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Coexistence of owl species in the farmland of southeastern Poland

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Abstract. The study relates to the Little Owl *Athene noctua*, Barn Owl *Tyto alba,* Tawny Owl *Strix aluco*, and Long-eared Owl *Asio otus.* By coexistence is meant the simultaneous nesting, or territorial occupation in the breeding period, of more than one owl species within the area of one farm. Altogether, 48 territories of owls in 16 farm building complexes were found. Distances between nearest-neighbour nest sites were 16–203 m. In the Little Owl the average distance was 43 m ± 28, in the Tawny Owl 159 m ± 61. The number of young in broods of Little Owls nesting in coexistence was significantly lower compared to those nesting with other owls. The considerable incidence of coexistence found was related to the specific conditions of the study area: "islands" of farm building complexes offered favourable nesting sites, while the surrounding monoculture fields provided hunting territories with only limited opportunities for nesting. The productivity of the Little Owl and Barn Owl in the study area was low, probably because of interactions brought about by nesting in close proximity.

Key words: Little Owl, *Athene noctua*, coexistence of owls, agricultural landscape, breeding success

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INTRODUCTION

The recent rapid changes to the Polish rural landscape, particularly as a result of economic recession and agricultural transformation, may have affected owls inhabiting farmland. Up to the late 1980s, a large area of agricultural land in SE Poland was given over to collective farming, which brought uniformity to the agricultural landscape: "islands" of farms and their associated structures widely scattered in a "sea" of large fields planted with single crops. A preliminary study suggested that these farming complexes might be owl refuges (Kitowski 1999). As they could make good breeding sites for these birds, it was thought possible that more than one species could nest in the same place. The questions thus posed were whether more than one species could coexist under such conditions, or whether this was not possible because, for example, of interspecific competition or even predation (Mikkola 1983).

The aim of this study was to describe the possible coexistence of owls and to assess the effect of coexistence on the factors affecting breeding success.

STUDY AREA AND METHODS

The studies were carried out in 1997-98 in the rural landscape of the south-eastern part of Zamość district (SE Poland). In the study area of some 800 km^2, approximately 400 structures such as cowsheds, barns, corn hop bins, granaries, fertiliser store houses, sheds, and blocks of flats in 34 farm complexes were inspected.

The farm buildings and other structures mostly (86.8%) formed islands surrounded by large fields. The fields were monocultures of cereals, maize or sugar beet. The average area covered by individual complexes of farm buildings and dwellings was 0.9 ± 0.03 km^2 (range 0.5–1.3 km^2).

Inspections of farms during the daytime was combined with nocturnal playback stimulation of owl calls. Such inspections were carried out in all the farms from mid-March to mid-June in 1997 and 1998. By "coexistence" was meant the nesting or territorial occupation of more than one owl species on one farm during the breeding period. Since only the farmhouses and the outbuildings were inspected, no data on breeding density is given in this paper.

The Mann-Witney U-test was applied to test the differences in the number of fledged young. Differences in distance to the nearest neighbouring owl nesting site were compared by Kruskall-Wallis one-way ANOVA.

RESULTS

A total of 48 breeding pairs of 4 owl species were found in all the farms studied. Most of them made use of artificial structures — dovecotes (2 cases), blocks of flats (6), other buildings (36) and an electrical transformer (1 case). Nesting in tree holes and stick nests was less frequent (3 in each case). The simultaneous breeding of 2–3 owl species on one farm was recorded on 14 farms (41% of the complexes examined) (Table 1). Owl pairs of different species often nested within 200 m of each other (Table 1). Four cases of Barn Owls and Little Owls using the same buildings simultaneously for breeding were recorded. In the other cases of coexistence, owls used structures in close proximity for breeding.

In the study area, Little Owls successfully reared an average of 2.26 ± 0.99 juveniles/pairs (n = 19, 1–4 young), Barn Owls 2.47 ± 0.71 (n = 17, 1–4 young), Tawny Owls 2.75 ± 0.70 young (n = 8, range 2–4), and Long-eared Owls 3.0 ± 00 juveniles/pairs (n = 3). No second broods were found in any of these owl species, despite intensive monitoring.

The numbers of fledged young of Little Owls nesting alone (in average 2.72 ± 0.90, n = 11) was significantly higher compared to those nesting in the presence of other owls (in average 1.62 ± 0.74, n = 8) (Whitney-Mann U-test: $U = 19$, $p < 0.05$).

There was a significant difference in the distance between the nearest-neighbour nests when more than one owl species bred on the same farm (Kruskall -Wallis one-way ANOVA: $H = 10.29$, $df = 3$, $p < 0.02$, Table 3).

Predators in the study area included Common Weasel *Mustela nivalis*, European Polecat *M. putorius* and Stone Marten *M. foina*. Ten Little Owl and two Barn Owl broods were destroyed by these mammals. One dead Little Owl fledgling was found in a Tawny Owl nest. One Little Owlet and one Tawny Owlet were found dead after apparently falling out of the nest. There were also cases of the human destruction of Little Owl (n = 2) and Barn Owl broods (n = 2).

DISCUSSION

The large number of cases of coexistence between different owl species recorded in this study was related to the environmental conditions of SE Poland. The single-crop fields surrounding the farms abounded in small mammals, important components of the diets of Long-eared, Barn and Tawny Owls (Goszczyński 1981, Pikula et al. 1984, Tome 1994) and in the insects preyed

Table 1. Coexistence of breeding owls within the same farm complexes. Mean distances to nearest owl nesting site on the same farm in metres.

	Athene noctua	*Tyto alba*	*Strix aluco*	*Asio otus*
Breeding cases — total	23	16	6	3
Coexistence with:				
one owls species	12	8	3	1
two owls species		2	2	2
Coexistence cases total:	12	10	5	3
Athene noctua	—	8	3	1
Tyto alba	8	—	2	2
Strix aluco	3	2	—	2
Asio otus	1	2	2	—
Mean distance (range)	43 ± 28 (16–114)	57 ± 54 (16–188)	159 ± 61 (54–203)	106 ± 56 (44–153)

upon by Little Owls (Herrera & Hiraldo 1976). On the other hand, coexistence was also linked to the high concentration of suitable breeding sites in the small "islands" of farm buildings scattered among large fields of monocultures. Interactions between owl species could reduce the survival prospects of one of them (Hakkarainen & Korpimäki 1996) and this may go some way to explaining the low breeding success of the Little Owl in the study area.

The coexistence of the Little Owl with other owl species was connected with the small size of their hunting territory in vicinity of nesting place (Exo 1992). The largest number of cases of coexistence revealed by this study concerned the occurrence of Little Owls and Barn Owls. Moreover, the observations of Glue & Scott (1980) confirm the coexistence of these species in Great Britain. The use of farm buildings enables owls to avoid mobbing by aggressive passerines and predation from diurnal raptors (Jaksić 1982). Such buildings also provide good overwintering sites as owls are sensitive to low temperatures (Exo 1992, Marti 1994). Almost all the nesting sites of Little Owl were in buildings (69%). These results are in contrast with observations from Western and Central Europe, where Little Owls clearly prefer tree holes for nesting (Glue & Scott 1980, Exo 1992, Genot 1994).

The average number of fledged Little Owls (2.26 juv/successful pair) in SE Poland was slightly lower than the 2.35 juv/ year estimated by Exo & Hennes (1980) as the minimum required to sustain populations of this owl species. However, Little Owls occur abundantly in the study area, perhaps because of the abundance of nesting places available. The results of studies in SE Poland (2.26 juv) show that the breeding success of Little Owls was smaller in comparison to the other European areas (range 2.39–3.19 juv/successful pair; Glue & Scott 1980, Exo 1983, Gassman & Baumer 1993, Genot 1994). The low productivity of the Barn Owls and Little Owls in the study area was probably caused largely by a poor food supply during the years of the study. The second factor could have been competition between owl species in the study area.

According to Mikkola (1983), the Tawny Owl preys upon Little Owls and Barn Owls. In addition, a high overlap in the food niche between the Barn Owl and the Tawny Owl was found (pellet analysis, author's data). This may partly account for the small number of cases of coexistence of these owls and Tawny Owls.

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STRESZCZENIE

[Współwystępowanie sów w krajobrazie rolniczym — badania z obszaru południowo-wschodniej Polski]

W latach 1997–1998 kontrolowano regularnie infrastrukturę 34 wielkoobszarowych gospo-

darstw rolnych w powiatach: Tomaszów Lubelski i Hrubieszów (ok. 800 km^2). Cechą badanych farm była wyspowa lokalizacja pośród wielkoobszarowych monokultur.

W 14 gospodarstwach (41.2% skontrolowanych) stwierdzono jednoczesne gniazdowanie 2–3 gatunków sów (Tab. 1). Wybierały one głównie konstrukcje stworzone przez człowieka (obory, magazyny, bloki mieszkalne itp).

Różnice odległości między najbliższymi miejscami gniazdowania sąsiedzkiego, w przypadkach gdy więcej niż jeden gatunek sowy zasiedlał farmę (Tab. 1), okazały się istotne (Kruskal-Wallis ANOVA, $H = 10{,}29$, $p < 0.02$).

Pójdźki wyprowadziły średnio 2.26 juv./parę z sukcesem, płomykówki 2.47, a puszczyk 2.75. Sukces rozrodczy samotnie gniazdujących par pójdźki był znacząco większy (2.72 ± 0.90 juv./parę z sukcesem, $n = 11$) w porównaniu z sukcesem par (1.62 ± 0.74 juv./parę z sukcesem, $n = 8$) gniazdujących jednocześnie z innymi gatunkami sów (Whitney-Mann U-test: $U = 19$, $p < 0.05$).

T. Cofta