

PREDATION BY RUFIOUS OWLS ON ECLECTUS PARROTS AND OTHER ANIMALS AT IRON RANGE NATIONAL PARK, CAPE YORK

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The Rufous Owl *Ninox rufa* is an imposing predator inhabiting the rainforests and sclerophyll forests of tropical Australia and New Guinea. Although large and charismatic, it is also unobtrusive, and surprisingly little is known of its natural history. Information is particularly scarce for the Cape York subspecies *N. r. meesi*, mainly because of its remote location (Garnett 1993; Garnett and Crowley 2000). A versatile hunter, it takes a range of prey (small to medium-sized mammals, small to large birds, and invertebrates) from all levels of the forest as well as in flight. It hunts at dusk and dawn as well as during the night (reviewed in Higgins 1999). The Rufous Owl is believed to breed seasonally, in the late dry season. Limited observations suggest that females lay two eggs (Olsen and Marples 1993) which take about 37 days to hatch. Nestlings fledge after 6–8 weeks (reviewed in Higgins 1999). We observed a pair of Rufous Owls nesting at Iron Range National Park, Cape York Peninsula, Queensland (12°47'S, 143°18'E). Here, we report their fledging success and the prey items delivered to the nest, which include some previously unrecorded species.

We were first alerted to the nest-site on 5 August 2000, whilst conducting research on Eclectus Parrots *Eclectus roratus*. One of the Eclectus nest hollows that we have monitored since 1997 (Heinsohn and Legge 2003; Heinsohn *et al.* 2003) had been 'usurped' by the Rufous Owls; the Eclectus Parrots had relocated their breeding efforts to a second hole higher up the trunk. During the next five monitoring visits to the Eclectus nest, we also checked the progress of the Rufous Owl's breeding effort.

The nest tree was a Milky Pine *Alstonia scholaris*, standing in semi-deciduous mesophyll vine forest on the bank of the Claudie River. Like many milky pines, this tree had a large hollow in the trunk. The hollow was 15 metres above the ground, with an entrance on the side of the trunk that opened directly into the nesting chamber. The floor of the hollow was about 35 centimetres in diameter and 80 centimetres below the bottom lip of the entrance. Eclectus Parrots had occupied the hollow from July to February during 1998/1999 and 1999/2000, so if Rufous Owls use the same hollow for successive breeding attempts then at least three years had elapsed since the previous attempt. Interestingly, the Rufous Owl nest found at Iron Range by Hollands (1991) is almost certainly the same tree (D. Hollands, pers. comm.), suggesting traditional use of hollows.

At every visit to the active nest, we found both owl parents roosting together in thick foliage near the nest hollow. This contrasts with earlier reports that the male roosts away from the nest after the eggs are laid (Schodde and Mason 1980; see also Nielsen 1995). When we inspected the nest, the owls defended it vigorously, repeatedly swooping (and on one occasion scratching) the climber.

We measured the length and width of one of the two eggs laid by the Rufous Owls (Table 1), and found its dimensions to be smaller than those summarized in Higgins (1999), where the mean size of 10 eggs is 51.7 × 42.8 millimetres. The subspecies found on Cape York is the smallest of the three subspecies recognized in Australia (Mason and Schodde 1980), and it is possible that most of the published egg measurements come from eggs collected from the other two larger subspecies, especially *N. r. queenslandica* which lives in the most accessible area (NE Queensland).

Although both owlets were still present for most of the nestling period, only one fledged (Table 1). Given the extent of feather development on the carcass, the second nestling appeared to have died about one week before fledging age. Fledging success has rarely been recorded from Rufous Owl nests, so the frequency of brood reduction is unknown. However, only one owlet fledged from a nest observed by Hollands (1991), and Schodde and Mason (1980) claim that one owlet is usually weaker.

The prey remains that we collected from the floor of the nest were comprised mainly of a variety of bird species (see Table 1). In other parts of their distribution, the Rufous Owl's diet appears to be dominated by mammals (Estbergs and Braithwaite 1985; Harrington and Debus 2000, but see Schodde and Mason 1980). Our dietary observations must be treated cautiously since they are from a single nest. However, Cape York rainforests contain a depauperate assemblage of mammals compared with the rainforests of the Wet Tropics and the Northern Territory and any dietary differences between areas may simply reflect the opportunistic hunting strategy of the Rufous Owl.

It has been suggested that Rufous Owls may prefer the rainforest edge, using the rainforest for roosting but hunting in the more open sclerophyll forests and woodlands (see Higgins 1999). However, most of the prey species reported here are found predominantly in rainforest rather than the adjacent areas of woodland. In addition, a survey of Rufous Owls in the Wet Tropics found they were

TABLE 1
Observations made on the nest of Rufous Owls.

Date	Stage of nesting cycle	Observations	Prey items found in nest
5 August	eggs	clutch of two eggs	
30 August	eggs	eggs still present; measured one egg: 48 × 40 millimetres	
14 September	nestlings	two nestlings successfully hatched	
5 October	nestlings	nestlings about half-grown; feathers beginning to grow	female Eclectus Parrot, male Magnificent Riflebird <i>Ptiloris magnificus</i> , female Double-eyed Fig-Parrot <i>Cyclopsitta diophthalma marshalli</i> , Rainbow Bee-eater <i>Merops ornatus</i> , two Metallic Starlings <i>Aplonis metallica</i> , invertebrate remains (e.g. grasshoppers)
24 October	nestlings	both nestlings still present	Spotted Cuscus <i>Spilocuscus maculatus</i> , Megachiropteran bat*
9 November	post-fledging	desiccated remains of one nestling in nest	Megachiropteran bat*

*Inferred from the presence of claws on the first and second digit of the forelimb and its size.

as common in extensive areas of rainforest as they were near rainforest edges (Kanowski 1998). At Iron Range we have noted Rufous Owls roosting in diverse habitats, from extensive patches of rainforest to *Melaleuca* swamps. Taken together, these observations suggest the owls' roosting and foraging behaviours may be fairly flexible.

As well as providing new information on Rufous Owls, these observations may be important for understanding the ecology of large rainforest parrots. In addition to the Eclectus Parrot described here, Rufous Owls are also reported to hunt Palm Cockatoos *Probosciger aterrimus* (Wood 1988). Thus, even large parrots fall prey to rainforest raptors. We know of another successful predation attempt late in 2000 on an Eclectus Parrot (also a female) by a Peregrine Falcon *Falco peregrinus* (M. Krannabeter, pers. comm.). Other potential aerial predators that we have noted at Iron Range include the Wedge-tailed Eagle *Aquila audax*, the White-bellied Sea Eagle *Haliaeetus leucogaster* which hunts opportunistically near rainforest margins (Heinsohn 2000), the Brown Goshawk *Accipiter fasciatus*, Red Goshawk *Erythrotriorchis radiatus*, and especially the Grey Goshawk *Accipiter novaehollandiae* which frequently elicits great alarm amongst Eclectus Parrots. In addition, the epicentre of the Eclectus Parrot distribution in New Guinea is an area of particularly high rainforest raptor diversity (Beehler *et al.* 1986). Thus, aerial predation may have played a significant role in the life-history evolution of large Australasian rainforest parrots. For example, the adult sex ratio of Eclectus Parrots is skewed towards males (Heinsohn and Legge 2003). Since the overall sex ratio at fledging is even (Heinsohn *et al.* 1997; Heinsohn and Legge 2003), this suggests that adult female Eclectus Parrots suffer higher mortality than males. Eclectus Parrots exhibit a unique form of dichromatism where both sexes are brightly coloured, but in completely different ways. Males are predominantly green, whereas females are red and blue and stand out more clearly against the background of rainforest vegetation. The skewed adult sex ratio of Eclectus Parrots could arise if females, with their relatively conspicuous plumage, were more vulnerable to attack from visually hunting predators, and it is notable that both confirmed predation events on Eclectus Parrots reported here were on females.

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