

## **Losses from birds' nests because of predators in different types of vegetation - an experimental investigation\***

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### **Subject**

The differences in mating behaviour between the corncrake *Crex crex* and the spotted crane *Porzana porzana* were the starting point for the present work. In the case of the corncrake, the female alone is responsible for incubating the eggs and rearing the young. The distribution of labour for the spotted crane is quite different: males and females are involved in the incubation process and both take part in the rearing of the young. The question arises as to which factors enable the female corncrake to deal with the incubation process without the help of a male. As the female corncrake bears sole responsibility for incubation and rearing of the young, there are long periods when the nest is unguarded. It therefore seems possible that clutches of eggs in the corncrake's habitat generally suffer less pressure from predators than those in the habitat of the spotted crane. This factor may have played an important role in the evolution of differing pairing habits.

This work is also concerned with the possible factors influencing intra-specific aggression, which is shown by both species. It is necessary to clarify whether predator pressure on clutches of eggs is related to nest density in a particular habitat, and if this is a decisive factor in behaviour.

### **Method and implementation**

The data was gathered in north-east Poland, in the valleys of the rivers Narew and Biebrza. An experimental test took place from April to July 1993. Standardised artificial nests with two crane eggs and a combination of two crane and one plasticine egg were placed in the preferred habitats of the spotted crane (tussock sedge reeds)

and the corncrake (sweet grass meadows). Losses were then calculated. This experiment was carried out in both types of vegetation. Each had three differing nest densities (11.1 nests/hectare, 44.4 nests/hectare and 100 nests/hectare), with a total of 930 nests. Use of the plasticine eggs was intended to provide direct information on the types of predator in each area. A further aspect of the problem had to be considered when a particular type of predator was found to occur frequently. The effect caused by vegetation covering the nests was investigated in a further series of tests.

### **Dependence of losses on nest density**

Neither the first check on the nests in the tussock sedge reeds (Logit-Model,  $2=0.4$ ;  $df=2$ ;  $p>0.05$ ), nor second check (Logit-Model,  $2=3.22$ ;  $df=2$ ;  $p>0.05$ ) revealed a link between the losses and nest density.

It was equally impossible to uphold the theory of dependence on nest density in the preferred habitat of the corncrake. Checks after five days (Logit-Model,  $2=1.28$ ;  $df=2$ ;  $p>0.05$ ) and after 10 days (Logit-model,  $2=3.05$ ;  $df=2$ ;  $p>0.05$ ) showed no variations dependent upon nest density.

### **Comparison of the losses in tussock sedge reeds and in sweet grass meadow**

Both the first and second examinations of the nests showed that twice as many losses occur in the corncrake habitat as in that of the spotted crane.

This difference was apparent in all three nest densities. Both habitats were first checked after

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five days. The tussock sedge reeds showed increasing nest density losses of 18.5 %, 16.7 % and 14.8 %. Losses were much higher in the sweet grass meadows, where the increasing nest density at 61.1 %, 80.6 % and 67.3 % became highly significant (Logit-Model,  $\chi^2=155.09$ ;  $df=1$ ;  $p<0.001$ ).

A second check was made after 10 days, showing similar results. Losses in the tussock sedge reeds measured 29.6 %, 33.3 % and 41.6 %. With increasing nest density, the values were far lower than in the sweet grass meadow, which measured 77.8 %, 86.1 % and 85.5 %, with the same increase in nest density. These results are also highly significant (Logit-Model,  $\chi^2=106.12$ ;  $df=1$ ;  $p<0.001$ ).

#### Tests with plasticine eggs

In tests involving the preferred Greenland type of spotted crane, not one of the plasticine eggs used showed the impression of a mammal. More than 90 % of the impressions were made by birds. Characteristic tracks and field observations pointed to the marsh harrier *Circus aeruginosus* as the most significant hunter. Other traces could not be successfully attributed. In the sweet grass meadow, the predator make-up was different. With 69.4 % after the first check and 66.7 % after the second check, the number of birds is fewer. Impressions in the plasticine eggs indicated marsh harriers were also present as predators, as well as Montagu's harriers *Circus pygargus*.

Mammals were represented more strongly here than in the tussock sedge reeds; at 30.6 % and 26.7 % for the first and second nest checks.

#### The effect of vegetation cover on losses

The findings from the tests with plasticine eggs suggest that the incidence of robbed nests might be directly dependent on the vertical cover offered by vegetation at the nesting site. Tests were carried out on three different concentrations of nests in a sedge meadow with tall plants. These tests provided evidence of a linear dependence

of losses on the vegetation cover at the nesting location (logistic model, linear increase  $b=0.522$ ).

A further experiment with artificial nests along a ditch confirmed the previous findings about cover dependency. It was expected that the linear structure of the ditch would make it easier for small mammals to find the nests. However, there were no losses in those areas of the ditch that had good cover. A comparative test in the neighbouring meadow resulted in significantly different losses of 68.8 % after the first check and 85.4 % after the second check (Fisher's Exact Test, bipartite,  $p<0.001$ ).

#### Summary

No dependence on nesting density for predatory activity could be found in either the sweet grass meadow or in the tussock sedge reeds. This means that other factors are responsible for territorial and aggressive behaviour.

Losses in artificial nests are greater in the sweet meadow grass habitat than in the preferred habitat of the spotted crane. In both habitats raptors of the genus *Circus* are most significant while small mammals are of only secondary significance. The vertical vegetation cover at the nest site is a decisive influence on the level of loss of clutches of eggs.

Corncrakes could compensate for the generally greater number of predators in their habitat by preferentially choosing nest sites with higher cover of vegetation.

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