

Conservation implications of flight initiation distance and refuge use in Corn Crakes *Crex crex* at a migration stopover site

(Aves: Rallidae)

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Abstract. Cryptic animals commonly wait until an approaching predator is near them before fleeing, i.e. they have short flight initiation distances. We determined flight initiation distances in the Corn Crake *Crex crex*, a species of conservation concern, at a stopover site in Egypt where this species is hunted with cast nets. When approached by a person, Corn Crakes had short flight initiation distances (2.8 ± 0.1 m), and these distances were not correlated with the distance at which the person started the approach, in contrast to previous findings in other species. After fleeing, crakes predictably chose to hide under the tallest plant in the area where they landed. The combination of a short flight initiation distance and a tendency to select predictable refuges is likely to make this species and others with similar traits particularly vulnerable to human hunting.

Key words. *Crex crex*, crypticity, Egypt, flight initiation distance, hunting, refuge use.

Introduction

Under the strong selective pressure of predation, birds have developed varied responses to approaching predators. For some species, however, responses that are effective against most predators may make individuals more vulnerable to human predation. One behavioural trait that might increase vulnerability to humans is a tendency to allow a close approach by hunters (GREEN et al. 1985, DUNCAN & BLACKBURN 2004). Numerous researchers have examined factors influencing flight initiation distance, the distance at which an individual flees from an approaching threat. A wide range of factors can affect the decision to flee, and birds adjust their responses to a threat based upon their vulnerability. For example, flight initiation distance typically increases as the approach speed of the predator increases (STANKOWICH & BLUMSTEIN 2005), and it is greater for birds in better health (MARTIN et al. 2006) and larger birds, which may be more visible to approaching predators and less agile at escaping them (BLUMSTEIN 2006). Similarly, cryptic animals may tend to have short flight initiation distances, both because they are less likely to be detected by a predator and because remaining motionless reduces the probability of detection (BROOM & RUXTON 2005, STANKOWICH & BLUMSTEIN 2005, COOPER 2006, IOANNOU & KRAUSE 2009).

A preference for predictable hiding places or refuges might also make a species more vulnerable to human hunting. If individuals threatened by an approaching human consistently choose a particular kind of refuge, humans, as well as some other predators, may learn to recognize preferred refuges and adapt hunting methods accordingly. We examined flight initiation distances and the use of refuges in Corn Crakes *Crex crex*. Although this species