

FLOCKING BEHAVIOUR IN THE HOODED PLOVER *Charadrius rubricollis*

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Received 3 December, 1985

Foraging in flocks is widespread amongst wintering shorebirds (Recher and Recher 1969, Goss-Custard 1970). In south-east Australia winter (non-breeding season) flock forming behaviour has been documented best in the Hooded Plover *Charadrius rubricollis* (Lane 1981, Schulz and Lumsden 1983). This paper discusses the implications of flocking in Hooded Plovers observed on Darby Beach, Wilson's Promontory between April and August 1984 during a study on the feeding ecology of the species (Schulz 1984). At Darby Beach flock size varied from three to forty individuals with an average of eight birds ($SD=6.8$) in a group. Rarely were single birds (2.3%) or pairs (5.0%) observed.

Crook (1964) and Lack (1968) proposed that flocking may either enhance the efficiency with which birds can exploit their food supplies and/or facilitate the detection of approaching predators. For Hooded Plovers I found no evidence for increased feeding efficiency (Schulz 1984) and the birds did not display any interest in food discovery patterns. For example, individuals did not approach closer to inspect the feeding activities and/or attempt to rob other plovers of prey items.

My observations suggest that flocking behaviour in this species can be attributed to predator avoidance. In this study an animal was regarded as a potential predator if the plovers halted their activity and became alert, with or without taking further evasive action. Reaction to the presence of a predator is outlined in Figure 1.

Anti-predatory responses by the plovers were varied:

- i. Forest Raven *Coryvus tasmanicus*; observed on 50 occasions and White-bellied Sea-Eagle *Haliaeetus leucogaster*; 10 occasions. The plovers' response varied from bunching together to flying in a tight flock over the surf zone.
- ii. Marsh Harrier *Circus aeruginosus*; 3 occasions, Peregrine Falcon *Falco peregrinus*; 3 occasions and Australian Kestrel *Falco cenchroides*; 1 occasion. In all cases the birds flew in a tight flock, taking an erratic path low over the surf zone.
- iii. European Fox *Vulpes vulpes*; 8 occasions. When a fox appeared on the beach or edge of the primary sand dunes within 100 m of the plovers the birds behaved in the same manner as for (ii). At greater distances the birds bunched together but did not fly.

Predator avoidance behaviour was also displayed when humans appeared on the beach. Behaviour varied from forming a compact flock to flying out over the surf zone away from the humans. Low-flying aircraft (<100 m above ground level) caused flocks to take to the air instantly and fly low over the sea in tight erratic manoeuvres. Four-wheel drive vehicles had a less pronounced effect with individuals generally forming a compact group but rarely moving to the water's edge or taking flight (unless in the vehicle's path).

No actual predation attempts (where attempted predation is defined as a definite food-catching manoeuvre of a predator towards another animal, such as a falcon stooping at a drinking bird) were observed during approximately 870 hours of observation. However, Stinson (1980) argued that predation does not have to be common to make foraging in flocks selectively advantageous. Flocking in tight groups in the presence of a predator may increase the safety of members (Krebs and Davies 1981) and hence appears consistent with the idea that flocking in the Hooded Plover is a result of predator avoidance.

Normally when foraging or resting, flocks of Hooded Plovers were loose-knit, with individuals rarely within 0.5 m of each other. Explanations for loose-knit feeding flocks can be found in the

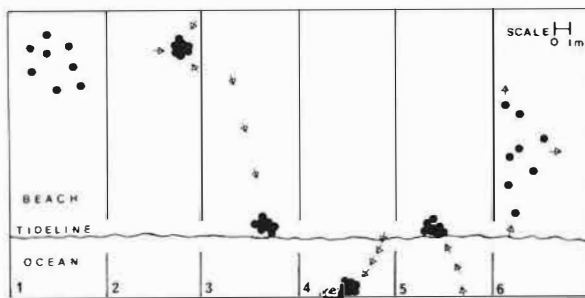


Figure 1. Reaction of Hooded Plover flock to the appearance of a predator. (●) represents an individual plover.

The sequence of events are:

1. Loose-knit feeding flock in the midregion of the beach.
2. With the appearance of a predator all individuals quickly bunch together to form a compact flock.
3. The compact flock moves quickly to the tideline.
4. If the danger appeared pronounced the flock would fly low out over the surf zone in tight erratic manoeuvres.
5. On the passing of the danger the flock lands on the tideline.
6. Then gradually the birds disperse up the beach and commence their previous activity.

literature. Conder (1949) found that there is an area around each bird ('individual distance') within which other individuals are not tolerated. In shorebirds, individual distance is maintained by avoidance movements or aggressive encounters (Recher and Recher 1969). Goss-Custard (1970) proposed that compact flocks may only form if the feeding method is able to function effectively when bird density is high. Penny (1970) found more compact flocks in the Greater Sandplover *C. leschenaultii* increased the chances of an individual encountering another. In the Redshank *Tringa totanus*, a species which searches by visual cues, increased contact with other birds was shown by Goss-Custard (1977) to reduce foraging success. This resulted from the prey, *Corophium volutator*, retreating down their burrows and becoming unavailable or from birds at the flock front removing most of the available prey (Goss-Custard 1970). Goss-Custard (1976) concluded that birds hunting by sight disperse themselves in such a manner as to minimize interference. Since plovers forage principally by visual cues (Pienkowski 1983), it is proposed then that flock

spacing in the Hooded Plover represents a compromise between predator avoidance and the costs of flocking due to feeding interference with conspecifics.

During the summer months the Hooded Plover occurs predominantly in pairs with only occasional flocks present (pers. obs.). Potential predators are still present along the Darby Beach, but observations suggest that the abandonment of flocking behaviour during this period can be attributed to breeding territoriality.

ACKNOWLEDGEMENTS

I would like to thank J. C. Z. Woinarski for helpful comments on this paper.

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