

Asynchronous Hatching, Fratricide and Double Clutches * in the Marsh Harrier

D. J. BAKER-GABB

A brood of four nestling Marsh Harriers *Circus aeruginosus* hatched over approximately seven days. When the three older nestlings were banded, the fourth and youngest was one quarter of the weight of the next older nestling. The youngest nestling was killed and eaten by its siblings during a period of food shortage. One female and one male nestling fledged when 46 and 43 days old respectively. Evidence for double clutching in Swamp Harriers is critically reviewed.

Many raptors lay their eggs at intervals of two or more days and begin incubation before completion of the clutch (Newton 1979). This results in asynchronous hatching and thus the youngest nestling may be greatly disadvantaged when competing with its siblings for food. Newton described aggression between nest-mates of large raptors as common, usually resulting in the death of the smallest nestling, while in medium-sized raptors, such as the Marsh Harrier *Circus aeruginosus*, aggression only occurs at times of obvious food shortage. In small species, serious aggression among nest-mates does not occur. However, if the nestlings of small species such as the Hen Harrier *C. cyaneus* die they may be fed to their siblings by the female parent (Balfour 1957, Breckenridge 1935). Weis (1923) regarded fratricide among European Marsh Harriers as common.

Nest History

In late 1979 I undertook regular observations of a Marsh Harrier nest built in Common Reeds *Phragmites australis* near the Werribee River, Victoria (37°57'S., 144°40'E.). Observations were made from a hide placed under a row of Pines *Pinus radiata* about 50 m from the nest

site on a high bank which allowed a clear view into the nest.

Four eggs were laid in mid-October 1979 and I saw the first two young that hatched in the nest on 14 November. Approximately three and five days later the third and fourth nestlings hatched. When I banded* the three older nestlings on 29 November, the weights of the four siblings in order of decreasing age were: 660, 410, 380 and 95 g.

During four hours of observation on the morning of 4 December I saw the male call the female from the nest only once, at which time he transferred a small bird to her via an aerial pass. During similar periods of observation on seven mornings prior to this time the male brought in larger prey, including six immature Rabbits *Oryctolagus cuniculus*, an Eurasian Coot *Fulica atra* and four unidentified nestling birds. The nestlings were all robbed from the same nest in tall reeds and they were brought in one after the other. These prey provided sufficient food for all of the harriers' nestlings, although the older ones always snatched more than the youngest. On 4 December the female returned to the nest with the small bird, but this time only the two older and the youngest nestlings succeeded in obtaining some of the food that she tore up.

* The author follows Amadon (1978) and Baker-Gabb (1979) who recognised the representative of the Marsh Harrier complex in Australia as being the Swamp Harrier, *Circus approximans*, which is one of the five component species of a Marsh Harrier super-species.

* Bands used were provided by the Australian Bird-banding Scheme, Division of Wildlife Research, CSIRO.

been almost entirely burned, probably did not nest; in any case KY, looking sickly when last seen on 19 December, probably died. In 1981 BG, mated to an unbanded female, had at least two nests in the same area.

♀GY. 1977, 1978, 1981. 7. 170 m. 0.8 ha. The male(s) was unbanded.

♀RB. 1977-79. 5. 150 m 0.5 m. ♂BW in 1979 and probably in the two previous years, when unbanded. The fire disrupted this pair; RB disappeared and BW was found, perhaps breeding, 500-600 m distant.

Eastern Whipbird *Psophodes olivaceus*

♀WR. 1975, 1977-79. 5. 350 m. 4.0 ha. ♂GR, 1979 but probably also in previous years. Both birds survived the fires in 1980 but disappeared late in the subsequent breeding season without having bred.

White-browed Scrubwren *Sericornis frontalis*

♂BW. 1976-77. 2. 50 m. This bird was banded in 1975 and was still in the same territory in 1980 and 1981 but I could not find its nests after 1977.

♂KO. 1978, 1979, 1981. 4. 130 m 0.6 ha. ♀GG, 1970; ♀R/WR, 1979; ♀R/WW, 1981. This male was banded on 24 November 1975 and has been in the same territory ever since though I did not find its nests each year.

♂RK x ♀WY. 1978-79. 2. 100 m.

Brown Thornbill *Acanthiza pusilla*

♀BW. 1976-78. 3. 95 m. 0.2 ha.

♀OR. 1976-78. 4. 110 m. 0.25 ha.

♂BG. 1976, 1978. 2. 140 m.

♂KW. 1978, 1981. 2. 130 m.

♂BY. 1978, 1979. 2. 85 m.

Yellow-faced Honeyeater

Lichenostomus chrysops

♀GG. 1977-78. 4. 130 m. 0.5 ha.

R/RR 1978, 1979, 1981. 5. 165 m. 0.3 ha.

YR 1977-78. 4. 60 m. 0.25 ha.

Both R/RR and YR were attending the same nests in 1978 but I was not sure of their sexes.

Eastern Spinebill *Acanthorhynchus tenuirostris*

♀OB. 1976, 1977, 1981. 3. 65 m. 0.3 ha.

Pied Currawong *Strepera graculina*

♂PdG. 1979-1981. 4. 200 m. 1.0 ha.

Gaps in these records, e.g. Golden Whistler GY for 1979 and 1980, occur almost certainly because I did not search for or failed to find nests. It must be stressed that some individuals and species, e.g. Yellow-faced Honeyeaters, did not nest at all in 1980 after the fires, because their nesting sites had been destroyed.

For all species mentioned, I have less complete information for other individuals, which suggests sedentariness, and have little doubt that individuals of most non-migratory species rarely leave their territories once they have been established. The full size of territories is, of course, larger than the areas given above, which refer only to the areas within which nests were found; it doubtless varies according to habitat and certainly differs from species to species; for instance, Eastern Yellow Robins have territories less than half the size (± 2 ha.) of those of Eastern Whipbirds (5-10 ha.) here at Moruya. Individuals of some species, e.g. Eastern Yellow Robins and Golden Whistlers, probably rarely leave their territories during their lives; individuals of other species certainly range outside them during the non-breeding season, either joining foraging flocks of mixed species (thornbills) or concentrating at sources of nectar (honeyeaters). Pied Currawongs leave the breeding area almost completely. Nevertheless members of most species return to the same small areas to breed, even individuals of those that are total migrants (Rufous Whistler *P. rufiventris*).

I have observations on individual Grey Shrike-thrushes *Colluricincla harmonica*, Grey Fantails *Rhipidura fuliginosa*, Spotted Quail-thrushes *Cinclosoma punctatum*, Striated Thornbills *A. lineata*, Lewin's Honeyeater *Meliphaga lewinii*, New Holland Honeyeaters *Phylidonyris novaehollandiae* and Olive-backed Orioles *Oriolus sagittatus* that support this view of sedentariness but they are no great improvement on what is already published.

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S. Marchant,
P.O. Box 123,
Moruya, N.S.W. 2537.

reduce broods when food is in short supply. It also reduces sibling competition for parental investment and minimises wasteful competition. Such a mechanism also seems to pertain to Tawny Owls *Strix aluco* (Southern 1970), Goshawks *Accipiter gentilis* (Schnell 1958), and Hen Harriers (Watson 1977). However, Brown *et al.* (1977) stated that their data on African eagles did not support Lack's (1966) hypothesis and the reason why fratricide, and Cainism in particular, occurs in raptors remained a mystery. The fratricidal behaviour termed Cainism occurs mainly in the nestlings of large eagles that lay on average two eggs (Brown and Amadon 1968). It involves the older nestling killing its younger sibling shortly after it hatches, even during years of abundant food. Stinson (1980) argued that, for eagle species in which Cainism is common, the second egg or nestling acts as an insurance against total nesting failure caused either by infertility in the first egg or by early death of the older nestling.

Although food shortage appeared to be the ultimate factor precipitating the fratricide I observed, proximate factors such as the size and delivery rate of prey items to the nestlings may also have been involved. Only when there was a change from regular delivery of large prey items such as immature Rabbits to smaller ones like single small birds was any serious aggression observed. There did not appear to be any marked increase in the rate of delivery of prey items at this time. Although there was a similar number of food items, because they were smaller, the total food provision would have been reduced. It is noteworthy that Schipper (1973) found that no young were fledged from the nests of Marsh Harriers that fed their nestlings with small prey such as insects. Furthermore, Baker-Gabb (1978) recorded, from a study of five nests, that those Marsh Harrier pairs that provided a greater number of large (> 200 g) food items to their nestlings fledged more young. The sample size was too low for statistical comparisons.

The habit of nestling harrier *Circus* spp. of clambering out of the nest to individual retreats during the second half of the nestling period provides them with shade, shelter and concealment from predators (Watson 1977) and aids in nest sanitation (Balfour and Macdonald 1970), Weis (1923) and Meyburg (1974)

suggested that prior to this period, a brooding female raptor may be able to prevent fratricide. However, once she begins hunting to help the male cater for the growing demands of the brood during the second half of the nestling period, she is no longer in a position to do this. Therefore, nestling harriers' habit of retiring to individual retreats could also serve to reduce agonistic behaviour between siblings, the number of serious injuries, and fratricide when the female was away hunting. This occurs at a time when younger siblings would probably have already been culled if they were going to be, and considerable parental investment would have been expended on the remaining nestlings.

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D. J. Baker-Gabb,
Department of Zoology,
Monash University, Clayton,
Victoria 3168
