

Hands on the daly

The Australian Geographic Society's Eighth Scientific

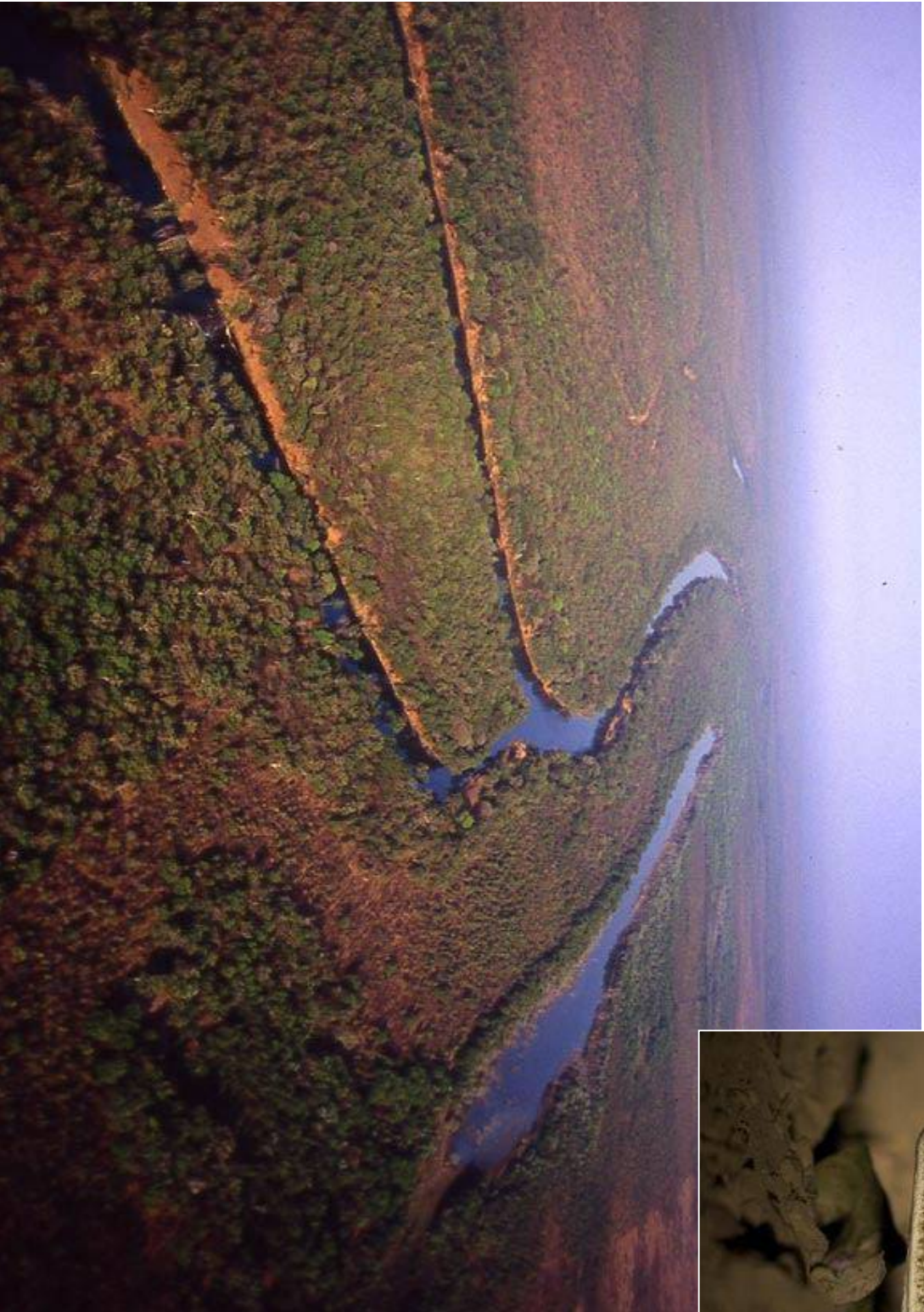
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Expedition – to the Daly River in the Top End

Turtle radio. While Dr Sean Doody weaves a tiny around the Daly's many snags, Christy Davies hones in on a pig-nosed turtle that's carrying a tracking device. These two scientists – and the intriguing turtles – were a vital part of our Top End expedition.

I'M SURROUNDED by eerie red pinpricks of light. In the post-midnight blackness, I sit in a small open boat on the mighty Daly River, 150 km south of Darwin. From among haze of insects, ecologist Mike Letnic sweeps a powerful beam of light back and forth like a lighthouse across the 50 m wide river. The beam picks up the eye shine of hundreds of crocodiles – freshies, salties – so that there seem to be as many crocs around us as there are stars overhead.

Crocodylus johnstoni



MIKE, part of the NT Parks and Wildlife Service crocodile-management team, calls out the details for me to record: "10-foot saltie, 8-foot freshie, 6-foot freshie, 14-foot saltie." For some reason, everyone still mea sures crocs in feet. Perhaps it's due to some sort of subjugated fear of losing an extremity. Suddenly the boat hits one of the Daly's many hidden sandbanks and the motor dies. It won't restart. Ranger Allan Phelps jumps over the back of the boat, standing knee-deep to tinker with it. Mike and I keep a nervous watch for salties moving behind him. A few kilometres upstream from here, Allan and another ranger Clay Smith trapped two 4.5 m males that had been taking dogs from the Daly River Aboriginal community. "Dogs and kids play together," Clay told me. Yet as we crossed the river earlier that afternoon, a group of laughing children were swimming and splashing in the river, within 100 m of a 3 m saltie sunning itself on a sandbank. When I told Mike, he laughed. "This is the Territory."

Douglas, meet Daly. At the confluence of the Douglas and Daly rivers (left), several old river channels, including Naenaye Lagoon, provide great habitat for crocodiles. Freshwater crocodiles (above) are most common this far upstream – 125 km from the Timor Sea – but there's no shortage of salties either.

Controversy on the savannah

CROCODILES, SAWFISH, SNAKES, SHARKS: you'd think the list of study subjects for the Australian Geographic Society's Eighth Scientific Expedition would frighten away volunteers. But for the first time in Australian Geographic's history, we had a full swag of paying volunteers to help the expedition's 17 scientists. Mike an, the NT Department of Primary Industry's Douglas Daly Research Farm, where our expedition was based last September, has been helping nt farmers and governments make decisions about farming the savannah. At the 53 ha site, a variety of crops, stocking rates, grasses and techniques are constantly tested. We camped there, in dongas or in tents, beside sheds and houses. Agile wallabies thumped around at night, feeding on the green pick fed by sprinklers left on 24 hours a day. It was near the end of the Dry and wherever the sprinklers weren't, the grass quickly turned to dust.

Over the 12-day expedition, the volunteers fanned out on diverse projects, including setting pit-traps for reptiles, conducting owl surveys and helping assess a new method of evaluating the health of a riparian zone (the thin strip either side of a river). I was amazed by the variety of the volunteers' backgrounds: there was Carol Pullar, who runs a wildlife shelter north of Melbourne; Bill Cunningham, a 57-year-old massage worker, who eased many an aching body during the expedition; and 67-year-old Lester

Prentice from Toowoomba in south-east Queensland, who was travelling on his own for four months. "This goes down as my best holiday yet," he told me.

But as I watched the volunteers lay 180 mammal traps in sapping heat one afternoon, while stinging green tree ants rained down on them, I knew it was no holiday. The work they were doing was vital for Brooke Rankmore, of the Department of Infrastructure, Planning and Environment's biodiversity unit, who was identifying what small mammals inhabited an ironwood and stringybark woodland.

At dawn the next morning, Brooke a platoon of volunteers were checking all the traps. Kneeling in a patch of reeds beneath a spring pandanus, with the sprung traps around her, she pulled out a couple of dusky rats, a chestnut mouse and a red-checked dunnart. The 10 cm dunnart, found only in northern Australia, sat on Brooke's hand.

Ears flat against its cheeks, it gnawed her fingers demotically with its little rows of pin-sharp teeth. "These are marsupials, they're carnivorous, eating mainly insects and some small lizards," she told the motley crew of volunteers. "It has a very triangular nose and flatter head than a mouse."

As her fingers were still raw from another stropy dunnart, Brooke was happy to pass it to me and it promptly bit me underneath a fingernail. I yelped involuntarily. Even the smallest tadders will bite you up here.

Eye to eye. The youngest of 14 volunteers on the expedition, 12-year-old Lucy Carr, admires a 600 g water-rat. The rat was one of six terrestrial mammal species caught in 180 mammal traps set each day by Brooke Rankmore and volunteers. Brooke's research showed there were fewer mammals than in previous surveys and, in particular, no northern quails. This may be partly due to the recent arrival of cane toads, but could also be attributed to a very hot late-dry-season fire in December 2003. About 50 per cent of Top End savannah vegetation is burnt each year, though mostly in less-destructive, managed fires earlier in the year.

Hydromys chrysogaster



Map

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Bunch of bustards

THE DAY'S FIRST RAYS barely penetrate the shroud of mist veiling the savannah. From a dwd I can make out the occasional Brahman, horse and straw-necked ibis. A small squadron of brolga flies overhead and a young agile wallaby, disturbed by the vehicle, bounds across a dry paddock, pursued by a wedge-tailed eagle with talons extended.

I'm with Mark Ziembecki, of the University of Adelaide, and we're looking for bustards – Australia's heaviest flying birds and one of very few species to benefit from land-clearing. "They like to be able to see far," Mark says.

One of Australia's largest flying birds prepares to launch after dining on some nearby peanuts. Male bustards are larger than females, weighing up to 15 kg. Called bush turkey, the birds are popular tucker among many Aboriginal groups. Research on our expedition confirmed that some male bustards return to the same spot to display, year after year.

With long, flowing locks, pretty-boy looks and sunglasses perched atop his head, Mark often looks more like a trendy surfer than a hard-core researcher. But the scar across his nose from a bustard wing and the thousands of kilometres he's travelled from Alice Springs to the Barkly Tableland to here, show he's more than committed to studying the behaviour and biology of this ground-nesting bird.

couple of hundred kays but the others have hardly moved at all."

We drive to a patch of peanuts that provides the only green around, and we can see 17 bustards, some more than a metre high. The larger males, which can weigh up to 15 kg, are running around within a few metres of each other. "They have what's called an exploded lek system for breeding," Mark says. "It's unusual in that the males aggregate solely for the purpose of attracting a female. The males gather – maybe 10 in a lek – and the females wander around and see who displays the best."

Part of Mark's research on this expedition – aided by patient, paddock-watching volunteers – was to confirm the males' behaviour during this time. "The females will spend two or three hours feeding in the morning, while the males will spend two or three hours displaying," he says. "Then they sit down for a few hours in the heat of the day, and do it all again in the afternoon. By the end of the breeding season their condition is just skinny."

Bustard breeding finishes in November – just before the clouds burst and all hell breaks loose.

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Ardeotis australis



Kaboom. Standing among some of the Douglas Daly Research Farm's lush irrigated pasture, Dr Mark Ziembecki shoots a net from the 'bustard buster' – a shotgun modified for catching his flighty subjects. "For some reason the males don't like being caught as much," he says. "The juveniles and females don't seem to mind."

Each silky wing on this eastern long-eared bat is only 4 cm across. Eight microbat species were caught on our expedition, four of which, like this species, are dependent on tree hollows. "One of the things that worries me with possible development of the area is the change in the vegetation," said bat researcher Matt Pauza. "Animals that depend on hollow-bearing logs, like bats and owls, always suffer." The expedition also found 16 lizard species, including hissing Mertens' water monitors (below) and this rainbow skink (opposite). The lizard count was considered low, but was probably due to the conditions towards the end of the Dry.

Myotis bifax

Varanus mertensi



STEVE WILSON / *Carlia rufilatus*



Turning turtle

ABOUT 1200 MM OF RAIN falls here each year, nearly all of it in a deluge between November and April. The rain turns the Daly into a raging brown torrent that tips the heads off river pandanus and barrels giant paper-barks down its centre, forming the many barramundi-friendly snags for which the Daly is infamous. Every 3–4 years the river spills over its 16 m high banks and spreads up to 50 km across the savannah, encouraging fish, crocodiles and turtles to disperse into billabongs well away from the river.

In morning colours reminiscent of tropical fruit, Brahman cattle (below) loom out of the mist and wedge-tailed eagles fight over a carcass (opposite). The expedition identified 126 bird species on and around the research farm, which is mainly used for cattle and crop experiments. Most local farmers seem confident that careful agricultural expansion could occur in the area without ruining the Daly. As Peter O'Brien, manager of the research farm, said: "No one wants another Murray River."

This dynamic season can be heart-breaking for locals. When I spoke to proud fifth-generation Territorian Pam Rixon at Oolloo station, she told me about the '98 flood that came up to the ceiling fans in her house. "It took the whole old homestead," she said, waving at a haystack beside a disused swing set where the homestead used to be. "I had a lot of history in that place."

The Daly's ferocious wet-season flow may be the largest of any NT river, but, fed by limestone aquifers, it also has a dry-season flow five times that of any other in the Territory. If this flow was tapped for agriculture, it would dramatically affect animals that depend on it, according to Dr Sean Doody from Australian National University,

who spends five months of every year living and working on the Daly.

"At the beginning of the management-plan process, they wanted to take 50 per cent of the dry-season flow directly from the Daly and that would have been disastrous – the Daly would have become a series of long billabongs, with implications for water flow and temperature," he says, as we cruise in a small dinghy one morning. Archerfish poke around in the shadows of large paperbarks and river mangroves. White-bellied sea-eagles study the river from high branches and rainbow bee-eaters dart from one bank to the other. I hear the monkey-like cry of a pheasant coucal while hundreds of other birds twitter, squawk and whistle in the trees. With researchers Christy-Louise Davies and Bret Stewart, Sean's tracking some of the most unusual-looking creatures here, pig-nosed turtles.

"It's often called an umbrella species," Sean says, with his North-American twang, "meaning that if you can look after it, and the ribbon grass it feeds on, everything else should be okay. The problem is we don't know if that's the case."

Although pig-nosed turtles are found on the Adelaide River and in New Guinea, the



Daly holds the world's largest population – probably 800–1000 individuals, which is about 30 per cent of the species. Sean and the other researchers have caught and tagged about 300.

"They lay twice every second year, which is really odd. And they're the only turtle in Australia with temperature-determined sex," he says.

Suddenly we see a turtle and Sean uses the boat to muster it into the shallows, while Christy and Bret hold big nets like giant tennis racquets. A freshwater crocodile splashes out of the way and we pull in Male 22, which has a radio transmitter screwed onto the outside of his shell and an external thermometer. "We've discovered they sit on thermal

springs all winter," Sean says. "For two years we saw turtles in the same spot all in a cluster, and finally we sent a snorkeller down there and he said 'There's a thermal spring!' They use them all winter long – day and night. If the river temps below 30°C, they'll use it."

Hang on Sean. "Did you say you snorkel in here?" I ask as I admire a scar on Bret's hand he picked up earlier when he tried to catch a small croc. "We snorkelled a lot during my PhD – '96–'98 – but gradually we began to see more salts," Sean says. "I get pretty nervous about snorkelling in there now."

Later, at their satellite camp on the banks of the river, sandily-bitten, bikini-wearing Christy shows me the turtle's anatomy, including its incredible twin-snorkel nose, for

which as yet there's no scientific explanation. "Unlike other turtles, they have this very soft, thin skin over their whole body and two claws on each limb," she says. "Females get about 50 per cent bigger than males – up to 20 kg – and have a smaller tail. The larger tail in the male is probably for insemination."

Suddenly, as if fed up with being the only interesting animal on display, the turtle turns its head and bites Christy hard on the boob, locking its jaws on her nipple. While Christy grimaces, I join several other blokes in a few moments of collective uncomfortableness as we wonder how to offer assistance. Thankfully, she prides the animal off herself and resumes talking about the turtle research and her love of the Daly.

"I came here a few years ago and fell in love with the place and decided I'd do almost anything to come back," the honours student at the University of Canberra says. "It's a top way to spend a Canberra winter – getting around in swimmers and bare feet everyday,"

The Douglas River bubbles through lush limestone country near the Douglas Daly Tourist Park, 20 km up the road from the research farm. Underneath the area, vast limestone aquifers gradually release water during the Dry, giving the Daly five times greater dry-season flow than any other NT river and providing year-round habitat for many species. During this period, the limestone gives the water a very high mineral content, and in some areas it builds mineral deposits called tufa dams.



What lies beneath

AS WELL AS PIG-NOSES, the Daly has another seven species of freshwater turtle – more than any other river in Australia. It's also one of the few rivers in the world to have three species of freshwater sharks or rays – a group known as elasmobranchs.

"This is the best place I've been," enthuses Richard Pillans, of CSIRO Marine Research, in south-east Queensland. "For someone who has an interest in freshwater sharks, it's perfect. There's three species here – nowhere else in the world, except perhaps the Amazon, would have that. There's a freshwater sawfish, the whip ray and the bull shark."

Of the world's 1000 elasmobranchs, only about 50, like the bull shark, swim into diluted seawater, and only about 10 live exclusively in freshwater, like the whip ray. "Most rivers in northern Australia have bull sharks, but whip rays are a bit more habitat-specific to the Daly. They sit on sand flats, so they don't like more turbid rivers like the Adelaide." Richard says whip rays are highly evolved because they've nearly lost a rectal gland that excretes salt. "If you put one in saltwater, it'd die," he says.

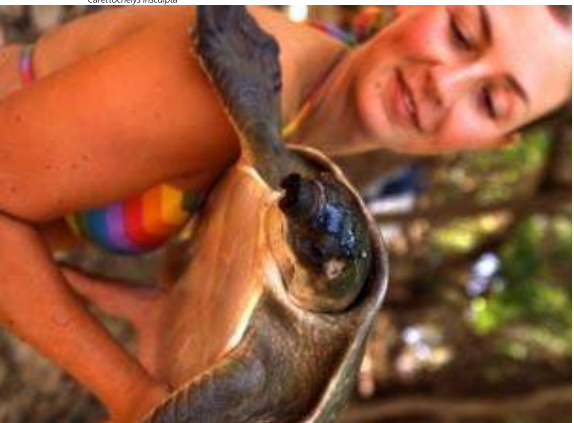
Despite a scar on his arm from a 90 cm bull shark and a brutal cut on his head from earlier in the week when he'd fallen from the boat while spotlighting, Richard, and colleague John Salini, were keen to travel downstream to Beecboom Crossing to track freshwater sawfish for the first time in Australia.

In a quiet pool near the crossing, Richard

Underground aquifers soothe the expedition's Red Desert catering and medical team (opposite) at Tiwalyin (Douglas) Hot Springs Park, 40 km upstream from the research farm. A popular camping spot, it's a women's sacred site for the Wagiman people. At Beecboom Crossing, a long way downriver, Dr John Salini, left, and Dr Richard Pillans cradle an endangered sawfish (below), while volunteer Allan Mayblom holds an underwater tracking device. Closer to camp, Christy Davies (below right), holds one of her extraordinary charges, a pig-nosed turtle.



Pristis microdon



Carettochelys insculpta

spots some of the rare fish resting on a shallow bank alongside freshwater catfish and sooty grunter. Casting a line, he quickly snares a 110 cm juvenile. It jerks into the shallows aggressively shaking its protruding saw, or rostrum. "They've got really strong shoulders so they can whip their head from side to side and cut mullet and barramundi in half," he says. I hold the fish in the shallows, observing its shark-like tail, flat ray-like body, and its rostrum – like an electric hedge-trimmer – which was missing six or seven teeth. "The rostrum's really hard – harder than bone," Richard says. "It's really dense and heavy – a saw from a 4 m sawfish weighs about 10 kg."

Sawfish used to be quite common, but now are listed as vulnerable. "Fishermen used to hate sawfish because they're so hard to get out of a net, so they'd just kill 'em and then get 'em out," Richard says. "People used to make garden fences out of sawfish rostrums."

By the end of the expedition, Richard and John had pulled in valuable data on the sawfish. They found 10 in this one pool, something that had never before been documented, and discovered through tagging that they didn't move far. Richard said this showed how important it was not to interfere with the Daly's flow. "Sawfish come up to the freshwater when they're young and if you take water out you're reducing habitat, and there aren't that many here to start with. If you didn't have linkage between all these pools in the Dry, then you'd have a problem."



Smash-test wallabies

Crocodile bait. On Ruby

Billabong, where at least one 3-4 m salite is known to lurk, Geoff Kay holds a 'smash test wallaby' while Dave Steer sets up a 'lickalator' he built that will initiate a wallaby drinking. "You won't see a set-up like that in NEW SCIENTIST too often," Dave said.

SOFT SILTY MUD oozes sensually between my toes as I stand on the edge of Ruby Billabong at sunset, not far from base camp. Beyond the billabong's mauve water lilies I see beautifully backlit agile wallabies coming to drink. Burdekin ducks wander around the far shore and an azure kingfisher patiently watches the water nearby.

Glancing down at the mud, I think the bank is moving. I look closer and see millions of tiny frogs on the hop. Picking one up, I have the sudden, sickening realisation these are not frogs: it's a plague of cane toads.

When we began planning this expedition, cane toads were still a future threat to this area. Now the introduced, poisonous pests are causing catastrophic damage. Locals say snake numbers have dropped off since the

toads arrived. Sean says many goannas just vanished. "We had four years of numbers that were pretty similar every year and then – crash."

Walking away from the skin-crawling scene, I approach Geoff Kay and Dave Steer, setting up a bizarre experiment on the edge of the lagoon. In an effort to study the interaction between agile wallabies and saltwater crocodiles, the pair are arranging a blow-up wallaby and a purpose-built 'lickalator' that initiates the lapping action of a wallaby.

"We're trying to determine whether crocs are finding wallabies visually, or using another sense, such as picking up vibrations," Geoff says. "Crocs have pits on the side of the face to detect movement in the water," Dave added.

"We understand the crocodile's hardware, but we don't understand how they use it."

Agile wallabies are the only wallabies known to dig drinking holes, in order to keep away from the water's edge where crocodiles might be lurking. Geoff has found the shallow holes – rarely more than 20 cm deep – are usually a metre or so from the water's edge. "If we could work out what the crocodile is homing in on, it gives us an idea about life from the wallaby's perspective," Dave says.

We stand back and admire the beautiful sunset scene, with the absurd blow-up wallaby poised by the water's edge, and I begin laughing. Geoff joins in. "It does look pretty ridiculous, though, doesn't it?" he admits.



Geoff and Dave celebrate when a wallaby – without a lickalator – was attacked after a week by the river. The other wallaby, with the lickalator, was attacked the first night. "This indicates that visual cues are not enough by themselves to quickly hone in on a drinking wallaby," Geoff says.



Croc attack

Agile wallabies congregate in almost plague proportions at sundown on the research farm. Studies during our expedition seemed to confirm that these wallabies dig drinking holes near water sources to avoid being eaten by crocodiles. But is this behaviour learned from parents, or is it innate among more intelligent wallabies in the Daly region? Maybe that's a subject for a future expedition.

DISMEMBERED. SMASHED. When I check the wallaby the next morning, bits of the lickalator are strewn over 5 m. The blow-up wallaby has been bitten almost in half, its bedraggled remains lying by the water's edge.

Dave and Geoff are stoked. They'd shown they can encourage a croc to strike – vital for the study's ongoing success.

They invite me on a camping trip downriver – to where the bigger salties are – to check wallaby holes and set up another crash-test wallaby. "Great idea," I thought. "Camp on a beach and encourage big saltwater crocodiles to attack." I was already nervous about their rapport with animals, knowing Dave was nursing a big bruise from earlier in the week, when he'd collected a large olive

python and it had uncharacteristically bit him on the arm. Just as well it wasn't the death adder Geoff was handling earlier in the day.

After launching a dinghy laden with camping gear, batteries, steel stakes (to tie down the wallaby) and spare fuel, we cruise until we find a beach with wallaby holes, each scraped out on the landward side. We find one hole 15 m from the water's edge – very unusual – suggesting the wallabies are pretty nervous around here. I know how they feel. Geoff records some data while Dave sets up another blow-up wallaby and lickalator.

Late at night, as I flash my torch into the water from beside my tent high on the beach, I can see 22 croc eyes looking at me. I try to be comforted by Geoff and Dave's assurances that no saltie would bother climbing this

very steep beach, but I was careful to pitch my tent directly behind theirs, reasoning a croc would get them first.

Screams from fruit bats keep me on edge most of the night, and I lie in a quandary about the Daly's future: not just the hordes of cane toads, but the push for increased agriculture with its land-clearing, the removal of up to 20 per cent of water from the aquifers that are vital for dry-season flow, and erosion of the slow-forming soils. There aren't that many places left in Australia that we can still open up for agriculture, and the Territory is still relatively undeveloped, with less than 5100 sq. km cleared in total – only slightly more than Queensland's recent annual land-clearing rate. The pastoralists I spoke to swear they'll look after the land if

more is available for agriculture, but it's hard to adopt their confidence when we've heard it all before. What will happen to the 30 threatened species in the area – the bats, monitors, turtles and sawfish we studied during this expedition?

A noise outside the tent reminds me of more immediate threats and I recall a comment by Queensland Museum herpetologist Steve Wilson earlier in the expedition. "Isn't it great to think that there's still great big animals in Australia that can eat you? It helps put us in our place."

Whatever happens in the Daly's future, perhaps that's what we need more than anything – before we take any action, to reflect once again on our humble place, beside the mighty Daly River.

Ken Eastwood is AUSTRALIAN GEOGRAPHIC's associate editor and helped plan this scientific expedition. His most recent feature was *Disturbed*, AG 78.

THIS EXPEDITION was greatly assisted by a loan of boats from Slacer, Alan Mayfield and Doug McKeen. In addition, AUSTRALIAN GEOGRAPHIC thanks the many individuals and organisations who helped, including Peter O'Brien and the Department of Primary Industry, Barramundi Marine Hertz, Red Desert, Douglas Daly, Caravan Park, Norwell Transport, Desert Discovery, Alan Andersen, CSIRO Sustainable Ecosystems, Darwin; Dr Sandy Scott, Odyssey Travel; Northern Land Council; Scott and Pam Rixon; Belinda Watt; Joanne Diver; all the scientists and the volunteers.



Macropus agilis