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Short research contribution

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LONG-TERM DECLINE OF THE LITTLE OWL (*ATHENE NOCTUA* SCOP., 1769) IN CENTRAL POLAND

ABSTRACT: The populations of Little Owl decreased over much of Europe including Poland, where it's status has not yet been elucidated in full. We compiled data from 13 censuses carried out from 1982 –2005 at a 12 km^2 study plot situated in an agricultural area in the north-western outskirts of Warsaw in Central Poland. We observed a significant decline in the Little Owl population, leading to its disappearance from the study site. The population dynamics was not correlated with the weather factors analysed (snow cover and thickness, air temperature for December-March period, precipitation for March, May and June), which indicates that climate change was not a direct cause of the decline. There were no substantial changes in the land use structure at the study area. We conclude that the reduction in nesting sites and decreased food availability are the potential factors of the Little Owl decline.

KEY WORDS: Little Owl, *Athene noctua*, density, decline

The Little Owl *Athene noctua* Scop. occurs in Southern and Central Europe, reaching the 55°N latitude. In many countries, especially in the central and northern part of its range, its decline can be seen in recent years (Manez 1994, Génot and Nieuwehuyse 2002). In Poland, the population size and dynamics of Little Owl are not investigated satisfactory due to few censuses available for some regions of the country. However, there are numerous facts indicating that the Polish population has fallen dramatically over the last 10–20 years (Stańko and Żegliński 2000, Tomiałojć and Stawarczyk 2003). Lack of sufficient data about the numbers and changes of Little Owl precludes an effective conservation of this species. Here we present the first results of censuses of Little Owl carried out regularly for the last 24 years at a selected study plot in Central Poland.

The research was conducted in the north-western outskirts of Warsaw (52°N, 21°E), within the flood terrace of the Vistula river, at a 12 km^2 study plot situated in an agricultural area in the Łomianki district. The prevailing form of land use on the flood terrace are meadows and pastures alternating with ploughland. The contribution of ploughland to the total area of arable lands in the study area accounted for over 83% and was higher than the mean for Poland, which amounted to 77% in 1982. The meadows and pastures contributed to 12% of arable lands in that time, ranking low below the mean for Poland (21.5%) (Chmielewski 1992). The study plot is situated close to the edge of the flood

terrace, where the habitat transformation is lower as compared to the managed part of the study area (Plitt 1992a). The landscape is dominated by meadows, ploughland and wasteland, and intersected by avenues lined with pollard willows and local roads. A small part of the study plot comprises rural and recreational buildings.

Historical analysis of cartographical material demonstrates that the land use in the study area suits regional environmental conditions and was not subjected to any greater changes in the last 200 years (Plitt 1992b). In order to access the changes in the land use in the period 1982 – 2005 as a potential factor of the Little Owl decline, we compared data for the study area in 1982–1988 (Dombrowski *et al.* 1991) with the recent 2002 topographic maps of 1:10000 scale, analysed with the ArcView 3.0.

We compiled data from 13 night censuses of the number of little owls carried out from 1982 – 2005 at a study plot by means of vocal stimulation with the standard playback technique (Domaszewicz *et al.* 1984, Zuberogoitia and Campos 1998). We also implemented the diurnal observations, to confirm the results of night estimates, and we searched for the little owls nests and roosts. In 1982, 1986 and 1988 the night censuses were conducted by Dombrowski *et al.* (1991). These researchers were simultaneously checking for the presence of other owl species. In 1983 and 1984 the censuses were conducted by Romanowski (1988). In our present research, data were collected in the years 1990–1992, 1995–1997, 2003 and 2005. In 2004 the study plot was not censused on a regular basis. For each year when a census was carried out, we calculated the density of breeding pairs (bps 10 km^{-2}). If a range of the breeding pairs in the study area for a given period was estimated, the mean value was used (e.g. 3–4 pairs give the mean value of 3.5 pairs).

The Little Owl is a resident species. Most of the ringed owls are found in the distance of less then 10 km from the ringing location (Bijlsma *et al.* 2001). This means that the post-breeding dispersal from far areas probably does not have much influence on the density of local population. This gave us a possibility to recognize the influence of weather conditions on the density changes of the little owls at the study area using the annual density data. In order to explain the observed changes in the population size of little owls, we calculated a correlation between density in consecutive years and weather conditions (data of Institute of Meteorology and Water Management in Warsaw). To do this we looked at the number of days with snow cover, the number of days with snow cover thicker than 10 cm, and mean air temperatures from December to March; all of these variables are indicators of the winter severity. We also included the amount of rainfall in March, May and June, since the sum of precipitation in these months affects breeding success of birds (Gaßmann *et al.* 1994). All the weather variables were plotted independently both against little owls density corresponding to the year when they were measured as well as against the density in the following year. This was meant to reveal factors that possibly influence the numbers of this species in the following breeding season. In total, 14 Pearson correlation analyses were performed.

The number of Little Owl pairs on the study plot ranged from 0 to 8. The highest density was recorded in the 1980, even though in 1988 there were only 2 breeding pairs. In 1982–1984 and 1986 there were 7 and 8 pairs, which is the highest density (6.0 and 6.8 bps 10 km^{-2} respectively) that has ever been observed in agricultural landscapes in Poland (Dombrowski *et al.* 1991). In the subsequent years, the number of little owls decreased, but there still were 3–4 bps at the end of the 1990s. In 2003, for the first time we did not detect any individual, and it was again so in 2005 (Fig. 1). In 2004, only one male was found but we were not able to confirm that it occupied a territory, so we did not estimate the density for that year. The plotted data for 13 yearly censuses indicates a sharp decline of little owl density in the study area ($r= -0.85$, $P <0.001$) (Fig. 1).

We found no significant effect of the weather variables under study on changes in numbers of little owls in consecutive years (all 14 correlations $P> 0.05$). The structure of land use on the study plot has underwent relatively small changes from 1982 as compared to present situation. The area of meadows

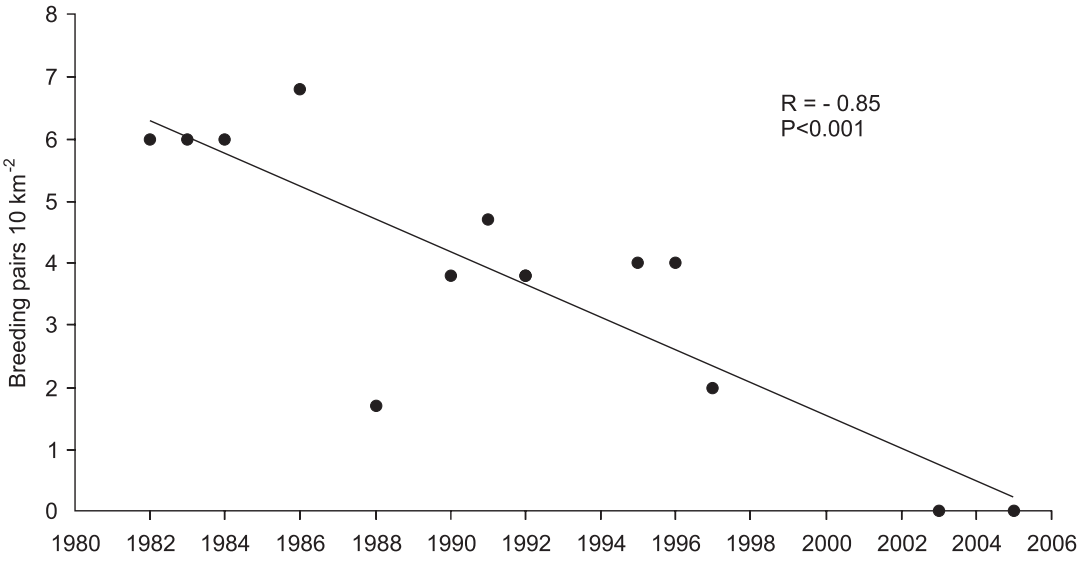

Fig. 1. The decline of density of Little Owl in the study area in Central Poland.

and pastures decreased by 0.6 km^2, ploughlands and wastelands by 0.3 km^2 (5.5% and 3.5% of the study plot area), while the area of orchards and forests increased by 0.5 km^2 and built up area by 0.6 km^2 (4.1% and 5.0% of the study plot area).

Our findings are the first results documenting long-term dynamics of Little Owl numbers in Poland. They confirm the observed decline of the Polish (Manez 1994, Stańko and Żegliński 2000, Tomiałojć and Stawarczyk 2003) and other central European populations (eg. Vogrin 1997, SOVON Vogelonderzoek Nederland 2002). The results of this study are consistent with the exceptionally low densities of this species found at other sites monitored between 2003–2005 in agricultural landscapes of Central Poland (M. Żmihorski and G. Osojca – unpublished), although locally Little Owl can still reach relatively high densities in this region (Żmihorski 2004). The reasons underlying the sharp decline in the little owls density in our study area remain unknown. The changes in the area of arable lands in the period between 1982–2005 were minor and should not be considered as a factor of the Little Owl disappearance. The analysis of weather conditions indicates that these are not the direct cause of the negative trend in the Little Owl density. Although this species is known to decrease after severe winters (Génot and Nieuwehuyse 2002), we could not detect such a negative effect in our study area.

In The Netherlands, the breeding population of Little Owl has decreased from 8000–12000 pairs in 1979–85 to 5500–6500 in 1998–2000 (SOVON Vogelonderzoek Nederland 2002). Factors responsible for this decline are the destruction of traditional orchards (nesting trees) in the farmland, urbanization, and usage of pesticides (former use of DDT). The intake of heavy metals and PCBs with the food (earthworms), especially in river floodplains (Bijlsma *et al.* 2001, SOVON Vogelonderzoek Nederland 2002) is another factor of decline. The analysis of different landscape components in our study area has shown a significant preference of the little owls to old pollard willows, which used to be the main nesting resource (Bacia 1997). During the last decade, the number of pollard willows in the study area has declined by illegal cutting and deliberate or accidental burning. Some little owls territories were located among fields and meadows which were recently converted into new housing areas (D. Altenburg-Bacia and J. Romanowski – unpublished.). It is possible that these factors have influenced negatively the nesting facilities of the local Little Owl population and at least partly caused the decline in the study area. Another possible factor may be the change of agricultural use of area. During the last decade, in the study area pastures were abandoned and left uncul-

tivated and meadows were less often mowed, resulting in a secondary succession of herb communities with Goldenrod *Solidago virgaaurea* and Horseweed *Erigeron canadensis*. Such a tall vegetation may severely impede the little owls to hunt for insects and rodents and have made the food less available. Finally, road traffic can be a factor for little owls mortality. Two specimens were found killed by cars in the study area (J. Romanowski – unpublished.).

The causes of the Little Owl decline in Poland require urgent investigation, but at the moment one may expect that the reduction in nesting sites (old trees in open landscape) and decreased food availability (succession of tall herbal vegetation on the arable fields and pastures) are the factors of decline.

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