

NATURE TERRITORY

April 2011

Newsletter of the Northern Territory Field Naturalists Club Inc.

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Club web-site: <http://ntfieldnaturalists.org.au/>

Meetings are generally held on the second Wednesday of every month, commencing at 7:45 PM, in Blue 1.14 (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. Discounts are available for new members – please contact us.



This male Slender Skimmer dragonfly (*Orthetrum sabina*) was photographed by Tissa Ratnayeke at Crab Claw Island on the Club's March excursion. The species was common, but had not been recorded on our previous excursion to the Island in May last year.

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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 13, 7:45 PM. Blue 1.14 (Business Bldg.), CDU.

Coastal dolphin research in the Northern Territory

"Carol Palmer"

Since 2008, a research project on three species of coastal dolphins has been undertaken in two study sites in the NT: Cobourg Marine Park and Darwin Harbour. This is the first research on cetaceans to be undertaken in the Northern Territory, and the presentation will focus on preliminary results from the last three years work, current



priorities and issues.

Carol Palmer has been a research scientist in northern Australia for the last 20 years and has worked on a range of threatened vertebrate species. During the last three years Carol's work has concentrated on three species of coastal dolphins and, opportunistically, one ocean-going dolphin.

Indo-Pacific Humpback dolphins (*Sousa chinensis*) socialising. Photographed in Shoal Bay by Carol Palmer.



April field trip. Mangrove birds. Sunday, 17 April, 7:45 AM, East Point Board Walk.

Join Chris Parker for an early morning stroll through the easily accessible mangrove habitat along the East Point Mangrove Board Walk, where he often sees iconic species such as the Red-headed Honeyeater, Black Butcherbird, Broad-billed Flycatcher, Yellow White-eye and more. Meet at the carpark near the start of the Board Walk (enter East Point Reserve, drive parallel to Lake Alexander, turn right at the end of the Lake and enter the large carpark on your left).

Bring binoculars and cameras. Biting insects might be a problem so come prepared and don't forget sun protection.



May 2011 meeting. Wednesday May 11. Dr Alan Andersen: *Ants*.

May 2011 field trip. Sunday May 15. Holmes Jungle, to look at ants; to be led by Dr Alan Andersen.

Top End Native Plant Society activities

April meeting. Thursday April 21. Tissa Ratnayeke: *Photography*.

April excursion. Saturday April 30. George Brown Botanic Gardens: Tissa Ratnayeke will lead a photography excursion.

May meeting. Thursday May 19. Marissa Fontez (landscape architect): *Landscaping with natives*.

June meeting. Thursday June 16. Brigid Oulsnam: *The illustrations of William Webster Hoare*.

General meetings are held on the 3rd Thursday of the month at the Marrara Christian College, corner Amy Johnson Ave. and McMillans Road, and commence at 7:30 PM (speaker at 8 PM). Visit <http://www.topendnativeplants.org.au/index.php> or contact Russell Dempster on 8983 2131.

Club notices

Welcome to new members: Maureen Mitchell; Jana Norman; Mark Grubert; Gill Ainsworth

Thank you: the previous issue was finalised by **Fiona Douglas** and collated and mailed by **Anne Highfield**. It was printed by **Stuart Young** using equipment kindly made available by **Collections, Biodiversity and Biological Parks** from the Department of Natural Resources, Environment, the Arts & Sport.

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

Deadline for the May newsletter: Friday April 22 (Good Friday).

Need a Club membership form? Go to: <http://sites.google.com/site/ntfieldnaturalists/downloads>.

Club library: The Club's journal and book collection is available to members. Lists of holdings can be found on our web-site: <http://sites.google.com/site/ntfieldnaturalists/library>. 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). 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 Club's journal, the *Northern Territory Naturalist*, is now calling for manuscripts for issue no. 23. The journal publishes works concerning any aspect of the natural history and ecology of the Northern Territory or adjacent northern Australia. and may include Research Papers (Articles or Short Notes), Reviews, Species Profiles and Book Reviews.

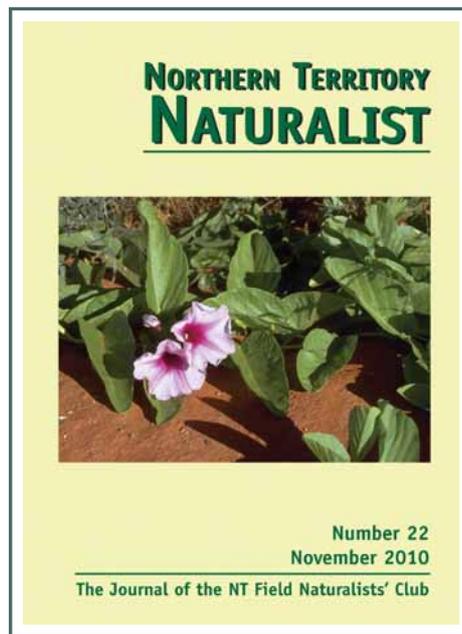
The *Northern Territory Naturalist* is a registered, peer-reviewed journal (ISSN 0155-4093) and is recognised as a Category C publication by the Australian Research Council

(http://www.arc.gov.au/era/era_journal_list.htm). Author instructions may be downloaded from our web-site:

<http://sites.google.com/site/ntfieldnaturalists/journal>.

If possible, manuscripts should be submitted in digital form by email to michael.braby@nt.gov.au. Editors of the journal are Dr Michael Braby, Dr Lynda Prior and Dr Chris Tracy.

The journal page of the web-site also has an order form for back issues of the *Northern Territory Naturalist*, which are available individually or as a set (some are out of print and available as photocopies only).



Sewage Pond Keys – Leanyer: NT Field Naturalists have access to the world-famous Leanyer bird-watching spot. The key can be collected from Graham Brown, (h) 8945 4745. A refundable \$50- deposit is required upon collecting the key, which is available only to members. Conditions imposed by PowerWater Corporation apply; these will be explained when picking up the keys and include that PWC must be notified during weekday working hours of your intention to visit.

Corrections and apology: Last month's report on the fungi field trip was written by BRUCE Maley, not Peter Maley, of course. In the body of the report, the species count was submitted by Lyn & Brian Reid, but species details were from Bruce's own notes.

We apologise sincerely to Bruce for these errors. An amended version of the newsletter can be found on the Club website.

Talking about the weather from *Recent Literature*, page 10

Have you noticed how, in the Build-Up, people from Darwin travelling to Katherine complain how hot it is, whilst people from Katherine travelling to Darwin complain how humid it is? There's a good reason behind the dichotomy; at that time of year, the two may be separated by the *northern Australian dryline*, a rather abrupt boundary between dry inland air and moister air fed by a *sea-breeze circulation*. During the Build-Up, the intense heat generates a low pressure system (a *heat trough*) over inland northern Australia during the afternoon. (At that time of year, you can often see a *heat low* south of the Kimberley on the weather chart.) The heat trough draws higher-pressure air towards it, in particular, the moist air off the north Australian coast, generating a sea-breeze circulation. Arnup & Reeder (2009) show that nocturnal conditions accelerate the sea-breeze circulation, rendering the dry-line most intense at night.

At a more local scale, "the passage of a sea-breeze front is a regular occurrence in Darwin, Northern Territory, Australia. On some days, what has been christened a 'second sea-breeze' is observed during the evening, an occurrence that has puzzled forecasters. We investigate this phenomenon using high-resolution numerical simulations of selected events. The simulations are compared with available data from automatic weather stations. They show that, on occasions when a 'second sea-breeze' is observed, the prevailing easterly to southeasterly winds over the 'Top End' [carry] a band of dry inland air northwestwards towards the Tiwi Islands during the morning. This dry air subsequently moves southwestwards towards Darwin and as it passes in the late evening, it is replaced by moist maritime air. Since this replacement is not a real sea-breeze, we refer to the phenomenon as a mid-evening surge" (Thomsen & Smith 2010).

Thunderstorms involve an intense updraft and downdraft of air (a *cell*). When several cells form in close proximity and merge, the result storm can be particularly severe. In Darwin, these are apparently known as "Northeasters" (your ed. hasn't heard the term). One such event occurred near Darwin Airport on 14 November 2005, uprooting trees, blocking outbound traffic on the Stuart Highway, and (coincidentally)



A dissipating thunderstorm anvil at dawn over the Van Diemen Gulf. Photo: Don Franklin.

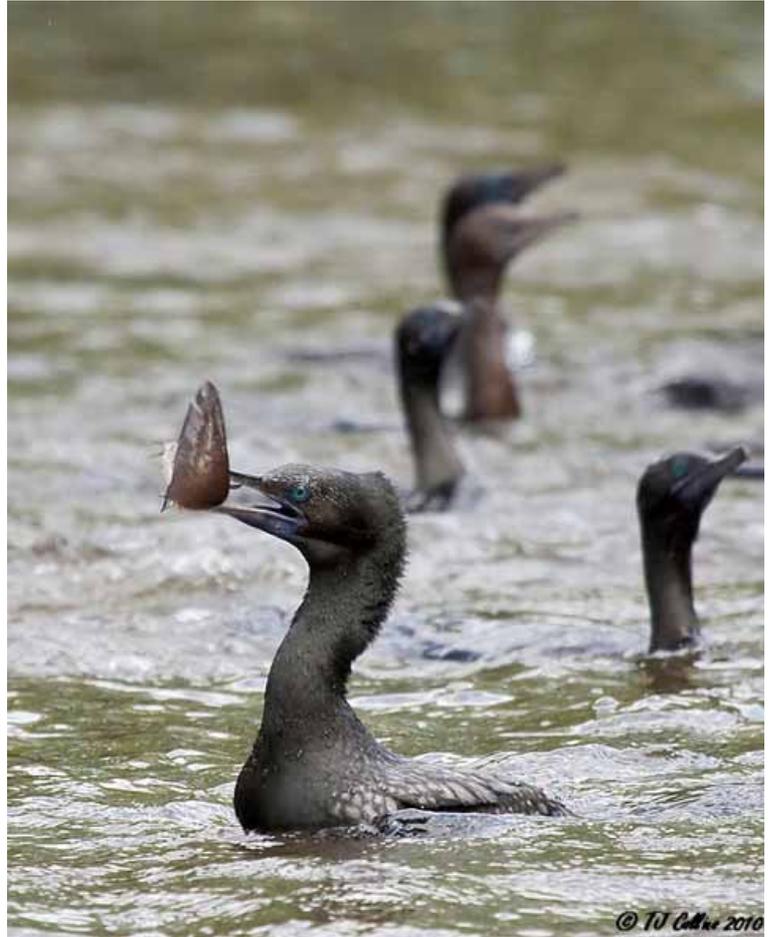
knocking out the Bureau of Meteorology's automatic weather station at the Airport. Using data obtained during that storm (obviously not from the Airport weather station!) and cloud modelling, Wissmeier *et al.* (2010) confirmed the meteorological suspicion that the formation of these *multicell thunderstorms* is related to the passage of a sea-breeze front. A initial cell forms with the passage of the sea-breeze front and, if the cell is strong and because the front tilts the angle of the updraft, further cells form in the gusts between the first cell and the front.

Rainfall during the Build-Up

Patterns of rainfall during the Build-Up vary across northern Australia. "Daily patterns in long-term rainfall records in Australia north of 23°S subject to regular monsoonal rainfall were compared with threshold levels for dryland and wetland seed germination, initiation of the growing season, patterns of gaps between early storms and the heaviness of the first falls, correlations between thresholds, spatial variation in correlation with the Southern Oscillation Index (SOI) and temporal trends in mean threshold dates" by Garnett & Williamson (2010). They found that the "earliest rains sufficient to cause seed germination or generate fresh fodder occur in the north-west of the Northern Territory with the average date being later to the south, east and west. Initial falls of the rainy season are heaviest, however, on Cape York Peninsula so that the time between first falls and saturation is shortest in the east. The probability of extended gaps between rainfall events increased from north to south." In some areas, these patterns have changed over time, with rains "tending to start earlier in the drier parts of the north and north-west and later in the east. This may be because anthropogenic climate change is resulting in fewer classical El Niño Southern Oscillation events and more frequent El Niño Modoki climate anomalies."

The fishers

A photo feature by Trevor Collins



Australasian Darter (top left and bottom right);
Little Black Cormorant (top right);
Little Pied Cormorant (centre left);
Pied Cormorant (bottom left).



It is hard being a freshie

Report on the talk by Ruchira Somaweera at the March 2011 meeting

Ross Trevena

Ruchira is a PhD student from the University of Sydney currently based in Darwin for field research into the ecology of the Freshwater Crocodile (*Crocodylus johnstoni*). He specialises in reptiles, having earlier studied snakes in both Sri Lanka and Australia, and has produced a poster on the snakes of Darwin.

The crocodile project is based at Lake Argyle in the East Kimberley and is focussed on nesting ecology and hatchling behaviour of this secretive species. Freshwater Crocodiles are widely distributed across northern Australia but to date most information on their behaviour has come from studies at the Lynd River in Qld and the McKinley / Mary River systems in the NT. Lake Argyle has a very large population of 'freshies', estimated at over 30,000, and Ruchira's project provides an opportunity for studies in a new location. Using field surveys and remotely-triggered digital cameras, Ruchira and his team of supporting volunteers have generated new information and insights into nest site selection, egg laying, predation, parental guarding and transport of young, and hatchling dispersal. The project commenced in late 2008 and will finish late 2011.

As well as being abundant, Freshwater Crocodiles grow unusually large at Lake Argyle – well over 3m, even to 4m according to local fishermen – presumably due to ample food resources and limited competition (specifically, from that other Top End crocodilian the Saltwater Crocodile – *Crocodylus porosus*).

However, notwithstanding the availability of resources to support a large population, the mainly rocky and vegetated lake shore provides a limited number of ideal sandy nesting locations which has led to some interesting behaviours. Large dominant females have been observed to guard prime nesting sites **prior** to egg laying (which is usually around August, with hatching taking place in Nov/Dec). Another notable observation is that the clutches are usually bigger (14-15 eggs on average) and the eggs bigger compared to other locations. Nesting sites are commonly re-used in later years.

In common with some other species of crocodilians, parental behaviour is unusually attentive for a reptile and is more akin to bird behaviour. Females do not actually sit on / guard the nest but they do remain nearby it seems, and once the eggs hatch and the babies cry out mum is on hand to dig open the nest and transport the young to water. The hatchlings could not dig themselves out. Interestingly however, it is not certain if it is in fact always mum that does this – it may be another female. Further, once in the water, large numbers of hatchlings have been observed grouped together, more than would come from a single nest, which suggests the formation of communal nurseries or crèches. Adults are observed to guard these crèches.



Freshwater Crocodile. Photo: Ruchira Somaweera.

It's obviously particularly hard being a **male** freshie, or more accurately getting to be a male in the first place! As for all crocodilians there are clearly defined incubation temperature bands within which either males or females form; however freshies seem to stack everything in favour of females. At both lower and upper (average incubation temperature) bands of 26-30° and 33°+ females only are produced; at 30-33° both males and females.

The remote cameras have also recorded some interesting observations into nest predation. Dingoes, goannas, storks, crows and various other animals are implicated in egg predation but dingoes, somewhat surprisingly, seem to be a dominant predator of nesting sites.

A strange as yet unexplained observation is the habit of new hatchlings to seek shade onshore on very hot days – one would think they would go to deeper cooler water rather than leave the water.

Another fascinating wildlife talk on one of the iconic but relatively little-known north Australian species, and I thought Ruchira's amateur underwater video following a hatchling was particularly impressive!



Lizard key Ruchira has prepared a key to lizards of the Darwin area for a University of Sydney field course. It is a 19 page document covering all 60-odd species. Most species are illustrated with a colour photo and, where helpful, sketches of key scale arrangements have been provided. Ruchira is happy to make it available to Club members as a 2Mb pdf file. In his absence on field work over the coming months, please contact Don Franklin on don.franklin@cdu.edu.au if you'd like a copy.

Crab Claw Island

Report on the March 2011 fieldtrip to Crab Claw Island

Magen Pettit

On the weekend of the 12th and 13th of March, 18 keen field natters travelled 130km from Darwin to Crab Claw Island Resort, situated on the south-western side of Bynoe Harbour. We were unsure what the weekend would hold as Darwin was then under the influence of a monsoon trough, and Darwin Airport's previous wet season record of 2499mm had already been broken. We were advised by Crab Claw Island staff to travel with a 4WD or high clearance vehicle and to pack our wet weather gear. Many of us left Darwin around 7am - 7.30am and the drive took us a bit longer than anticipated due to the wet conditions. The Charlotte River crossing on Fog Bay



Prepared for the rain? Rumour has it that the real point of Peter Holbery's umbrella is to ensure that all species of butterfly can find an attractive colour. Photo: Annie Grattidge.

Road was flowing fairly fast and the road depth gauge reading was 0.4m – and the one car that wasn't a 4WD had to be towed across. On arrival, we were greeted by Crab Claw Island Resort's Managing Director, Jackie Campbell and her friendly staff members. Jackie had kindly invited us to survey the island, after last year's successful dry season assessment.

During the weekend, we surveyed plants, fungi, birds, frogs, reptiles and insects. The main insects observed were ants, beetles, butterflies and moths, dragonflies and grasshoppers. The only mammal sightings were resident Agile Wallabies, a large Feral Pig and, whilst spotlighting, a Black Flying-fox feeding at the flowers of Long-fruited Bloodwood (*Corymbia polycarpa*).

Jackie joined some members on the spotlighting expedition. Other nocturnal wildlife seen included a newly emerged wood moth (Family Cossidae) drying its wings, fireflies (Family Lampyridae), frogs (and the not so popular Cane Toad), and a single Australian land hermit crab (*Coenobita variabilis*) perched nearly two metres up a tree.

A large number of juvenile wolf spiders (Family Lycosidae) were seen during the night walk and we also observed one wolf spider carrying her young on her abdomen. Tissa Ratnayeke showed a few members how to locate spiders using a torch, by placing it onto the end of their nose and shining the light onto the ground. Some thought it was one of Tissa's party jokes, however, they then saw the eyeshine of the spiders. The light from the torch is reflected from the spider's eyes directly back towards its source, producing a "glow" that is easily noticed. Jackie, in particular, was amazed at the distance at which spiders could be detected.

Overall, a total of 49 bird species were sighted, in comparison with 69 species last year. Eight "new" birds were recorded: Black-necked Stork, Grey-tailed Tattler, Terek Sandpiper, Little Tern, Spotted Nightjar, Collared Kingfisher, Mangrove Gerygone and Mangrove Robin, bringing the Island list to 77 species.

A nest of the White-bellied Sea-eagle was spotted but seemed inactive. A couple of members stumbled across a beautifully decorated bower of the Great Bowerbird with white shells, aluminium foil and a trail of carefully placed green glass fragments. Another exciting find for the 'birdos' was an active nest of a Green-backed Gerygone.

Over ten different ant genera were collected, although their identifications are yet to be confirmed. These included the Sugar Ant (*Camponotus* sp.), Valentine Ant (*Crematogaster* sp.), Meat Ant (*Iridomyrmex* sp.), Mono Ant (*Monomorium* sp.), Green Tree Ant (*Oecophylla smaragdina*), Strobe Ant (*Opisthopsis* sp.), Parrot Ant (*Nylanderia* sp.), Big-headed Ant (*Pheidole* sp.), Spiny Ant (*Polyrhachis* sp.), Ghost Ant (*Tapinoma* sp.), Pennant Ant (*Tetramorium* sp.), Black Tree Ant (*Tetraponera* sp.), and individual specimens of *Cardiocondyla* sp. and *Paraparatrechina* sp.



Green-backed Gerygone at nest. Photo: Will Duiker.

A total of 21 butterflies were identified, with four additions to previous lists: Orange Migrant, Small Brown Crow, Shining Oak-blue and a dart whose identity is yet to be confirmed. This brings our Island list to 37 species. The Orange Migrant is a handsome butterfly with white forewing uppersides edged in black and orange/yellow hindwings and forewing undersides. Rumour (another one) has it that on Sunday morning Don Franklin was seen in the vicinity of a lone, barely-flowering specimen of the vine-thicket shrub *Bridelia tomentosa* for over an hour in the hope of identifying new butterfly species! (*Ed.: never believe a rumour, even if it is true.*)

There were fewer grasshoppers sighted in comparison with last year's visit, and this may have been due to the showery weather. Saturday was mainly overcast with patchy rain, while the sun was shining on Sunday morning and the fauna seemed more abundant. Mainly juveniles were observed and these are difficult to identify to species level.



Above: Ornate Burrowing Frog (photo: Annie Grattidge). Below: Cotton Harlequin Beetle (photo: Will Duiker).



Five frog species were positively identified: Desert Tree Frog (*Litoria rubella*), Rocket Frog (*Litoria nasuta*), Ornate Burrowing Frog (*Opisthodon ornatus*), Green Tree Frog (*Litoria caerulea*) and the call from a Marbled Frog (*Limnodynastes convexiusculus*). An unidentified frog has been described by members as possibly Tornier's Frog (*Litoria tornieri*).

The reptiles identified included three skinks and two geckos: Desert Rainbow Skink (*Carlia triacantha*) *Cryptoblepharus ?metallica*, Essington's Ctenotus (*Ctenotus essingtonii*), Bynoe's Gecko (*Heteronotia binoei*) and the introduced Asian House Gecko (*Hemidactylus frenatus*). There were no snakes sighted during the weekend, nor was the 4m male Saltwater Crocodile (*Crocodylus porosus*) that regularly sunbathes on the boat ramp according to Jackie.

The flora survey featured wet season herbs. The flowers of Long-fruited Bloodwood (*Corymbia polycarpa*) and Weeping Paperbark (*Melaleuca leucadendra*) were attracting a number of bird and butterfly species. The Neem Tree (*Azadirachta indica*), initially planted around the Resort was observed to be growing along the sandy banks of the Island. This plant is classified as a potential weed threat in the NT, with birds responsible for dispersing its seeds.

Species lists, photos and natural history notes are currently being collated for Jackie. We would like to thank Jackie and the Crab Claw Island Resort staff for generously providing comfortable accommodation and the most scrumptious

meals. Thanks also to Tissa for organising the field trip. It was a productive trip and a great time was had by all.

Left: a sundew – *Drosera dilatatopetiolaris* (photo: Magen Pettit).

Right: friendly Great Bowerbird (photo Magen Pettit).



Interesting bird sightings

19 February to 18 March 2011

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	9/3	Leanyer swamp	John Rawsthorne & Jon Clark	1
Nankeen Night Heron	13/3	Crab Claw Island	Peter Holbery et al	1
Buff-banded Rail	24/2	Palmerston Bus Exchange	Mike Ashton	3
Pale-vented Bush-hen	c. 9/3	Leanyer Swamp	Jon Clarke	1
Seabirds				
Masked Booby	c. 13/3	Nightcliff Jetty	Magen Petit	1
Lesser Frigatebird	13/3	Kulaluk Bay	Fiona Douglas	2
Bridled Tern	20/2	Stokes Hill Wharf	S&A Keates	1; & report of another taken into care
Waders				
Swinhoes Snipe	19/2	Walker Court, Humpty Doo	Geoff Corry	52
~	6/3	East Point	John Rawsthorne	1
~	9/3	Leanyer Swamp	John Rawsthorne & Jon Clark	4
Birds of prey				
Peregrine Falcon	28/2	Elrundie Ave., Palmerston	Dicaeum	1
Passerines				
Mangrove Robin	13/3	Crab Claw Island	Peter Holbery	1
Barn Swallow	9/3	Leanyer Sewage Ponds	John Rawsthorne & Jon Clark	1
Eastern Yellow Wagtail	9/3	Leanyer Sewage Ponds	John Rawsthorne & Jon Clark	1

Mosquito control from *Recent Literature* in the December 2010 newsletter

The plague of mosquitoes last November was mainly of one species, the Northern Saltmarsh Mosquito (*Aedes vigilax*). In recognition of the problem it poses for the northern suburbs of Darwin in particular, population fluctuations over time, and the spatial and temporal distribution of larvae and control efforts has been thoroughly reviewed and analysed in a series of papers, the latest of which is Kurucz *et al.* (2010). "This species is a vector for Ross River virus and Barmah Forest virus, as well as an appreciable human pest. To improve aerial larval control, we identified the most important vegetation categories and climatic/seasonal aspects associated with aerial control operations in this wetland after inundation with tide, rain and tide and rain combined. The analyses showed that the *Schoenoplectus*/mangrove areas require most of the control after inundation by tide only (30.1%), and also extensive control when tides and rain are coinciding (18.2%). Tide-affected reticulate vegetation requires extensive control after inundation by rain only (44.7%), and when tide and rain inundation coincide (38.0%). The analyses further showed that most of the control needs to be carried out between September and January, with a control peak in November and December."

Another facet of the activities of Medical Entomology, the unit responsible for monitoring and control of mosquitoes in the Northern Territory, is the early detection and eradication of exotic species, notably including the dengue-fever vector *Aedes aegypti*. Nguyen *et al.* (2010) reported that "There were 2 exotic mosquito interceptions at a port facility in Darwin NT on the 25 January and 5 February 2010. *Aedes aegypti* larvae and pupae were collected live from a tank container offloaded from a vessel from Timor Lesté. The receptacle and all other receptacles in the port facility were treated with residual insecticide and the area fogged to kill any possible importations of adult mosquitoes. Follow up surveillance collected *Aedes albopictus* males in a Biogents trap near the first importation site. Further surveys and elimination measures were undertaken. There have been no further detections of any adults or larvae of these 2 species.



Genetic variation without sex from *Recent Literature* in the March 2011 newsletter

The undescribed shrub *Erythroxylum* sp. 'Cholmondely Creek' is known from Cape York Peninsula and a few hundred plants occupying a fraction of a hectare at Gove – the only site in the Northern Territory (van der Merwe *et al.* 2010). The Gove Population is not known to produce fruit, and genetic studies suggest that the population is the product of clonal growth from a single individual. In seeming contradiction, van der Merwe *et al.* (2010) identified 12 different genetic individuals in the Gove population. Remarkably, the evidence suggests that the 12 are the result of *somatic mutation*, a process that does not require flowering or fruiting.

Recent literature about Top End natural history

Back listings and summaries may be viewed at <http://www.cdu.edu.au/ser/profiles/ecologyintopend.htm>.

CLIMATE & WEATHER

Compiled by Don Franklin

The Build-Up

- Arnup SJ, Reeder MJ. 2009. The structure and evolution of the northern Australian dryline. *Australian Meteorological and Oceanographic Journal* 58: 215-231.
- Garnett ST, Williamson G. 2010. Spatial and temporal variation in precipitation at the start of the rainy season in tropical Australia. *The Rangeland Journal* 32: 215-226.

The monsoon

- Beaufort L, van der Kaars S, Bassinot FC, Moron V. 2010. Past dynamics of the Australian monsoon: precession, phase and links to the global monsoon concept. *Climate of the Past* 6: 695-706.
- Kajikawa Y, Wang B, Yang J. 2010. A multi-time scale Australian monsoon index. *International Journal of Climatology* 30: 1114-1120.
- Luffman JJ, Taschetto AS, England MH. 2010. Global and regional climate response to late twentieth-century warming over the Indian Ocean. *Journal of Climate* 23: 1660-1674.

Cloud & thunderstorm experiments

- Baran AJ, Connolly PJ, Heymsfield AJ, Bansemer A. 2011. Using in situ estimates of ice water content, volume extinction coefficient, and the total solar optical depth obtained during the tropical ACTIVE campaign to test an ensemble model of cirrus ice crystals. *Quarterly Journal of the Royal Meteorological Society* 137: 199-218.
- Boyle J, Klein SA. 2010. Impact of horizontal resolution on climate model forecasts of tropical precipitation and diabatic heating for the TWP-ICE period. *Journal of Geophysical Research-Atmospheres* 115: D23113.
- Collis S, Protat A, Chung K-S. 2010. The effect of radial velocity gridding artifacts on variationally retrieved vertical velocities. *Journal of Atmospheric and Oceanic Technology* 27: 1239-1246.
- Del Genio AD, Wu J. 2010. The role of entrainment in the diurnal cycle of continental convection. *Journal of Climate* 23: 2722-2738.
- Fan J, Comstock JM, Ovchinnikov M, McFarlane SAM, Greg, Allen G. 2010. Tropical anvil characteristics and water vapor of the tropical tropopause layer: Impact of heterogeneous and homogeneous freezing parameterizations. *Journal of Geophysical Research-Atmospheres* 115: D12201.
- Li J-p, Yin Y, Jin L-j, Zhang C-z. 2010. A numerical study of tropical deep convection using WRF model. *Journal of Tropical Meteorology* 16: 247-254.
- Protat A, Delanoe J, O'Connor EJ, L'Ecuyer TS. 2010. The evaluation of CloudSat and CALIPSO ice microphysical products using ground-based cloud radar and Lidar observations. *Journal of Atmospheric and Oceanic Technology* 27: 793-810.
- Protat A, Delanoe J, Plana-Fattori A, May PT, O'Connor EJ. 2010. The statistical properties of tropical ice clouds generated by the West African and Australian monsoons, from ground-based radar-lidar observations. *Quarterly Journal of the Royal Meteorological Society* 136: 345-363.
- von Hobe M, Grooss J-U, Guenther G, Konopka P, Gensch I, Kraemer M, Spelten N, Afchine A, Schiller C, Ulanovsky A, Sitnikov N, Shur G, Yushkov V, Ravegnani F, Cairo FR, A, Voigt C, Schlager H, Weigel R, Frey W, Borrmann S, Mueller RS, F. 2011. Evidence for heterogeneous chlorine activation in the tropical UTLS. *Atmospheric Chemistry and Physics* 11: 241-256.
- Wissmeier U, Smith RK, Goler R. 2010. The formation of a multicell thunderstorm behind a sea-breeze front. *Quarterly Journal of the Royal Meteorological Society* 136: 2176-2188.

Miscellaneous

- Thomsen GL, Smith RK. 2010. Darwin's mid-evening surge. *Australian Meteorological and Oceanographic Journal* 60: 25-35.
- Webber BGM, Matthews AJ, Heywood KJ. 2010. A dynamical ocean feedback mechanism for the Madden-Julian Oscillation. *Quarterly Journal of the Royal Meteorological Society* 136: 740-754.



Pre-history of the monsoon

Beaufort *et al.* (2010) used an analysis, including carbon dating, of pollen and nanofossils of phytoplankton and similar tiny organisms from a 31 m core to examine changes in the monsoon over northern Australia and parts of Indonesia over the last 150,000 years. The core was obtained at 2,382 m below the surface of the Banda Sea some 850 km NNE of Darwin. Importantly, the core was obtained from an area that is not subject to much run-off from rivers, so the resultant sediments should reflect percolation to the sea floor of marine microorganisms, and atmospheric pollen. The former provides a measure of marine productivity, which is heavily influenced by the strength of the monsoon, and the latter a measure of strength of the south-east trade winds that are characteristic of the dry season. (If this seems far-fetched, you probably should in fairness read this very detailed analysis.) The authors found that, whilst the amount of monsoon rainfall followed classical glacial (Ice Age) – interglacial cycles, productivity and the length of the dry season were strongly related to each other and followed c. 26,000 year cycles that are related to the position of the Earth's axis.