in room 22.03 (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.



Are these people the original Darwin field naturalists?

Photo: Breakfast at Howard River, 1923. Roy Edwards Collection, NT Library.

The Howard River catchment has changed enormously since then with horticultural and rural residential development and other demands on the catchment and its water – issues discussed at our last meeting and reported in this newsletter.

Club activities .. p2; Club notices .. p3; Moa bones .. p4-5; frogs .. p6-7;

Howard River .. p8-9; bird observations .. p10; recent literature .. p11.

Disclaimer: The views expressed in *Nature Territory* are not necessarily those of The NT Field Naturalists Club Inc. or members of its Committee.

Club activities

April meeting. Wednesday April 9, 7:45 PM. Room 22.03 (Business Faculty Bldg.), CDU.

Carol Palmer

"Coastal dolphins"

Carol Palmer's talk in April will summarise her research program into two poorly known Northern Territory dolphins: the Australian Snubfin and Indo-Pacific Humpback Dolphin. These species live in estuaries, so may be vulnerable to fishing activities. Carol's work aims to improve understanding of the species' distributions, habitat requirements and behaviour, as well as the threats they face. This will help to determine their conservation status and identify appropriate management actions.

Carol Palmer is a research scientist with the Biodiversity Conservation Division, Department of Natural Resources and the Arts (NRETA). Carol has 20 years experience in northern Australia, working on a broad range of threatened species, fire management and radio-tracking programs. Her last talk to NTFNC was about the effects of cyclones on birds and bandicoots on Martjanba Island.

April field trip. Sunday April 13. Holmes Jungle nature walk.

Meet at the top car park at 8:30 AM. Bring the usual: hat, water, sunscreen; also binoculars, camera etc. to individual preference.

May 2008 meeting. Note non-standard date and location: Friday May 16 at Mary River Park.

Combined evening meeting with the Australian Naturalists Network. There will be four speakers:

- Bob Wasson: *Geomorphic development of the Alligator Rivers floodplain.*
- Stephen Garnett: *Climate change and tropical birds.*
- Peter Jacklyn: *Termites.*
- Don Franklin: *Life history of bamboo.*

Top End Native Plant Society activities

April 17 general meeting. Speaker - Ken Scott: *Grass-layer dynamics in a long unburnt savanna.*

General meetings are held on the 3rd Thursday of the month at the Marrara Christian College, corner Amy Johnson and McMillans Drives, and commence at 7:30 PM (speaker at 8 PM). For more information, contact Russell on 8983 2131.

Saturday, April 19; excursion – weeding *Citrus gracilis* at Sayer Road, McMinns Lagoon and look at native grasses in the area – time to be advised.

Social butterflies?

Christine Maas



Have you ever wondered why butterflies are called butterflies and not – more appropriately – flutter-bys? Well, I had a look on-line, and this might be the answer to it: "The Old English word for butterfly was *butterfleoge* apparently because butterflies were thought to steal milk ... This is believed to have led to the evolution of its present name form - butterfly. An alternative folk etymology, current in Great Britain, is that it originated as a contraction of term *butter-coloured fly* referring to the Brimstone Butterfly *Gonepteryx rhamni*, often the first butterfly of Spring." (Source: Wikipedia, <http://en.wikipedia.org/wiki/Butterfly>)

The colour of butter: the Scalloped Grass-yellow. Photo: Don Franklin.

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Club notices

Welcome to new members: Trevor & Ruth Billany

New venue for Club meeting: see notice and map on page 7.

Thank you

The previous issue was proof-read by Christine Maas. It was printed by Gay Crowley 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. It was collated and mailed by Linda Rennie.

Newsletter contributions welcome

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

Deadline for the May newsletter: Friday April 25.

Club library

The Club's journal, magazine and reference collection is available to members. Lists of books, reports, CDs and journals held 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 4–6PM on Tuesday, or indirectly by phoning Lyn at work on 8985 3250.

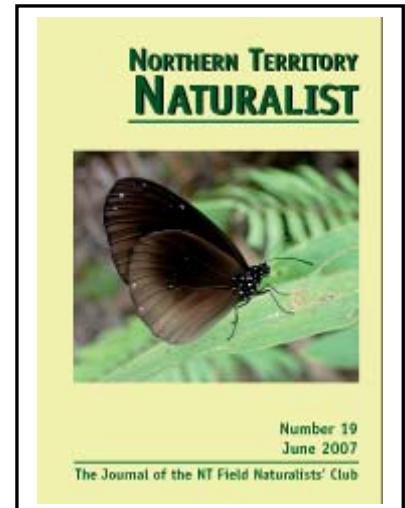
Journals: in the office of Don Franklin at CDU Casuarina (room 31.2.34). These can be accessed directly during working hours, or by ringing Don on 8946 6976 (w) or 8948 1293 (h).

Northern Territory Naturalist

The Editorial Committee of the *Northern Territory Naturalist* is calling for manuscripts for issue no. 20. Manuscripts may relate to any aspect of natural history or ecology relevant to the NT, and may include reviews, papers, research reports, species profiles and thesis abstracts.

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, Stephen Reynolds and Dr Michael Braby.

Back issues of the *Northern Territory Naturalist* are available individually (some in photocopy only) or as a set. The cost of a set is \$50- for nos. 1-18 or \$60- for nos. 1-19. Contact Don Franklin, don.franklin@cdu.edu.au.



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

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A New Zealand adventure

Lyn Reid

Brian and I spent 2 weeks in January and February 2008 camping at a swamp in North Canterbury, New Zealand. We were assisting, as volunteers, at a dig (more properly an 'excavation'). We were there in response to an invitation sent to its members by the Ornithological Society of New Zealand – we joined on one visit and kept it up because we enjoy their publications. But why accept?

MOA, that's why. I've been fascinated by these birds for years. They probably originated in Gondwanaland around 80 million years ago and, indigenous to New Zealand, became the most highly diversified of all the ratite groups. Over the last century and a half the number of recognized Moa species has fluctuated but is now held to be about nine. The large size difference between the sexes led to some extra species being described but DNA sexing of material has partly resolved this. DNA studies also suggest that the Moa were more closely related to the Emu/Cassowary group than to the Kiwi (another ratite).

Moa filled the herbivore ecological niche, there being no mammals to do this in New Zealand; there was not very much grass either so the diet was fibrous leading to the need for gizzard stones – a common finding on New Zealand farms. The birds varied in size from a heavily built large goose to being the tallest known bird – tallest if she stretched her neck upwards. Alas she probably held it almost horizontal but even so her pelvis was at the level of a tall man's head.

The only predator of adult Moa was Haast's Eagle (*Harpagornis moorei*), which is similar to but larger than our Wedge-tailed Eagle (*Aquila audax*). Presumably Forbes' Harrier (*Circus teauteensis*) attacked unprotected nestlings and fledglings but there were no land carnivores to attack the eggs. Late maturity, large size, low fertility rate and a long life are typical attributes of island-adapted birds, shared to an extreme by the Moa.

There may have been surviving Moa when Europeans first visited New Zealand but the sightings are difficult to validate. There is no doubt that from the 14th century onward their populations were decimated by humans and rats. Perhaps the recent date and speed of their extinction adds to their fascination.



Neat: the modern Moa "dig" site.
Photo: Brian Reid.



Setting for a New Zealand adventure:
Pyramid Valley, in the dry hills of north Canterbury.
Photo: Lyn Reid.

A further incentive to accept was the site of the dig – no less than Pyramid Valley, named imaginatively after the eroded 'pyramid shaped' rocks on its sides. This valley is famous for the finding of many almost complete skeletons of several Moa and some other extinct species. In 1938 the then farmer and his son (Grandfather and Father of the current farmer, Michael Hodgen) dug a hole in the swamp to bury a horse but found leg bones larger than the horse's which they assumed would not be of interest to the Canterbury Museum as it 'already had plenty'. A year later the bones were rescued from the woolshed and the Museum became interested in the swamp. A large trench was dug and many bones were recovered between 1939 and 1948 (photo next page), as they were in subsequent digs at different parts of the swamp.

Our 'dig' was rather different; the photo shows how small and neat we are. Instead of picks and shovels we (mostly Richard Holdaway) used a small trowel. The material removed was dry- or wet-sieved and items of interest were collected, the source being labeled to a square metre of the surface and the depth to 10 cm layers. The aim of the excavation was not to find Moa bones, though we did want some for DNA studies, but to try to understand the history of the swamp and its preceding lake and to elucidate the local ecosystem as it was at the time the Moa died there – around 3,000 to 4,000 years ago. We were also testing the validity of using ground radar to find items in the swamp – our 'major disturbance' of the radar turned out to be a huge tree, beautifully preserved in the guttya (lake sediment below the peat). We also collected specimens of the sediments and packed them for future analysis, making sure they were protected from oxygenation until the different DNA profiles of each layer could be worked out. There were some preserved ferns and probable beach (*Nothofagus* sp.) leaves, and a delicate sternum from either a pigeon or a parrot.

Meanwhile, at a farm about 2 km away the farmer wants to flood his swamp to store water. There are Moa bones in his swamp (and I suspect in every swamp for miles, if not in every swamp in New Zealand). Not wishing to deprive science (and keen collectors) of access to his bones he is getting them out before he floods the swamp. He isn't using a trowel or a shovel – the front end loader does the job very well. He kindly allowed us a look at his bones – the photos of the Moa bones are from there.



Above: skull of one of the smaller species of Moa
(photo: Brian Reid).

Right: Moa keel (photo: Lyn Reid).



This year's excavation was, hopefully, a pilot for a larger one next year but this depends on funding. If interest from around the world is any measure then the next stage should go ahead. We met a palaeontologist from Majorca, DNA scientists (all aged about 10) from Aberdeen (extinct big cats), Oxford (DNA stratigraphy), Copenhagen (extinct big mammals), Canterbury (NZ) (all of the above) and Toronto (paleogeology). I probably missed some.

Richard Holdaway organized and conducted the program. He is to be congratulated on keeping the team together through some pretty interesting summer weather. I'd love to go again.

There is, of course, an extinct giant Australian bird – the thunderbird, *Genyornis newtoni* - equally fascinating, though not a ratite. Anyone for a more local dig?

Bibliography

Duff R, Moa and Moa-Hunters, Canterbury Museum, 1957.
Holdaway R and Worthy T, Lost World of the Moa, 1980.
Tennyson A and Martinson P, Extinct birds of New Zealand, Te Papa Press, 2006.

*Air photo of the 1939 trench and swamp.
From Duff (1957).*



An amphibious amble

Reporting back on the February excursion

Text and photos by Ashley Carlson

Saturday nights are occupied by people in many different ways, partying to the wee small hours at a club, sinking a cold stubby while watching the footy, attending the theatre, or as for 22 people including 3 kids on February 16, sloshing through the swamps with bums in the air looking for frogs.

As we assembled at the rendezvous point, the weather tried vainly to sway our mood with a drizzly shower. Unperturbed and armed with coats, brollies and gum boots, we visited three sites along Gunn Point Road, all offering slightly different habitats.

Site 1 - was a floodplain area adjacent to the Howard River. Water depth was to about 150 mm with emergent grasses to 500 mm over a deep sandy layer. Number of species observed or heard: 6.

Site 2 - was approximately 1 km up the road and consisted of an excavation on the side of the road surrounded by woodland. Water depth was over the top of my gum boot, say to 700 mm, with emergent reeds to 1.0 m around the edge over gravel strata. Number of species observed or heard: 10.

Site 3 - was an area previously stripped of sand for the landscape market, and natural drainage lines off the Howard River Swamp Road. Here we skirted the edge of pooled water through soft silty clays and sands which made for interesting walking. Number of species observed or heard: 6.

Generally the process consisted of catching a sample of frogs and placing them into plastic bags prior to a group session of identification and then release. Lack of calls was not a problem, however locating the little tadders proved to be a quite a challenge. With many of the frogs less than 1 ½ inches long and coloured sandy brown / grey, size and colouration was an issue and they made a small target for our spotlights.

Diminutive and undistinguished, but locally-endemic and only recently described: the Howard River Toadlet Uperoleia daviesae.

Situations / highlights from the night included the following: viewing the recently described Howard River Toadlet, a sandsheet specialist from the Howard and Elizabeth River catchments at site 1; witnessing three mature individuals (field natters) pouring under a shrub with obvious frustration at site 2, their parting comment being something to the effect of 'let us know when you find it with your younger eyes'; also caught at site 2 was a 150 mm long Orange-naped Snake (Moon Snake) *Furina ornata*; and at site 3 observing a young green version of the Giant Frog and a dozen Cane Toads which will soon become fertilizer.

Thanks go to Graeme Sawyer who not only led the night but articulated a great cross-section of frog related information and provided backup spotlights when our torch batteries died.

[species list on next page]



A highlight: the Giant Frog Cyclorana australis. The habits of the species are described further on pages 10 and 11.

List of frog species heard / observed:

Family **Hylidae**

<i>Cyclorana australis</i>	Giant Frog		3
<i>Litoria bicolor</i>	Northern Dwarf Tree Frog	2	3
<i>Litoria dahliei</i>	Dahl's Aquatic Frog	1	
<i>Litoria microbelos</i>	Javelin Frog		2
<i>Litoria nasuta</i>	Rocket Frog	1	
<i>Litoria pallida</i>	Pale Frog		2
<i>Litoria rothii</i>	Roth's Tree Frog		2
<i>Litoria rubella</i>	Desert Tree Frog (Red Tree Frog)	2	3
<i>Litoria tornieri</i>	Tornier's Frog	2	

Family **Leptodactylidae**

<i>Limnodynastes convexiusculus</i>	Marbled Marsh Frog		3
<i>Crinia bilingua</i>	Bilingual Froglet (Ratchet Frog)	1	2
<i>Crinia remota</i>	Remote Froglet	1	2
<i>Uperoleia daviesae</i>	Howard River Toadlet	1	
<i>Uperoleia inundata</i>	Floodplain Toadlet		3
<i>Uperoleia lithomoda</i>	Stonemason Toadlet	2	

Family **Bufonidae**

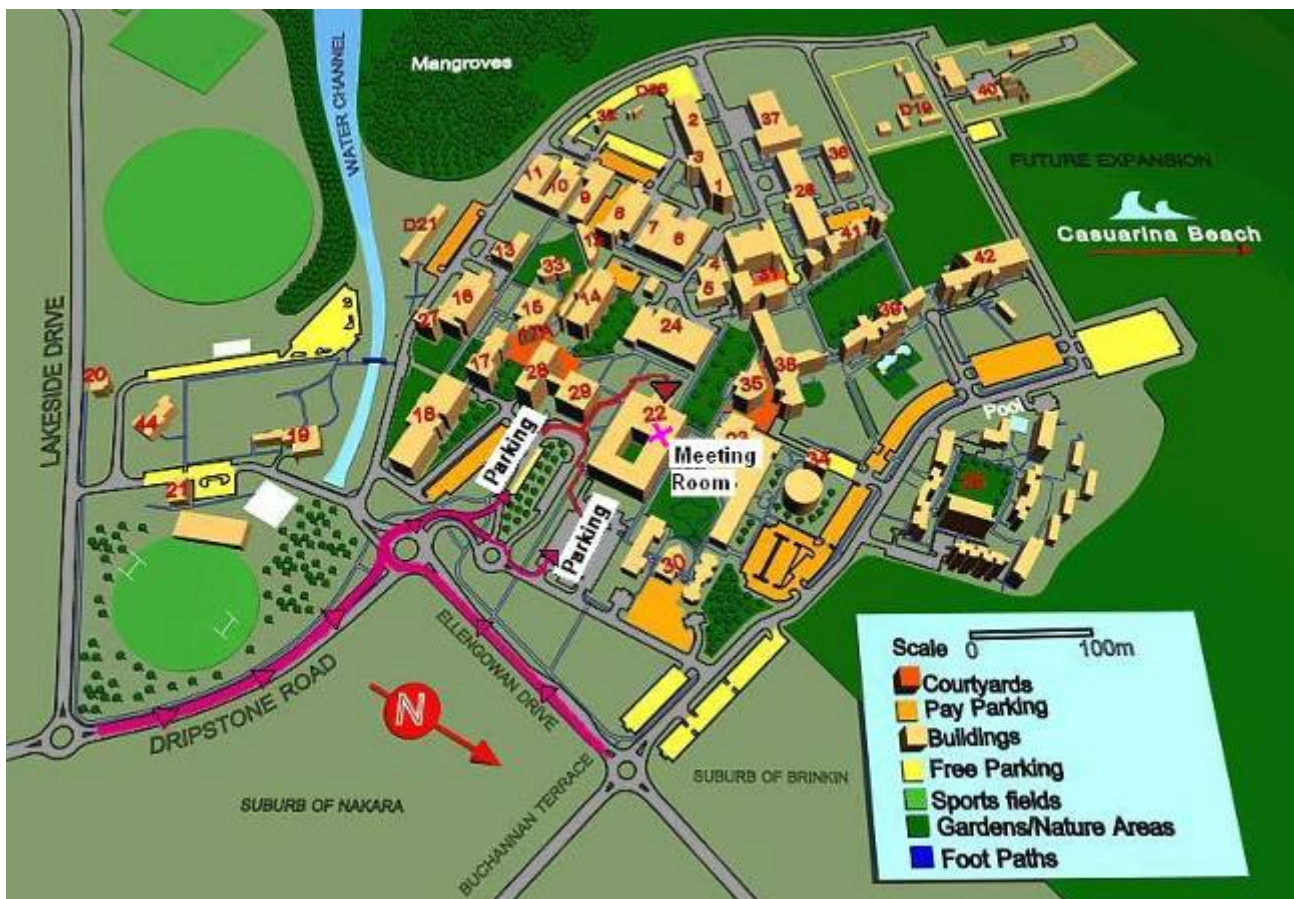
<i>Bufo (Chaunus) marinus</i>	Cane Toad	1	2	3
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Roth's Tree Frog.

New room for Club meetings

Due to clashes with CDU evening classes, we can no longer meet regularly in the SAIKS seminar room. We have negotiated a new room for at least the first half of this year - room 03 in building 22, the Business Faculty Building. The building and nearby parking areas are indicated on the map below. Entry to Building 22 is by the main door on the west side, i.e. the side facing away from the car park. Entrance via side doors on north side may also be possible.



Howard River: social and cultural values

Reporting back on Emma Woodward's talk – A project to support water planning in the Howard River catchment.

Lyn Reid

Emma is currently working for CSIRO on this project which aims to present to Government the community's views to assist in the development of a water allocation plan for this area. The plan will need to include non-consumptive uses. Development of the plan is a part of the nationwide water management effort and also part of the Northern Territory water management plan. Private, industrial, agrarian, recreational and environmental needs must be addressed.

The Howard catchment extends from Holmes Jungle to south of the Arnhem Highway, just west of the Stuart Highway and to Black Jungle but not to Fogg or Harrison's dams.

The project has looked at the history, current use and management of the region and has taken note of conflicts and concerns found. Notice is taken of resident, concerned individual, and interested group opinions. The level of current community input into the care and management of the lagoons is important in protecting them.

Some of the lagoons have a rich history. Knuckeyes Lagoon was a rice growing area at the end of the 19th century, then a market garden up to and during World War II. Motor cycle racing and picnic races were popular in 1940 and Radar Station 132 was camouflaged on the racecourse. The area is known to Aboriginal people as Barramundi Dreaming and hunting for food items still continues there.

Howard Springs also has a long history of community use, as a breakfast spot in 1923, it was a significant site during WWII. Shooting was allowed there until 1952 when a 1 mile radius ban was imposed. This was enlarged for fear disturbed birds would fly into the shooters range – there was apparently no concern as to the fate of the innocent picnickers or swimmers who had disturbed the birds. Camping was forbidden from 1977 and in 1981 there were 200,000 visitors to the reserve. The reserve was declared in response to concern about the state of the place – broken glass, filth, rifle practice on the pool and so on. Today only the bacterial count prevents a swim.

Howard Springs is, of course, spring fed and the flow in the spring is reduced toward the end of the dry season. At his time the flow may be further reduced by bore usage of the aquifer.

Most of the 137 lagoons in the catchment are 'perched'. That is, their water is prevented from sinking by a layer of impervious clay. Only evaporation reduces the level and some may continue to be fed from the superficial aquifer during the dry season.

The rivers and flood plains also need attention – there is a critical period at the end of the dry when water may be almost insufficient to support the ecosystem. Water use planning must allow for this.

There is an increasing population in the catchment and in Darwin and there is increasing agrarian and horticultural activity in the catchment. The demand for water is increasing. Currently 10% of Darwin's water is drawn from the Howard Spring aquifer. Even if this proportion is not increased the amount removed will rise as overall usage increases.

Emma then conducted a quiz – which is your favourite area? Why? What constraints are there? What concerns about the future? While the areas chosen varied the reasons – habitat, flora and fauna were all similar. Constraints varied from parking restrictions to uncontrolled dogs and most fears for the future centred on increasing use by increasing numbers.



Howard River scene. Photo: Emma Woodward.

Not surprisingly none of the Field Naturalists wanted to hunt, shoot, fish, ride trail bikes or otherwise destroy the region but Emma has talked to many groups of different interests and all the above are included in her long list of desired activities.



*A great natural asset in Darwin's rural area: McMinns Lagoon (above and right).
Photos: Emma Woodward.*

Thank you Emma for spending your time with us and for clarifying many of the current issues about water and its uses in the Howard Springs catchment.



As development of the area continues those places with strong established community groups, such as McMinns, can protect their area better than the less lucky. Models such as combined management by the community, Power and Water and Litchfield Shire, being tried at Girraween, may be of great help.

There is always going to be conflict over competing uses but perhaps a plan can accommodate most. Management of feral weeds and animals will also need to be considered

Death Adders winning evolutionary war between predator and prey (from *Recent Literature*)

Northern Death Adders (*Acanthopus praelongus*) living on the Adelaide River floodplain eat mainly frogs. Some of the frogs they eat are non-toxic, whereas the Marbled Frog (*Limnodynastes convexiusculus*) produces a sticky mucus when attacked, and Dahl's Aquatic Frog (*Litoria dahliei*) is "dangerously toxic". That doesn't stop the adders from eating Marbled and Dahl's Aquatic Frogs (Phillips & Shine 2007). Whereas non-toxic frogs are consumed immediately by the adders, Marbled and Dahl's Aquatic Frogs are envenomated and left for about 20 minutes or more, by which time the mucus and toxins have degraded and are no longer effective. *****



The skink Ctenotus quirinus, known only from the Top End and particularly Arnhem Land, was described only recently by Paul Horner (2007 – see Recent Literature, p11), who took this photo.

Interesting bird sightings

23 February to 20 March 2008

Compiled by Sheryl Keates

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
Emerald Dove	11/03/08	Lee Point	A & S Keates	1 building nest
Partridge Pigeon	2/03/08	Arnhem Hwy near Jabiru t'off	M Gardner	2
	4/03/08	Litchfield NP	A & S Keates	1 on road
Black Bittern	4/03/08	Mary River excavation pits	M Gardner	1 flying over road
	5/03/08	McMillans Rd, Knuckeyes Lag.	A & S Keates	1 flying over road
	15/03/08	Marrakai Creek, Marrakai Rd	A & S Keates & D Binns	1
Great-billed Heron	8/03/08	Channel Is bridge	X Dennett	1 or 2
Eastern Osprey	1/03/08	Rapid Creek foreshore	A & S Keates	pair, male displaying
Pacific Baza	2/03/08	Howard Springs	A & S Keates	1
	9/03/08	Finn Rd, Berry Springs	A & S Keates & D Binns	2
Grey Goshawk	27/02/08	Leanyer sewage ponds	D Binns & T Collins	1
Grey Falcon	4/03/08	Wangi Falls, Litchfield NP	A & S Keates	1 flying near Falls
Brolga	23/02/08	Heather Lag. Rd, Lake Bennett	R Stanton	1 with chick (photo)
Beach Stone-curlew	8/03/08	Wickham Point	A & S Keates	1
	11/03/08	Lee Point	A & S Keates	1, also on 15/3
	13/03/08	Nightcliff Rocks	A & S Keates	3, also on 14/3
Common Noddy	27/02/08	Nightcliff rocks	A & S Keates	1 immature
Hooded Parrot	2/03/08	tour car pk Yirmikmik, Kakadu	B Baker & L Harrison	1 male
Channel-billed Cuckoo	15/03/08	Lee Point	A & S Keates	1 heard
Rufous Owl	27/02/08	Darwin Botanic Gardens	A & S Keates	pair, also on 11/3
Little Kingfisher	2/03/08	Howard Springs	A & S Keates	1 or 2
	5/03/08	Buffalo Creek	S Keates & X Dennett	1
Mangrove Gold. Whistler	12/03/08	Nightcliff roost mangroves	A & S Keates	1 male, also on 13/3
White-breasted W'swallow	2/03/08	Leanyer sewage ponds	N Adlam <i>et al.</i>	c. 100
Zitting Cisticola	6/03/08	Holmes Jungle floodplain	S Keates & X Dennett	1+ flying & calling
	15/03/08	Marrakai Road flood plain	A&S Keates, D Binns	2
Australian Reed-warbler	4/02/08	Termite mounds, Litchfield NP	A & S Keates	1
Barn Swallow	24/02/08	Leanyer sewage ponds	A & S Keates & D Andrew	1
	14/03/08	Leanyer sewage ponds	A & S Keates	1
Red-rumped Swallow	23/02/08	Leanyer sewage ponds	D Binns & S Keates	1
	1/03/08	Leanyer sewage ponds	A Carlson	1
Yellow Wagtail sp.	15/3/08	Leanyer sewage ponds	A & S Keates	c. 40

Big Toads suffer from bad backs and more Cane Toad news (from *Recent Literature*, p11)

Brown *et al.* (2007) found that 10% of large adult Cane Toads suffer from spinal arthritis. The problem is associated with the same set of traits that make some individuals such good invaders – a large body, long legs and frequent movements. There is also a bacteria involved – *Ochrobactrum anthropi* - though cause and effect are not clear (Shilton *et al.* 2008).

Notwithstanding a wealth of anecdotal evidence of the impact of Cane Toads, there is surprisingly little scientific data evaluating the question. In a study at Manton Dam, Griffiths *et al.* (2007) found that the abundance of Merten's Water Monitor *Varanus mertensi* declined markedly within 8 months of the arrival of Cane Toads, and remained low thereafter; however, the Monitor population survived.

Cane Toads eat different food to a large native frog, the Giant Frog *Cyclorana australis*. This held true even in experimental enclosures across a range of densities, there being no effect of the Toads on either the amount or type of food eaten by the Giant Frogs (Greenlees *et al.* 2007). This could have been because food was abundant at the time. However, Giant Frogs reacted to the presence of Cane Toads by being less active.

Could there be an up side to Cane Toads? Maybe. Hagman & Shine (2007) found that mosquitoes were less likely to lay eggs in waterbodies that contained Cane Toad tadpoles (toadpoles! – that is not official).

Furthermore, in laboratory experiments, the presence of toadpoles in a waterbody reduced the size of the adult mosquitoes that emerged, and for one mosquito species, reduced the survival rate of their larvae.

A toad repellent might be handy – Hagman & Shine (2008) found that toadpoles and Toad metamorphs avoided the scent of – crushed Cane Toads. They did not avoid a number of other chemical cues including food, of course, but also the scent of native fish and other predators.

Recent literature about Top End natural history

REPTILES & AMPHIBIANS

Compiled by Don Franklin

Cane Toads

- Brown GP, Shilton C, Phillips BL, Shine R. 2007. Invasion, stress, and spinal arthritis in cane toads. *Proceedings of the National Academy of Sciences of the United States of America* 104: 17698-17700.
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- Griffiths AD, McKay JL. 2007. Cane toads reduce the abundance and site occupancy of Merten's water monitor (*Varanus mertensi*). *Wildlife Research* 34: 609-615.
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Snakes

- Brown GP, Shine R. 2007. Rain, prey and predators: climatically driven shifts in frog abundance modify reproductive allometry in a tropical snake. *Oecologia* 154: 361-368.
- Lukoschek V, Waycott M, Marsh H. 2007. Phylogeography of the olive sea snake, *Aipysurus laevis* (Hydrophiinae) indicates Pleistocene range expansion around northern Australia but low contemporary gene flow. *Molecular Ecology* 16: 3406-3422.
- Phillips B, Shine R. 2007. When dinner is dangerous: Toxic frogs elicit species-specific responses from a generalist snake predator. *American Naturalist* 170: 936-942.
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Freshwater turtles

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Surviving the dry season underground

At the beginning of the dry season when soils are still moist, Giant Frogs (*yclorana australis*) dig burrows 2 to 8 cm below the surface and remain within them until moistened by the rains of the next wet season (Tracy *et al.* 2007). As the soils dry out 2-3 months after they enter the burrow, they form impermeable cocoons so that they never dry out, even though they may be underground for 5-6 months. Whilst underground but before forming the cocoons, they weigh on average 36% more than their "normal" (above-ground) weight, the extra weight apparently being stored water.

*Giant Frog at home during the dry season
(until rudely interrupted!). Photo: Chris Tracy.*

