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SHORT NOTES

Fluctuations of a Common Buzzard *Buteo buteo* population in Central Poland

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Abstract. Studies carried out in the vicinity of Rogów in central Poland showed a 47% rise in the population density of the Common Buzzard, inasmuch as the average number of breeding pairs in the study area of 105 km^2 increased from 18.2 in the years 1982–1991 to 26.7 in the years 2001–2003. Furthermore, an upward trend was observed for each separately investigated forest complex. Possible mechanisms underpinning this increase in density are discussed.

Key words: Common Buzzard, *Buteo buteo*, population trends, density

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Under the previous studies carried out in the area in question over the years 1982–1991, the estimated density of the studied population of the Common Buzzard was shown to be similar to that noted in other regions of Poland (Goszczyński 1997). However, as the overall number of pairs of this species in recent decades has been increasing in Poland (Tomiałojć & Stawarczyk 2003) and in many European countries (Hagemeijer & Blair 1997, Snow & Perrins 1998, Sim et al. 2000), we assumed that similar changes were probable for our investigation area. In the case of the Common Buzzard, the interesting question then arising concerns the patterns to the increased density in the species. It is theoretically possible to consider three (not mutually exclusive) scenarios by which the process may be accounted for:
1. the 1976 inclusion of the Common Buzzard within the group of species protected by law was followed by a progressive filling-up of all free areas suitable for the establishment of territories;
2. the changes in forest habitat structure and in landscape composition occurring in the last 30 years may have proved positive as regards the food supply and nesting conditions for Buzzards, allowing for the settlement of more pairs per unit of space;
3. as a result of the initial rapid increase in numbers, the pressure of intraspecific competition for space among Buzzards may have led to a decrease in the nesting and hunting ranges of territory holders. The influence of interspecific competition between Common Buzzard and Goshawk *Accipiter gentiles* should be also taken into consideration (Kostrzewa 1991).

The aim of our studies was to reassess the density of the population of Common Buzzards in question, to make comparisons with the previous data and to analyse the possible factors influencing the Common Buzzard population.

The studies were conducted in the years 2001–2003, near Rogów (51°48'N, 19°53'N) in Central Poland. The study area (of 105 km^2) is a mosaic of woodlands (23%), cultivated fields (59%), grasslands (5%), and orchards (5%). Small towns, villages, roads and fallow land account for the remainder of the area. Forest in turn comprises woods of differing size (from 50 ha to 1000 ha, Fig. 1), with the prevalent species being Scots Pine *Pinus silvestris* (70%), with an admixture of oak *Quercus* sp., European Larch *Larix decidua*

and Beech *Fagus silvatica* (Zielony 1993). The dominant types of stand are fresh mixed deciduous forest (46%) and fresh deciduous forest (38%). The average age of stands is approximately 55 years. Apart from a slight increase in the area left fallow and a minor reafforestation of previously-cultivated fields, no significant changes in the landscape have been observed since the time of the previous studies in the years 1982–1991.

Breeding territories and potential nesting sites of Common Buzzards were located by traversing wooded areas throughout the year. The fieldwork was done by one or two observers. Soaring pairs were first mapped in February and March, with note taken of all signs of birds' presence in the breeding territory (like courtship calls, remnants of prey or the feathers of the raptors). Occupied nests were sought from early April onwards, with those found being checked again in May and June to ensure occupancy. Note was also taken of the appearance of nests (i.e. presence of down, fresh twigs), as well as the presence of faeces or prey remnants beneath them. Finally, certain areas in which birds had been observed frequently during the breeding period, but no occupied nest found, were searched again during autumn and winter. The numbers of fledglings in nests were estimated by binocular observation in June and July. During visits to the study area, trees identified as having nests of Buzzards in them were measured. Data regarding composition of the diet were in turn obtained from pellets and remains of prey, as collected from beneath nests, and in their immediate surroundings, through the 2001 and 2002 seasons. A total of 747 food items were obtained, and used to ascertain the nature of the diet of Buzzards.

The years 1982–1992 were associated with long-term constancy of the number of pairs of Common Buzzard in the Rogów Forests. On average, some 18.2 (SD = 1.33) pairs of Buzzard were recorded each year during the breeding season (Goszczyński 1997). In contrast, the average for the years 2001–2003 was of 26.7 (SD = 1.84) pairs of the raptors breeding annually in the same study area, implying a 47% increase in numbers (t-test, $t = 8.56$, $p < 0.001$).

Furthermore, an upward trend of this kind was observed in each of the forest complexes studied (Table 1). Thus, the mean number of breeding pairs of Common Buzzards in any particular wood was significantly higher in the latter study period than in the former period (paired t-test, $t = 3.62$, $p = 0.011$). In line with the increase in density, the average distance between the two closest occupied nests diminished from 1020 m in 1982–1992 to 712 m in 2001–2003.

The mean number of fledglings per breeding pair in the Rogów Forest over the period 2001–2002 was much lower (1.20 ± 0.77) than that in 1982–1992 (1.78 ± 0.52, Goszczyński 2001).

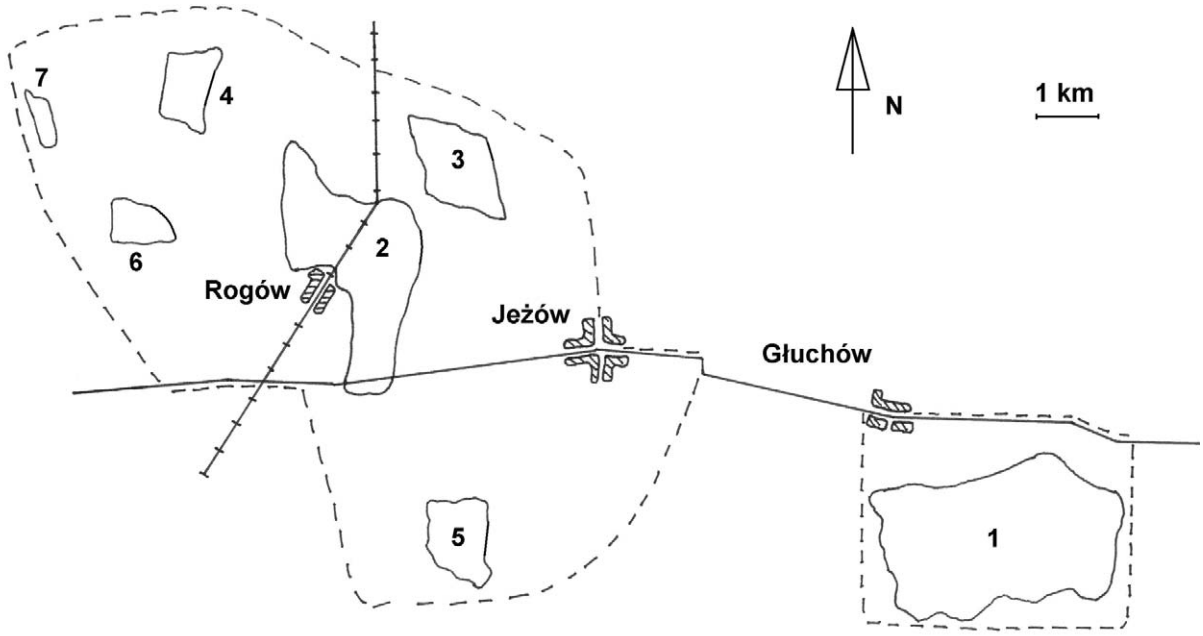

Fig. 1. Distribution of the forests (1–7) in the study area.

Table 1. Increase in numbers of pairs in particular forest complexes.

Forest complex (see Fig. 1)	Area (ha)	Mean number of pairs	
		1982–1991 (Goszczyński 1997)	2001–2003 (this paper)
1	1000	5.6	7.0
2	717	4.0	5.0
3	205	1.9	3.5
4	168	2.2	3.3
5	166	2.3	2.5
6	135	1.4	1.7
7	50	0.9	3.7

However, it must be treated with due caution, because of the fact that the recent estimation was based on just two years of data.

As was suggested above, different factors could contribute to increased density of the Common Buzzard population (implementation of the law protection, changes in the food and nesting places availability, intra- and interspecific competition).

The first factor is likely to be responsible for an increase in number in those regions of Poland where populations of the species had been reduced markedly before 1976 as a result of human persecution (by shooting, trapping and nest-destruction). However, the role played by the Rogów Forests in teaching ensured that, even at the time when raptors were not protected by law, the level of persecution of Buzzards must have been rather low there. Additionally, as during the previous study, the annual numbers of pairs varied little over the study period (in the range 17 to 21 only), it seems improbable that so many potential territories (above 30%) could have remained unoccupied each year.

According to some opinions, the current recession in agriculture in Poland and consequent increase in the area of fallow land may be resulting in greater numbers of mammalian prey, i.e. the Common Vole *Microtus arvalis*. The greater availability of mammalian prey is able to sustain the existence of a more abundant population of Common Buzzards within the same habitat mosaic (Newton 1979, Sim et al. 2000). However, in our study area, the changes in field habitat were not so major as those in north and west Poland, in which the abrupt closure of the State Farms allowed extensive areas of once-cultivated fields to be transformed into fallow land. Unfortunately we do not have data on the abundance of the field and forest rodents in two compared periods. It seems, however, that food conditions for Common Buzzards remained the same as the recorded shares of Buzzards' diets accounted for by the two most important dietary components, which is to say by mammalian and bird biomass, are similar to those registered in the previous study (Table 2).

It would also seem that nesting conditions enjoyed by Buzzards in the wooded areas have remained almost the same as they were. The mean age of stands has inevitably changed slightly (from 52 years in 1989 to 55 years in 2000), but Buzzards build their nests in trees of similar girth and at a similar height. The difference between the average heights at which nests were placed in the two study periods (18.9 m in 1982–1992, n = 62 and 19.2 m in 2001–2003, n = 35) did not attain statistical significance ($t = 0.53$, $p = 0.6$), and neither did the difference in girths of nesting trees (112 cm, n = 51 in the first study period vs 119.6 cm, n = 35 in the latter, $t = 1.11$, $p = 0.27$). One difference that was capable of being registered (in line with changes in stand composition in the study area) was that smaller numbers of Scots Pines were chosen as nest trees, with the 93% incidence of this species in the previous period comparing with just 67% in the years 2001–2003. This difference was statistically significant (test for comparison of two percentages, $t = 3.83$, $p < 0.001$, Bailey 1959). This was the only observable reaction on the part of Buzzards to changes ongoing in the forest habitat.

As far as the last of the aforementioned three scenarios is concerned, it does seem reasonable to assume that the high numbers of young birds, ready to reproduce but unable to find vacant territories, do exert strong pressure on

Table 2. Food composition of the Common Buzzard (percent by weight).

Food items	1982–1990 (Goszczyński 1991)	2001–2002 (this paper)
Mammals total	42.6	38.5
Rodentia	17.9	18.6
Talpa europea	12.8	16.7
Lepus europaeus	10.0	1.4
Birds total	56.7	60.7
Columba sp.	20.4	35.0
Gallus domesticus	10.7	7.2
Perdix + *Phasianus*	1.7	1.0
Turdus sp.	1.1	2.2
Sturnus vulgaris	0.4	0.5
Corvidae	2.7	3.9
Piciformes	0.8	1.3
Amphibia	0.4	–
Reptilia	0.2	0.6

territory-holders, forcing them to reduce their ranges. The success of intruders may in turn reflect a high degree of relatedness among those involved, with a resultant restraining of aggressive behaviour because of the kinship. Another factor facilitating the successful colonisation of additional pairs would be a richness of food in some territories allowing for increased tolerance on the part of holders toward new neighbours. These two mechanisms — the "kin-related" and "food related" —have the potential to sustain an increase in the density of pairs while at the same time intensifying local competition for food.

On the other hand, the decrease in number of Goshawk from 17.1 in the years 1982–1992 (Goszczyński 1997) to 11 pairs in 2002 (J. Gryz, unpubl.) may have contributed to the increase in number of the Common Buzzard. According to Kostrzewa (1991) Goshawk is the dominating species which could have influenced local population density and breeding success of the Common Buzzard.

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STRESZCZENIE

[Zmiany zagęszczenia populacji myszołowa w środkowej Polsce]

Porównanie dwóch ocen liczebności przeprowadzonych w Lasach Rogowskich wykazało, że w przeciągu kilkunastu lat zagęszczenie myszołowów wzrosło prawie o połowę i wynosi obecnie 2.5 par/10 km^2 całego terenu badań lub około 11 par/10 km^2 terenów leśnych. Wzrost liczby par odnotowano w każdym z badanych kompleksów leśnych (Tab. 1). Myszołowy w obu okresach badań budowały gniazda na drzewach o zbliżonym obwodzie pnia (110–120 cm) i umieszczały je na tej samej wysokości ok. 19 m, ale rzadziej niż dawniej wybierały sosny na drzewa gniazdowe. Proporcje biomasy dwóch głównych grup pokarmu: ptaków i ssaków były podobne w pierwszym i drugim okresie badań (Tab. 2). W latach 2001–2002 średnia liczba odchowanych młodych na parę lęgową była mniejsza niż w latach 1982–1992. Wydaje się, że najbardziej prawdopodobną przyczyną zwiększenia liczebności na tym terenie było wsiedlanie się nowych par w istniejący układ terytorialny.