

## Response of Prey Species to Foraging Goshawks *Accipiter* Spp.

The response of prey species to hunting Grey Goshawks *Accipiter novaehollandiae* and Brown Goshawks *Accipiter fasciatus* was observed in the wet tropics of north Queensland in 1987-89. Data were obtained during observations of the hunting behaviour of goshawks, and by observing the response of prey to trained goshawks (principally Grey Goshawks) that were flown as naturally as possible, i.e. dogs were not used to flush prey and goshawks were allowed to free-range (the 'follow-on' method of McElroy 1977).

Ground-feeding prey, such as quail *Coturnix* spp., Peaceful *Geopelia placida* and Bar-shouldered Doves *G. humeralis*, the Emerald Dove *Chalcophaps indica*, Superb Fruit-Dove *Ptilinopus superbus*, Brown Cuckoo-Dove *Macropygia amboinensis*, and the Pheasant Coucal *Centropus phasianinus*, typically froze on the approach of a hunting goshawk. Cade (1965, in Siegfried & Underhill 1975) described 'freezing' in a crouched attitude, as an evasive reaction to a stooping falcon. When flushed, quail exploded into flight. Adults flew before any young that were present. Quail then headed for the nearest cover, and dived headlong into it. Doves and pigeons, when flushed, flew fast and erratically, trying to evade the hawk and reach cover. Aumann (1986) suggested that prolonged tail-chases are probably expensive energetically. Megapodes (Orange-footed Scrubfowl *Megapodius reinwardt* and Australian Brush-turkey *Alectura lathami*) escaped by flying erratically through the dense rainforest understorey. The Emerald Dove and Superb Fruit-Dove also used this method. Other ground-feeding birds such as rails *Rallus* spp. made rapidly for dense cover. Reptiles also generally made for cover, as did small mammals surprised in the open. Bandicoots (Peramelidae) tended to 'freeze' or run erratically towards cover and freeze again. Aumann (1986) described Rabbits *Oryctolagus cuniculus* as freezing or running fast and erratically to gain cover in the presence of foraging Brown Goshawks.

Arboreal reptiles, such as goannas *Varanus* spp. and the Frilled Dragon *Chlamydosaurus kingii* moved around to the opposite side of a vertical branch or trunk to avoid detection, or simply froze flat against the branch. This is similar to Red-bellied Woodpeckers *Melanerpes carolinus* (Saul 1983, in Aumann 1986), which hitched to the underside of their perch and remained motionless during overflights of Sharp-shinned Hawks *Accipiter striatus*.

Parrots (Psittaciformes), particularly Rainbow *Trichoglossus haematodus* and Scaly-breasted Lorikeets *T. chlorolepidotus*, used sentries while feeding in flocks. When moving between feeding sites they typically flew fast and erratically. Metallic Starlings *Aplonis metallica* foraged in flocks, exploding in unison from food or feeding trees if disturbed. They flew very fast, dipping in and out of the canopy of closed forest and flying below the canopy of tall open forest and tall woodland. Pre-migration flocks in February-April behaved similarly to flocks of the Common Starling *Sturnus vulgaris* in the presence of avian predators as recorded by Aumann (1986), and described by Lord (1956), Dickson (1979), Mooney (1981), Hollands (1984) and Ross & Olsen (1988).

Red-browed Firetails *Emblema temporalis*, Crimson Finches *Neochmia phaeton* and Chestnut-breasted Mannikins *Lonchura castaneothorax* foraged in small flocks close to cover. When alarmed they retreated quickly to cover, similar to the response of House Sparrows *Passer domesticus* to hunting Sparrowhawks *Accipiter nisus* as reported by Barnard (1979).

Small forest passerines either froze on the approach of a hunting goshawk or

exploded in a combined cacophony of protest, mobbing the predator. Mobbing was effective: once detected, the goshawk had little hope of continuing to hunt secretly, because prey were alerted to its presence. The response was similar to that reported by Gaddis (1980) for mixed flocks of North American woodland songbirds to foraging accipiters. Species such as the Blue-faced Honeyeater *Entomyzon cyanotis*, friarbirds *Philemon* spp., Spangled Drongo *Dicrurus hottentottus*, Australian Magpie *Gymnorhina tibicen*, Pied Currawong *Strepera graculina*, butcherbirds *Cracticus* spp., Australian Magpie-lark *Grallina cyanoleuca* and kookaburras *Dacelo novaeguineae* and *D. leachii* were bolder and, on occasions, struck the goshawk. Mobbing by these species was intense, driving the hawk from the area.

Finally, in response to a soaring goshawk, the large Wompoo Fruit-Dove *Ptilinopus magnificus*, Torresian Imperial-Pigeon *Ducula spilorrhoea*, White-headed Pigeon *Columba leucomela* and Topknot Pigeon *Lopholaimus antarcticus* formed tight flocks. Flocking behaviour is thought to confuse attacking predators (Lazarus 1972; see also Kenward 1978).

In summary, a variety of methods was used by prey species to avoid detection and/or capture by hunting hawks. These included: 'freezing' (remaining motionless and silent in order to avoid detection: Aumann 1986); making for cover; erratic and/or rapid flight—either to out-distance a pursuing hawk or to reach cover; flocking behaviour; and mobbing.

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