

Nest Defence by Black-tailed Godwits on the Ouse Washes, Cambridgeshire, England

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The Black-tailed Godwit *Limosa limosa* is a rare and declining breeding species in the British Isles and the majority of those remaining are located on the Ouse Washes. At this site, we studied the frequency and effectiveness of aerial attacks on avian predators by colonially nesting Black-tailed Godwits, and assessed the effects of similar attack behaviour by Lapwings *Vanellus vanellus*. Here, we summarize the main findings of this work, though full details are available in Green *et al.* (1990).

Observations were confined to the summer of 1984 and were made at two, discrete, Godwit colonies. Nests within these colonies were situated 50-100 m apart, and the two colonies were of similar size, each comprising 4-7 pairs. Firstly, we recorded the distance of closest approach by avian predators which came closer than 300 m to Godwit nests or broods, and recorded the reactions of the Godwits. Secondly, we plotted the movements of avian predators in the vicinity of the two colonies during continuous watches of 1-6 hours, and recorded their interactions with Godwits and Lapwings.

Predator intrusions

Three predatory species accounted for the majority of the 329 recorded intrusions to the vicinity of the Godwit colonies; the Carrion Crow *Corvus corone corone* (71%), the Grey Heron *Ardea cinerea* (17%) and the Kestrel *Falco tinnunculus* (9%). Other avian predators, for example gulls, were rarely recorded. The responses of the Godwits to such intrusions were examined in relation to the species of in-

truder, the distance of approach and to whether the majority of the Godwits had eggs or chicks at the time of the intrusion. The likelihood of both Crows and Herons being attacked was significantly greater the closer they approached either of the colonies; a similar trend was apparent for Kestrels, although the trend was not statistically significant. Furthermore, although Crows and Herons were equally likely to be attacked when the majority of the Godwits had either eggs or chicks, the proportion of Kestrel approaches challenged by Godwits was significantly higher in the chick rearing than the incubation period. The tendency for the Godwits to attack Kestrels only during the chick rearing period, and not when they have eggs, is a consequence of the differential threat of predation at each stage of the breeding cycle. We suspect that the alarm calls used by the Godwits to warn of an approaching Kestrel, and hence to initiate group defence, differ according to whether the Godwits have eggs or chicks.

Effects of attacks on Crows

The percentage of Crow visits that were challenged by Godwits or Lapwings, and the rate of visiting by Crows to sectors of one of the two colonies studied, is shown in Figure 1. It is apparent that the Crows made relatively little use of the area most vigorously defended by the Godwits, and perhaps also avoided the areas occupied by Lapwings. Instead, the Crows foraged away from the Godwit colony and at relatively close range to their own nests. Multiple regression analysis confirmed that the Crows

made most use of the areas closest to their nests but, once this had been taken into account, they were significantly less likely to visit areas in which there was a high risk of being attacked by Godwits. Defence by Lapwings, however, was not sufficient to affect the foraging behaviour of Crows. This was in accordance with field observations which suggested that even though Lapwings tended to attack Crows in larger groups than the Godwits, the Crows were much

less capable of tolerating groups of defending Godwits than groups of Lapwings. The greater degree of turbulence resulting from the swooping attacks of the Godwits was probably more problematical to the Crows than the relatively slow attacks of the smaller Lapwings.

Could defence by Godwits reduce predation rates?

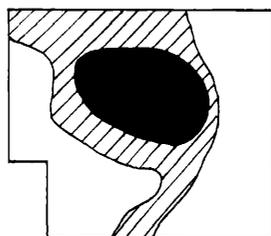
To test this experimentally, we created 30 artificial nests, each comprising three white hens' eggs, and arranged them in three groups of ten in and around the nucleus of one of the two Godwit colonies; one group was placed in the area defended most vigorously by the Godwits and the other groups were situated approximately 400 m from its centre, within Lapwing-defended areas. Three Godwit pairs were incubating within the colony at this time and one pair had small chicks. Many Lapwings had eggs or young. The artificial nests were monitored daily.

Crows were observed to take eggs from the artificial nests, and several of the hens' eggs were recovered from an egg-dump used by one pair of Crows. The timing of egg removal from the artificial nests varied significantly, with those from nest groups outside the colony disappearing sooner than from those within the colony. Furthermore, first evidence of predation from the nest groups outside the Godwit colony often represented removal of the whole clutch, whereas eggs disappeared more gradually from nests within the colony. Thus, group defence by Godwits proved effective at reducing predation of the artificial nests, and consequently coloniality could lead to increased hatching success in this species. Lapwings, however, were much less effective at deterring avian predators.

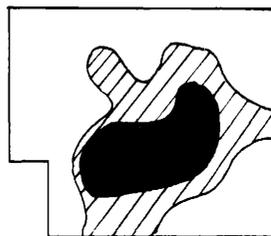
Reference

Green, R.E., Hiron, G.J.M. & Kirby, J.S. 1990. The effectiveness of nest defence by Black-tailed Godwits *Limosa limosa*. *Ardea* 78: 405-413.

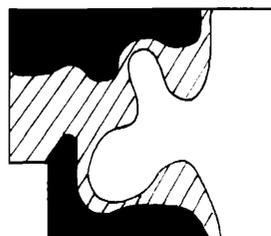
LAPWING CHALLENGES



GODWIT CHALLENGES



CROW USAGE



100m

Figure 1. Contour maps showing the frequency of visits by Carrion Crows to the vicinity of a Black-tailed Godwit colony, and the proportion of visits that were challenged by Lapwings and Godwits. The frequency distributions of Crow visits and challenges upon them were divided into three: the dark shading represents >66% visits/challenges; the hatched shading shows 34-66% visits/challenges; and no shading represents 0-33% visits/challenges.