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CONTENTS

PREFACE

The Institute of Ecology of the Polish Academy of Science has financed the journal "International Studies on Sparrow". Unfortunately, publication was liquidated for financial reasons. The Editing Board had problems continuing with the last journal.

Thanks to a proposal for editing and financing the "ISS" from the Institute of Biotechnology and Environmental Protection UZ, the journal will now be edited by University of Zielona Góra beginning in 2005. Even exchange, subscription and sale the journal after 2005 year will now be coordinated by University of Zielona Góra.

The old numbers of journal "ISS" are in the Library of the Centre of Ecological Studies (Biblioteka Centrum Badań Ekologicznych PAN, Dziekanów Leśny, ul. Konopnickiej 1, PL 05-092 Łomianki).

The Editor
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NUMBERS, DISTRIBUTION, AND ECOLOGY OF THE HOUSE SPARROW IN LVOV (UKRAINE)

General distribution, numbers, distribution across habitats, food requirements, behaviour, and some other aspects of the biology of House Sparrows *Passer domesticus*, also their spatio-temporal dynamics in human settlements and larger towns of Ukraine have been poorly known as yet. This issue is of particular importance now because of a decline of this species in many European towns (Bowers 1999, Summers-Smith 1999, 2000, Freeman and Crick 2002, Siriwardena *et al*. 2002, Jasso 2003, Böhner *et al*. 2003).

STUDY AREA

Lvov is one of the biggest towns of Ukraine, with 742 000 inhabitants in 1985. It is located in western part of the Wolyn-Podole plateau, in the forest-steppe area of Roztocze and Opolia, on the watershed of the main European catchment basins of the Baltic and Black Sea.

The city is located in the valley of the Poltva river and on slopes of the hills surrounding it on all sides, except for north-west. The mean height of the hills is 360 m above sea level, and no more than 290-300 m in the region of the Lvov valley. The highest point of the city

is Mount Vysokij Zamok, reaching 413 m. Within its administrative boundaries, the city covers an area of 155 km^2, and its built-up part (ecological area) is 66.7 km^2.

Central part of Lvov represents a typical "old town" characterised by dense 3-5-storey buildings from the 18th and 19th centuries, narrow, paved streets, and almost total absence of green areas. It covers an area of 572 ha. Around the old part of the city there are most of the urban parks with a total area of 887 ha. The outskirts of the city support modern multi-storey buildings occupying 1562 ha. The residential quarter in most cases represents former suburban villages engulfed by the expanding town. It occupies an area of 2713 ha. Industrial area covers 768 ha. Ruderal areas in ecological parts of the town are scarce, and typically these are abandoned housing lots, the number of which is declining with time. During the study period they occupied 61 ha.

MATERIAL AND METHODS

The study on the biology of the House Sparrow in the city of Lvov was conducted from 1980 until 2004. The distribution and abundance were examined in the breeding seasons of 1994 and 1995 and in the winters of 1993/94 and 1994/95 in ecological areas of the city, occupying 66.7 km^2 (Fig. 1), as part of the work on the atlas of nesting and wintering birds of Lvov.

For the purpose of the Atlas, the time of the beginning of the work and its duration in each season were chosen so that the breeding and wintering seasons of the urban population of House Sparrows were covered as completely as possible. In the nesting periods of 1994 and 1995, birds were surveyed from 15 April until 30 June, and in winter from 20 November until 20 February.

For mapping birds, we divided the study area according to habitat types, following the approach previously used in the work on the atlas of the distribution of birds of Warsaw (Luniak *et al*. 2001). In our opinion, this is a more objective method for estimating the distribution of birds in urban areas than the commonly used method of dividing the study area into squares.

With this method, the whole study area of 6 670 ha has been partitioned into separate habitats.

The following criteria were used to delimit habitat types in the ecological area of Lvov: 1) type of urban design, 2) proportion of greenery, and 3) inclusions of small structures foreign to particular habitat types (Bokotey 1996a, 1997).

The type of urban design, in turn, was subdivided into 4 categories: old closely built-up areas in the city centre (C), modern multi-storey quarters (M), residential areas (R), and industrial areas (I).

The proportion of greenery was determined from a 1:10000 map and also visually in the field. The proportion of green areas less than 10% was considered as small (g), 10-30% as medium (gg) and above 30% as high (ggg).

Inclusions of atypical designs were considered only when they influenced population density of the House Sparrow in a given part (for example, several tall buildings). Inclusions are denoted by the same letter as the types of urban design (C, M, R, I).

With these rules, 13 habitat types were distinguished in the ecological areas of Lvov (Fig. 1):

1-2. Old close housing in central part of the city (C) – 572 ha:
   1. with a small proportion of green areas (Cg) – 433 ha;
   2. with a high proportion of green areas and inclusions of areas with modern tall houses (CgggM) –139 ha.

3-6. Modern multi-storey housing (M) – 1562 ha:
   3. with a small proportion of green areas (Mg) – 873 hał;
   4. with a medium proportion of green areas (Mgg) – 260 ha;
   5. with a medium proportion of green areas and inclusions of residential areas (MggR) – 263 ha;
   6. with a high proportion of green areas and inclusions of residential areas (MgggR) –166 ha.

7-9. Residential area (R) – 2713 ha:
   7. with a high proportion of green areas (Rggg) – 1822 ha;
   8. with a high proportion of green areas and inclusions of areas with old close housing (RgggC) – 519 ha;

9. with a high proportion of green areas and inclusions of areas with tall houses (RgggM) – 372 ha.

10-11. Industrial area (I) – 768 ha:

10. with a low proportion of green areas (Ig) – 285 ha;
11. with a medium proportion of green areas (Igg) – 483 ha.

12. Parks and cemeteries (PC) – 887 ha.
13. Ruderal areas (RA) – 61 ha.

As the surface area of most habitats was large, we divided them in a mechanical way into smaller plots to facilitate the census, so that an observer could cover the whole plot within 2-3 hours. In this way, 105 plots were established within the ecological boundaries of the city. The boundaries of neighbouring plots followed large streets and railways crossing the city. All the plots were numbered so that observers could easily define their position in the area when working.

As a rule, three surveys were made in each plot during the breeding season, and four when necessary. Successive surveys of the same plot were conducted as close as possible to the earlier established route, each time from the opposite end of the plot. No surveys were conducted on windy and rainy days. In winter, surveys on each of the 105 plots were conducted once a season.

In total, 105 routes were established of a total length of 755 km. Over the breeding season, the total length of the survey route was 2 250 km (562 hours of the field work), and in winter 1 530 km (398 hours).

The breeding seasons of 1994 and 1995 were warm with little precipitation. The winters of 1993/94 and 1994/95 were mild with a mean temperature of –2ºC and little snow.

Basically, the method of line-transect (Bibby *et al*. 1992) was used. The routes/lines were established so that the largest part of the plot was surveyed. Transect lines could be walked only once per survey. The speed of walking was 3-4 km/h.

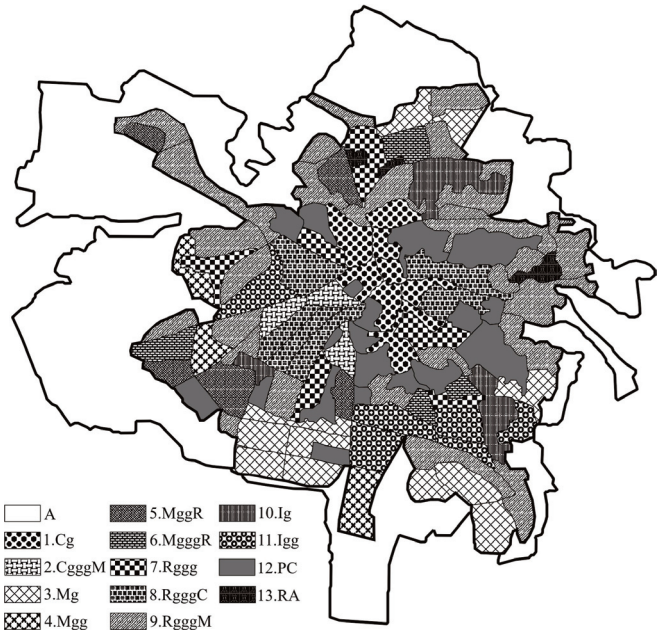

Fig. 1. Habitat types in the administrative boundaries of Lvov

A – urban areas beyond the ecological boundaries of the city; 1. Cg – old close housing in central part of the city with little green areas; 2. CgggM – old close housing in central part of the city with a high proportion of green areas and inclusions of areas with modern tall houses; 3. Mg – modern multi-storey housing with a small proportion of green areas; 4. Mgg – modern multi-storey housing with a medium proportion of green areas; 5. MggR – modern multi-storey housing with a medium proportion of green areas and inclusion of residential areas; 6. MgggR – modern multi-storey housing with a high proportion of green areas and inclusion of residential areas; 7. Rggg – residential areas with a high proportion of green areas; 8. RgggC – residential areas with a high proportion of green areas and inclusion of areas with old close housing; 9. RgggM – residential areas with a high proportion of green areas and inclusion of areas with tall houses; 10. Ig – industrial areas with a low proportion of green areas; 11. Igg – industrial areas with a medium proportion of green areas; 12. PC – parks and cemeteries; 13. RA – ruderal areas.

RESULTS

Distribution and density of the population

The results of the study are illustrated in Fig. 2.

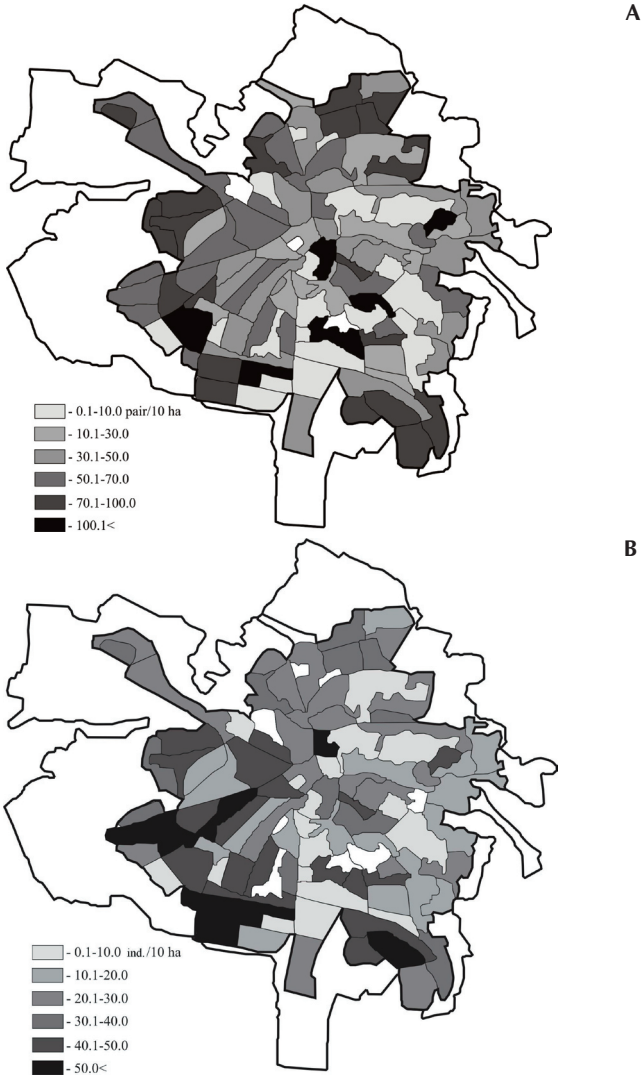

Fig. 2. Distribution and density of the House Sparrow (*Passer domesticus*) A – in the breeding season, B – in winter

In the breeding seasons of 1994 and 1995, House Sparrows occurred in all urban habitats and they were noted in almost all the plots, except for several parks and ruderal areas, without buildings. In the winters of 1993/94 and 1994/95, this species was recorded in 102 out of 105 study plots. The number of House Sparrows in the breeding season was 16-18 thousand pairs (256 pairs/km^2) and in winter 50-60 thousand individuals (830 ind./km^2). These were the most abundant birds both in the breeding season and in winter time. They accounted for more than 50% of the whole breeding avifauna and up to 40% of the wintering birds (Bokotey 1996a).

In all periods, sparrows reached the highest densities in areas of modern multi-storey housing (M), which were 44.4 pairs/10 ha in the breeding season and 79.4 ind./10 ha in winter. Their densities were especially high in habitats with a high proportion of green areas (MgggR, Mgg, RgggM).

A little lower densities were observed in residential areas (R) – 34.3 pairs/10 ha in the breeding season and 56.3 ind./10 ha in winter.

Even lower densities were found in the areas with old close housing in the city centre (C) – 26 pairs/10 ha in the breeding season and 40.1 ind./10 ha in winter.

Low densities of the House Sparrow were noted in the industrial areas of the city (I) – 12.3 pairs/10 ha in the breeding season and 23.3 ind./10 ha in winter.

The lowest densities occurred in parks (PC) and ruderal areas (RA) – 2.4 and 5.0 pairs/10 ha in the breeding season and 5.6 and 9.9 ind./10 ha in winter, respectively.

Gradient of population density and its determinants

In Lvov, the density of the House sparrow population declined from the areas of modern multi-storey housing with a high proportion of green areas and inclusions of residential areas (MgggR) to parks and cemeteries (PC) (Table 1).

Table 1.
Population density and percentage of the House Sparrows in different habitat types of Lvov during the breeding seasons of 1994 and 1995 and in the winters of 1993/94 and 1994/95

Habitat	Breeding season		Winter	
	density pair/10 ha	proportion, %	density ind./10 ha	proportion, %
MgggR	61.9	62.5	94.0	44.1
Mgg	41.5	46.6	74.3	32.4
RgggM	41.2	68.0	61.8	37.9
Mg	39.2	59.4	75.6	43.4
MggR	35.1	54.8	73.9	35.5
Rggg	31.8	67.6	64.3	38.7
RgggC	29.9	46.7	43.0	33.3
Cg	29.2	46.3	50.5	23.1
CgggM	22.8	31.6	29.8	28.1
Ig	13.3	57.8	19.0	24.0
Igg	11.2	50.9	27.6	14.9
RA	5.0	20.8	9.9	8.0
PC	2.4	6.5	5.6	4.5
Whole area	28.0	47.6	48.4	28.3

The highest population density was in plots with the highest proportion of green areas as they provide shelter from enemies and food for raising nestlings. The structure of buildings erected in the mid-20th century provides convenient nest sites to a height of the 3-4th storey. Typically, this corresponds to the height of trees growing around buildings and enables sparrows to hide easily and fast from predators. The high density of human population and abundance of open trash/garbage containers in these areas guarantee a rich supply of available food.

In residential areas (R), population density was a little lower. This may be a consequence of the reduced number of nest sites. Typically, private houses are totally coated with plaster and attended, and spar-

rows are not welcome neighbours, especially in the breeding season, when they stain the walls of houses with faeces. In this habitat, food is not so abundant. Trash containers are not so numerous as in the areas with multi-storey architecture, the human population is relatively low, and breeding of poultry, which provided food also for sparrows, nowadays is rather rare in the city. In addition, the abundance of sparrows is influenced by high numbers of predators such as Sparrowhawks (*Accipiter nisus*) and domestic cats.

Still lower densities of sparrows were noted in the areas with dense old close housing in the city centre (C).

Here, nesting conditions were rather good as the old city is in the state if neglect and there are many places for constructing nests. Also foraging conditions are rather good because of a high abundance of feral pigeons (11 pairs/10 ha) that are fed by people. A rather low population density in this area can be a result of some underestimation. In the city centre there are many back-yards inaccessible to observers and frequently visited by sparrows.

The low density of the House Sparrow population in industrial areas (I) can be related with limited food resources and also with a considerable underestimation of sparrow numbers due to the fact that the entrance to many industrial establishments can be very complicated.

The lowest population density in parks (PC) and ruderal areas (RA) may often be a consequence of the absence of buildings.

Population dynamics

The number of House Sparrows in the city probably declined over the last 20-year period. In one of the study plots of 1.3 ha located in one of the areas with modern multi-storey buildings constructed in 1960-70, with a high proportion of green areas, 46 pairs nested in 1997, 37 in 2000 and 31 in 2004.

One of the main factors responsible for this decline was changes in the habitat structure due to urbanisation processes. Each year the area of residential housing diminished, whereas increased the area of modern multi-storey architecture almost completely deprived of green ar-

eas, thus unsuitable for nesting. Also the area of ruderal habitats among buildings, covered with weeds, where sparrows forage frequently, especially in the post breeding period, is shrinking. These areas are being occupied by large supermarkets that do not provide suitable nest sites for sparrows.

An important factor of population decline is also the glazing of open balconies as this deprives birds the opportunity for warming in cold winters and occasionally for nesting. During the recent decade, the amount of such loggias increased by 60-70%.

In recent times, the number of open trash containers has markedly decreased in the city centre, and they are replaced by closed plastic containers preventing the access to food resources for birds. In the places without open containers, the number of sparrows declines rapidly. Besides, more and more often trash is disposed in polyethylene bags so that birds cannot use food.

Also an increasing use of petards by the inhabitants on holidays should be noticed, especially in the evenings and at nights. During two evening-hours in winter holidays, the number of explosions can vary from 50 to 120. Such distressing noise can disrupt roosting sites, and frequently causes movements of sparrows from place to place. As a consequence, they choose places of poorer quality, where they are more prone to predation.

According to some authors (Jasso 2003), the decrease in the House Sparrow population is partly due to the increasing traffic that kills mainly young birds. In Lvov this factor is not so important because the state of streets does not allow fast driving. Diseases are known as a cause of House Sparrow mortality in Britain (Summers-Smith 1999) but not in Lvov.

One of the most important factors of the decline in the House Sparrow population in Lvov may be a decrease in the abundance of insects fed to nestlings, as noted by Bower (1999). This finding requires further investigations.

Mass roosting

In winter, House Sparrows typically form flocks of 5 to 20 individuals, less often up to 50 individuals. The largest flocks we observed comprised 75, 94 and 130 birds. The mean flock size was 10 individuals (n=2133). But in recent years, the flock size markedly dropped. Most often sparrows roost in the same number. Nonetheless, during the last 25 years we recorded five cases of mass roosting in Lvov, each of which disappeared long before the breeding season. The reasons and mechanisms of the formation and disappearance of such roosting are unknown.

The first mass roosting we observed in the city centre in the winter of 1980/81. In mid-December, 200-250 sparrows started to aggregate in shrubs of hawthorn (*Crataegus spp*.). Their numbers increased to 1.5 thousand birds after a heavy snowfall early in January. By the end of this month the number of sparrows increased to 2300 individuals, and they were joined by 60 Starlings (*Sturnus vulgaris*). At the end of February, the birds disappeared.

The largest roosting of House Sparrows was observed in the square at the railway station in the winter of 1984/85 (Bokotey 1996a). During frosty weather in January, 4700 House Sparrows and 400 Starlings roosted in the canopy of hawthorn. This roosting was continued until 7 March. In following years no more than 250-300 birds roosted there, and only in 1987/88 their number increased to 2300. Later, several hundred birds roosted until 1995, and then this site was no more used for roosting although habitat conditions remained almost unchanged.

Other mass roosting of House Sparrows in Lvov occurred in September 1988, in limes and young chestnuts lining busy streets of the city centre. About 700-800 birds were roosting in 14 trees. They disappeared in mid-January 1989. In the period from September to January 1989, this roosting site was occupied by 750-900 birds. In following years it was abandoned.

Competitive interactions

In the conditions of multi-storey architecture (3-4 storeys) with a high proportion of green areas, House Sparrows can compete for nest sites

with Swifts (*Apus apus*) that nest in colonies under roofs. In areas with tall buildings (9 or more storeys) competition between these species do not exist because Swifts occupy upper storeys while sparrows nest lower. In these areas, we observed competition with the House Martin (*Delichon urbica*). Occasionally, Sparrows can occupy nests of House Martins but they are not always able to raise even one brood because of frequent conflicts with the hosts of these nests.

We know two cases of the nesting of the Black Redstart (*Phoenicurus ochruros*) in old nests of sparrows in one of the central parks of the city. In another central park, the Jay (*Garrulus glandarius*) nested under the roof of a building where a House Sparrow nested previously.

In residential housing we know more than 30 cases of competition with starlings for nest boxes. Starlings were the winners in all these cases.

House Sparrows also nested in burrows of the Sand Martin (*Riparia riparia*) on the outskirts of Lvov. They occupied eight abandoned burrows from the preceding year, and successfully raised the young. (Bokotey 1996b).

Predators

Four species of avian predators attacking House Sparrows were found in Lvov. First of all, this was the Sparrowhawk, hunting for sparrows at resting and roosting sites. Out of 163 attacks observed beyond the breeding season, 37 were successful, including 22 that took place one hour before the dusk.

In the years of invasion of the Merlin (*Falco columbarius*) in Lvov, they hunted mainly on sparrows, more often on the outskirts of the city where there were more mixed flocks of House and Tree Sparrows (*Passer montanus*). Of 39 attacks, 20 were successful. In 9 cases House Sparrows were the prey and in 11 cases these were Tree Sparrows. This predator hunts mainly in the morning. No evening hunting was recorded.

In winter, we observed Long-eared Owls (*Asio otus*) and Tawny owls (*Strix aluco*) hunting for sparrows. Their remains were found in

pellets collected in the city. Also the Barn Owl (*Tyto alba*) preyed upon sparrows. For the last time, it was seen in the city of Lvov in 1985 (Kijko and Jakubena 1995).

Also the Jay is known to prey on House Sparrows. It captured a young bird from the flock, killed it and swallowed whole.

DISCUSSION

Densities of House Sparrows at the beginning of the breeding season in 6 to 26 European towns, depending on the habitat type, during 1950-1975 are summed up by Pinowski and Kendeigh (1977, App. 3.1). In residential areas with apartment complexes it was 109.0±85 ind./10ha (max. 226, min. 18, n=19), in commercial and shopping areas 84.5±38.1 ind./10ha (max. 381, min. 1, n=10), in residential areas 72.3±107.9 ind./10ha (max 381, min. 1, n=21), in suburban areas with one family houses 61.1±46.4 (max. 188, min. 4, n=19), in old parks of larger towns 38.2±69.1 (max. 360, min. 1, n=26), in small allotments and gardens in towns 10.7±12.6 ind./10ha (max. 35, min. 1, n=6). These sparrow densities in different urban habitats were recorded before the decline observed in western Europe during 1980-2000 (Summer-Smith 1999, 2000, Sirivardena *et al*. 2002, and others). Sparrow population was also declining in eastern Europe, as found by Konstantinov *et al.* (1996) in different towns of Russia.

Against this background, sparrow densities in different urban habitats of Lvov were the highest (Table 1), although scarce data from 1960-1970 suggest that sparrow numbers are declining there.

Population densities of the House Sparrow in Lvov in 1993-1995 were close to their densities observed at the end of the 20th century in the city centre of Warsaw (1987-1990) and in Lublin (1975-2003) (Nowicki 2001, Biaduń 2004) (Table 2). These three towns of similar sizes are located sufficiently close to each other, at a distance of 350 km.

Similarity in population densities among all these towns can result from the similarity in their architecture and climate. In all the three cases, the authors conclude that the population of the House Sparrow has declined over the recent decades.

Table 2.

Population density of the House Sparrows (per 10 ha) in different habitat types of Lvov, Warsaw and Lublin at the end of XX century

Habitat type	Lvov		Warsaw (Nowicki 2001)		Lublin (Biaduń 2004)	
	Breeding	**Wintering**	**Breeding**	**Wintering**	**Breeding**	**Wintering**
Old city centre	32.6	45.3	37-64	62-111	63.6	141.9
Modern multi-storey housing	43.0	79.0	37-61	64-106		
Residential area	32.9	60.7	39-70	74-133		
Industrial area	11.9	24.8	9-16	24-51	10.1	1.5
Parks, cemeteries	2.4	5.6	3-5	17-31	4.1	2.7

CONCLUSIONS

Although House Sparrows continue to be the most abundant birds in Lvov, their numbers are probably declining. This is mainly due to changes in urban habitats resulting from urbanisation processes such as contracting of the residential areas, development of new microhabitats with very little greenery and architecture unsuitable for nest construction, building houses in ruderal areas covered with weeds. Also important is the limitation of access to traditional sources of food in winter, such as trash containers, also decrease in the number of allotments at houses where poultry are raised, and increasing disturbance to birds at night caused by the explosions of petards.

REFERENCES

Biaduń, W. (2004) – Birds of Lublin – Akademia Medyczna, Lublin. – 199 p. (in Polish, English summary).

Bibby, C.J., Burgess, N.D., Hill, D.A. (1992) – Bird Census techniques – Academic Press, London.

Böhner J., Schulz, W., Witt K. (2003) Abundanz und Bestand des Haussperlings (*Passer domesticus*) in Berlin 2001 – Berl. ornithol. Ber., 13: 42-62.

Bokotey, A. (1996a) – Preliminary results of work on the ornithological atlas of Lviv city (Ukraine) – Acta ornithol., 31 (1): 85-88.

Bokotey, A.A. (1996b) – About modes of nesting of the House Sparrow – Berkut 5 (2): 173 (in Ukrainian, English summary).

Bower, S. (1999) – Fortpflanzungsaktivitat, Habitatnutzung und populationsstruktur eines Schwarms von Haussperlingen (*Passer d. domesticus*) im Hamburger Stadtgebiet – Hamburger avifaun. Beitr., 30: 91-128.

Freeman, S.N., Crick, H.Q.P. (2002) – Population dynamics of House Sparrow *Passer domesticus* breeding in Britain: an integrated analysis – In: H.Q.P. Crick, R.A. Robinson, G.F. Appleton, N.A. Clark, A.D. Rickard (eds): Investigation into the causes of the decline of Starlings and House Sparrows in Great Britain. BTO Research Report No 290: 193-212, DEFRA, Bristol.

Jasso, L. (2003) – [House Sparrow (*Passer domesticus*) at the beginning of the third millennium and possible reasons of its decline] – Zprávy ČSO. – 57, p. 51-57 (in Czech).

Kyiko, A.O., Yakubenia, O.I. (1995) – Species structure, spreading and feeding of Owls in Lviv region – In: Problems of study and protection of birds – Lviv-Chernivtsy, pp. 61-63, (in Ukrainian, English summary).

Luniak, M., Kozłowski, P., Nowicki, W., Plit, J. (2001) – Birds of Warsaw. 1962-2000 – IZ PAN, Warszawa, 179 p. (in Polish, English summary).

Nowicki, W. (2001) – Birds of the Warsaw's city centre – IZ PAN, Warszawa, 136 p. (in Polish, English summary).

Pinowski, J., Kendeigh, S.C (1977) – Granivorous birds in ecosystems – Cambridge Univ. Press, Cambridge, 431 p.

Siriwardena, G.M., Robinson, R.A., Crick H.Q.P. (2002) – Status and population trends of the House Sparrow *Passer domesticus* in Great Britain – In: H.Q.P. Crick, R.A. Robinson, G.F. Appleton N.A. Clark, A.D. Rickard (eds): Investigation into the causes of the decline of Starlings and House Sparrows in Great Britain – BTO Research Report No 290, pp. 35-51, DEFRA, Bristol.

Summers-Smith, J.D. (1999) – Current status of the House Sparrow in Britain – British Wildlife, 381-386.

Summers-Smith, J.D. (2000) – Decline of House Sparrows in large towns – British Birds, 93, 256-257.

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CHANGES IN THE HOUSE SPARROW POPULATION IN BRITAIN

ABSTRACT

The number of House Sparrows has declined markedly in mid-latitude western Europe in the last 25-30 years. This was first noticed in Britain in farmland about 1979, though after a fall of about 60% the population appears to have stabilised at this lower level. It is now generally accepted that this decline was a consequence of reduction in the availability of food resulting from intensification of agricultural practices.

There has also been a reduction in built-up areas, though it is considered that, with little interchange between the two populations, the two declines are not directly related. The urban decline did not become obvious until about 1990, where in the centres of some large towns the decline, unlike that in farmland, took place at an increasing rate leading to virtual extinction. Closer examination shows that the situation in the built-up areas is far from uniform, with a similar decline to that in the urban centres occurring in the so-called "leafy affluent suburbs", but any decline being much less pronounced in the inner residential areas and modern housing estates. The main cause of the urban decline is again reduced availability of food, but here compounded by reduced availability of nesting sites and increased predation by cats and Sparrowhawks, with these factors having differing impacts in the different

built-up habitat types. The House Sparrow is a social species, breeding in loose colonies, which depend on social stimulation for successful breeding. It is suggested that, when the colony size falls below a certain level, the birds cease to breed because of the lack of social stimulation and the colony collapses (the "Allee Effect"). This stage has been reached in the centres of some large towns, where lack of nesting sites has been the critical factor, and in the „lafy suburbs", where the separation of the buildings on which the birds prefer to nest leads more rapidly to lack of social stimulation than in the case of the other residential areas where the houses are much closer together. Any decrease in these latter areas has occurred though an increased spacing of the colonies rather than by a decrease in colony size.

INTRODUCTION

While it is not possible to put numbers on the House Sparrow *Passer domesticus* population in Britain prior to the development of modern scientific field ornithology in the 20th century, there is little doubt that it became a common bird following the advent of 'high farming' with its intensive mixed farming methods in the 18th century. This is highlighted by the recognition of the species as an agricultural pest with the payment of bounties for eggs and dead birds, together with the formation of "sparrow clubs" dedicated to the destruction of the bird. Bounty payments continued into the beginning of the 20th century (Clark 2000). Increasing urbanisation (agricultural acreage fell by approximately 750,000 ha in the second half of the 19th century), with horse drawn transport providing food for the bird in the spillage of oats from the nosebags and undigested seed in the droppings and generally poor street hygiene, provided a habitat of growing importance for the bird.

House Sparrows are extremely sedentary birds, the majority living out their lives within an ambit of 1-2 km. Moreover, evidence from ringing, both recoveries of birds with numbered rings, and also sightings of colour-ringed ones, suggest that there is little interchange between the farmland birds and those living in built-up areas (Summers-Smith & Thomas 2002).

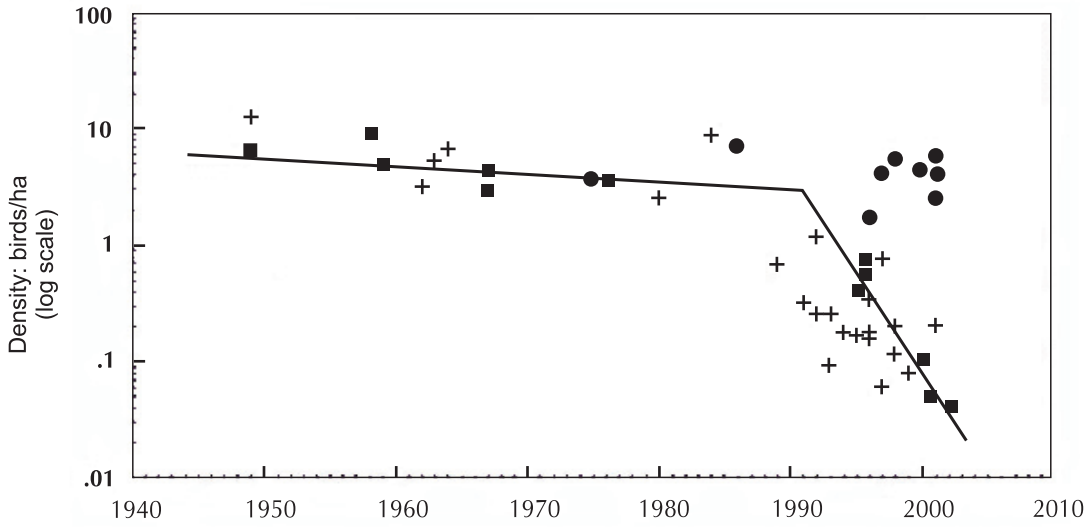
Major changes have occurred in both the populations of house sparrows living in farmland and those in built-up areas in the last 100 years. The situation up to the end of 2001 has been reported elsewhere (Summers-Smith 2003). The objective of this paper is to examine the situation in built-up habitats in the hope that this will provide some insight into the underlying causes for the current decline.

Replacement of the horse by the internal combustion engine

A major set-back to the House Sparrow occurred in the 1920s with the replacement of the horse by the internal combustion engine as the source of power for transport. Although not particularly well recorded, there is little doubt that the consequent loss of food for the bird resulted in a major decline in the urban population. The maximum effect of this change was over by the 1930s, though there is some indication that the density of birds in urban centres continued to fall, though albeit at a much reduced rate (Figure 1). However, with ongoing urbanisation creating more built-up areas, the prime habitat for the House Sparrow, and increasing agricultural activity, numbers overall were increasing, detailed studies of the data accumulated by the British Trust for Ornithology (BTO) suggesting that the breeding population in Britain was between 12 and 15 million pairs in 1970 (Crick *et al.* 2002).

The decline in farmland

Excellent data on the farmland situation is provided by the Common Bird Census (CBC) enquiry organised by the BTO. This monitored the number of breeding birds annually on 200-300 farmland and woodland plots between 1962 and 2000, expressing the result for each species as a "Population Index" that gives an indication of its abundance. Although the CBC began in 1962, the House Sparrow was largely ignored in the early years and sufficient data from the farmland surveys for indexing purposes only became available in the 1970s (Figure 2). The plot shows that a marked decline set in about 1979, with a fall of approximately 60% up to the mid 1990s when the index appears to have stabilised at a lower level.



■ Kensington Gardens London, + large town centres, ● small rural towns'

Fig. 1. House Sparrow densities in built-up areas

The lines are the linear regressions of the Kensington Garden counts for 1945-1975 and 1995-2002. The other large town centre results show a reasonable fit for the regression lines, but those for the small rural towns do not show the dramatic decline after 1990 (Summers-Smith 2003).

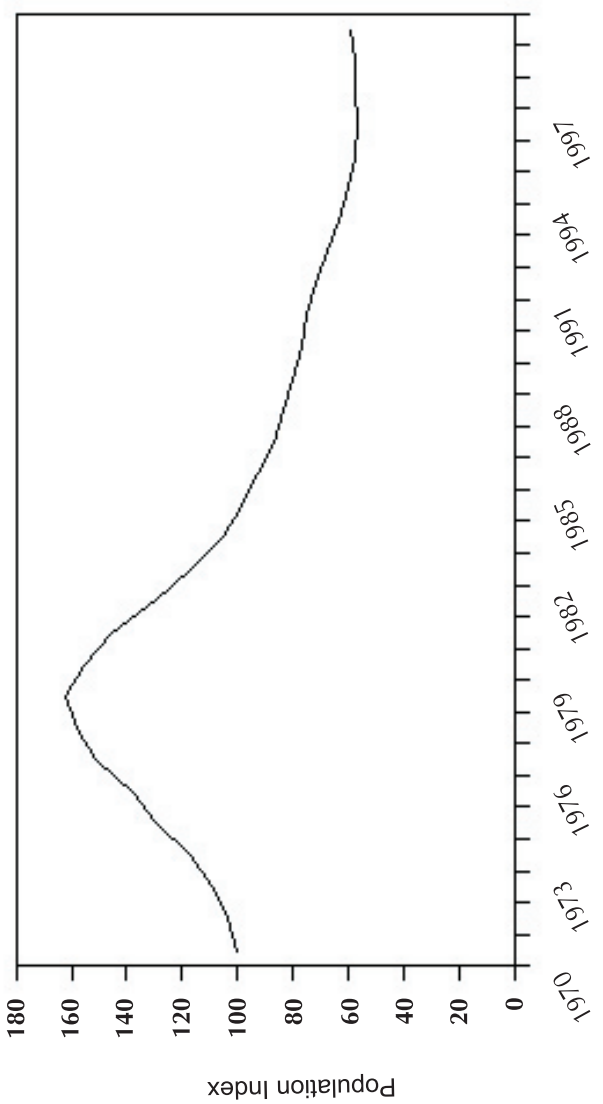


Fig. 2. Farmland Population Index for House Sparrow

The Population Index, a measure of abundance, is derived from the Common Bird Census enquiry of the Britsh Trust for Ornithology with data from 200-300 farmland plots (Summers-Smith 2003)

It is now widely accepted that this decline was the result of changes in agricultural practices that reduced the availability of food, not only for the House Sparrow, but also for a suite of other farmland birds ranging from finches to the Skylark *Alauda arvensis* and the Grey Partridge *Perdix perdix* (Chamberlain *et al.* 2000).

The decline in built-up areas

While the CBC Population Index for the House Sparrow has some limitations – a bias in the distribution of the survey plots to the populous south-east of England, lack of distinction between different farmland types (arable, pastoral, mixed) – it nevertheless gives a good indication of the overall farmland situation. In contrast, apart from some intermittent counts in Kensington Gardens, London, between 1945 and 2002, no comparable trend data are available for the built-up areas. As an alternative, Summers-Smith (2003) has used census data, with results expressed as birds/ha, to give some indication of the situation in the built-up environment, dividing this roughly into "urban centres" and "small rural towns"; the available data are plotted in Figure 1, which includes the Kensington Gardens data with the regression lines for the periods 1945-1975 and 1995-2002. This is much less secure than the CBC Population Index: most censuses refer to only one year so that there is no allowance for normal annual variations that for the House Sparrow may be as much as ±30-40%; House Sparrows are social animals living in small colonies, thus the density obtained depends critically on the census area; further, there is no standard protocol for the census technique. Accepting these caveats, the plot nevertheless confirms the suggestion of a slow decline in all built-up areas going back at least to the 1950s, with a dramatic collapse in the urban centre populations in the 1990s. In contrast to the situation on farmland, there is no suggestion of a slow-down in the decline or stabilisation at a lower level.

It is considered that the reason for the urban centre collapse is a consequence of the so-called "Allee Effect" (Allee 1938; see also Barnett 2001). Warder Allee was an American biologist who postulated that social animals depended on stimulation from their conspecifics if they

are to breed successfully. If a colony size falls below a certain critical level, the animals fail to come into breeding condition and the colony withers away. The House Sparrow is a social animal, living in small loose colonies. What appears to have happened in the urban centres is that the decline has reached the critical stage where the colonies are no longer viable.

The overall situation

The recent analysis of the BTO data suggests that the breeding population of the House Sparrow in Britain is currently about 6 million pairs, a decrease of between 50 and 60% since 1970, with two-thirds associated with built-up habitats (half of them in suburban areas) where population densities are about an order of magnitude higher (2.2-3.2 birds/ha) than in farmland (0.25-0.45 birds/ha); regionally the decline has been greatest in the south-east of England, with numbers actually increasing in Wales and Scotland (Crick *et al*. 2002).

DISCUSSION

The two most important factors that are likely to have affected urban House Sparrow numbers are:

1. A decrease in the availability of the animal food essential for rearing the young
2. A shortage of suitable nesting sites, particularly in the urban centres.

Although quantitative data are lacking, there is little doubt that the number of invertebrates has decreased: where are the flypapers that were once a *sine qua non* in every kitchen? how much reduced is the problem of squashed insects on our car windscreens? The increased coverage of exposed soil by concrete, improved street hygiene, increased usage of pesticides in parks and gardens, increased planting of exotics and sterile varieties have probably all played a part in reducing the number of invertebrates, as has possibly exhaust pollution from cars running on unleaded petrol. Both Bower (1999) and Vincent *et al.* (2002) have

produced evidence to suggest that shortage of animal food is a significant factor in breeding success. Lack of suitable nesting sites in modern buildings is certainly a factor in urban centres, though alternative sites like creepers on house walls and thick hedges can have compensated for this in residential areas. (In a survey covering the Greater London area (Noble & Eaton 2002), most nests were found to be in bushes and hedges).

While the available evidence points to a shortage of invertebrate food as the most likely cause of the decline in built-up areas, the possibility of an overall decrease in productivity in a colony, even though this is still above the critical „Allee level" cannot be discounted. Seeds are probably important in the diet of the adult birds, with increasing reliance on scraps possibly reducing their physical condition (fitness). This could result in failure of a female to come into breeding condition or a reduction in the number of breeding attempts per pair. Neither of these would be detected by the BTO nest record data, but would require a study of an individually marked population similar to that carried out by the Oxford Farmland Study Group (Hole *et al*. 2002)

Further, while not a primary factor, increasing predation by Sparrowhawks *Accipiter nisus*, added to that existing from cats *Felis catus*, both domestic and feral, cannot have helped with populations already under pressure. The domestic cat, not dependant on its prey for survival, poses a particularly severe threat (Woods *et al.* in press).

The built-up habitat is a complex one. Clearly the situation with House Sparrows is influenced by variations on a much finer scale than that of 'urban centres' and 'small rural towns' used in Figure 1. (The Greater London Survey in 2002 (Noble & Eaton 2002) showed large variations in abundance in the different boroughs.) For the purpose of discussion, the built-up habitat can be divided into the following sub-types, though these are not necessarily discrete and tend to merge with one another. However, it is hoped that the examination of the House Sparrow situation in each of these sub-types can throw some light on the causal factors for the decline in the built-up habitat.

1. Highly developed urban centres with vegetation largely limited to squares, parks and a few waste areas, with a high density of traffic.

2. Residential areas, ranging from inner city areas with a high density of housing and small, often neglected, gardens ("socially-deprived areas") to the outer suburbs, both those with large, well-developed gardens and a low density of housing ("leafy suburbs") and modern estates with a high density of housing and small, but well-tended, gardens and often thick hedges.

3. Small towns where the above categories are less clear and tend to merge together.

4. Rural villages with a varied density of housing and easy access to open country.

The most dramatic decline has been in some urban centres where a sudden collapse began in the late 1980s or early 1990s and has led to almost complete extinction (Figure 1). The factors most likely to have caused this are decreased availability of the invertebrates required to rear the young and loss of suitable nest sites in modern buildings and loss of holes through rehabilitation of older properties.

The only other significant avian species in the urban centre habitat is the Feral Pigeon *Columba livia*. This species does not appear to have decreased, but, unlike the sparrow, it is not dependent on invertebrates, being able to rear its young on „crop milk" derived from vegetable food. Moreover, it has not suffered from a decrease in the ledges that it uses for nesting.

Not all urban centres have lost their House Sparrows: according to Judith Smith (quoted by Prowse 2002) there has been no decline in Greater Manchester; Böhner *et al.* (2003) report no significant decrease in Berlin; House Sparrows are still common in the centre of Paris (McCarthy 2000), though a survey in 2002 showed an overall decrease of 36% from an earlier census in the 1960s (Galinet 2003). Perhaps, however, these anomalies are more apparent than real, reflecting differences that have allowed the colonies to be maintained above the critical "Allee level" – possibly fewer petrol-engined cars in Paris, more open areas in Berlin.

The residential areas provide a mixed bag, with good populations in areas of high density housing, both the older inner city areas and the new housing estates (even those estates with the birds nesting in thick hedges where the houses themselves do not provide nesting opportunities). Small towns and villages similarly hold good populations, though, in contrast, the 'leafy suburbs' have largely been abandoned. House Sparrows effectively disappeared from my garden in 1996, since when they have only been very irregular visitors. Paston (2001), Robinson (2002) and Tulley & Bland (2002) report a similar situation for Norwich, Crowthorne (Berkshire) and Bristol respectively even where there are plenty of nesting opportunities (creepers on walls, thick hedges), provision of seeds and scraps, and evidently enough invertebrate food to satisfy the requirements of other small passerines that occur as breeding species in built-up areas (Appendix 1). The built-up centres have probably always been a marginal habitat for these birds and only used opportunistically by wandering colonists (dispersers), though they have been able to maintain small numbers in the parks and gardens. For example, in a study of the breeding birds of Buckingham Palace Gardens, London, Sanderson (1999) found that, whereas the House Sparrow had become extinct in 1961, the other small passerines had only decreased by less than 30% (Appendix 2). The autumn bird counts in Kensington Gardens, London, give a similar picture, though being autumn counts rather than a breeding census this could be a reflection of their mobility rather than an indication of breeding numbers.

This effect in the town parks and the "leafy suburbs" is likely to be a consequence of the following key defining characteristics of the House Sparrow:

- obligate associate with man's built-up environment,
- extreme sedentariness,
- social behaviour.

Perhaps the parks and leafy suburbs are "sinks" for the other passerine species dependent on the mobility (dispersal) of their young, able to accommodate the odd pair of the non-social species, but offering insufficient invertebrate food to support a viable colony of House Sparrows. It is perhaps significant that the only other species showing

a major decline in Buckingham Palace Gardens between 1961 and 1997 is the semi-colonial Greenfinch *Carduelis chloris*.

CONCLUSIONS

The major difference between the House Sparrow and the other urban passerines is that the former is a colonial species, dependent on interactions with its conspecifics to provide the necessary social stimulation for breeding. It is thus limited to those urban areas where there are both sufficient nesting opportunities and invertebrate food to maintain a colony rather than just the odd pair.

With a continuing fall in the numbers of House Sparrows in all built-up areas, the future looks rather bleak for the bird. Moreover it is not easy to see what conservations measures can be taken to remedy the situation.

REFERENCES

Allee, W.C. (1938) – The Social Life of Animals – New York.

Barnett, A. (2001) – Safety in numbers – New Scientist 03.02.01: 38-41.

Böhner, J., Schulz, W &.Witt, K. (2003) – Bestand und Lebensraumspezifische Dichten des Haussperlings in Berlin Artennschutzreport (Sonder-) Heft 14:13-17.

Bower, S. (1999) – Fortpflanzungsaktivität, Habitatnutzung und Populationsstruktur eines Schwarms von Haussperlingen (*Passer d. domesticus*) in Hamburger Stadtgebeit – Hamburger avifauna Beitr. 30: 90-129.

Chamberlain, D.E., Fuller, R.J., Bunce, R.G.H., Duckworth J.C. & Shrubb, M. (2000) – Changes in the abundance of farmland birds in relation to the timing of agricultural intensification in England and Wales – Journal of Applied Ecology 37: 771-788.

Clark, J.F.M. (2000) – The Irishmen of birds – History Today October 2000: 16-18.

Cramp, S. (ed.) (1985) – The Birds of the Western Palearctic – vol. 4. Oxford Univ. Press, Oxford.

Cramp, S. (ed.) (1988) – The Birds of the Western Palearctic – vol. 5. Oxford Univ. Press, Oxford.

Cramp, S., Simmons, K. E. L. (eds.) (1980) – The Birds of the Western Palearctic – vol. 2. Oxford Univ. Press, Oxford.

Cramp, S., Perrins, C. M. (eds.) (1993) – The Birds of the Western Palearctic – vol. 7 Oxford Univ. Press, Oxford.

Cramp, S., Perrins, C.M. (eds.) (1994) – The Birds of the Western Palearctic – vol. 8. Oxford Univ. Press, Oxford.
Crick, H.Q.P., Robinson, R.A., Appleton, G F., Clark, N.A., Rickard, A.D. (eds.) (2002) – Investigation into the causes of the decline of starlings and house sparrows in Great Britain – BTO Research Rep. No. 290.
Galinet, C. (2003) – Et si les Moineaux parisiens disparaissaient? – Club Nature et Environnement d'Ile de Paris. April 2003. (see Le Figaro 12-13.04.03)
Hole, D.G., Whittingham, M.J., Bradbury, R.B., Wilson, J.D. (2002) – In: in Crick *et al.* 2002: 141-161.
McCarthy, M. (2000) – Where have all the sparrows gone? – The Independent 18.03.00.
Mitschke, A., Garthe, S., Mulsow, R. (2000) – Langfristige Bestands von häufigen Brutvögeln in Hamburg – Vogelwelt 121: 155-164.
Noble, K., Eaton, M. (2002) – Where have all our sparrows gone – Survey Report London 2002. RSPB: Sandy.
Robinson, C. (ed.) (2002) – House Sparrows: more DIY – BTO Berkshire News, January 2002.
Paston, S. (2001) – The House Sparrow in Norwich during autumn/winter 2000 – a population study – Norfolk Bird & Mammal Report 2000: 289-293.
Prowse, A. (2002) – The urban decline of the House Sparrow – Brit. Birds 95: 143-146.
Sanderson, R.F. (1997) – Autumn bird counts in Kensington Gardens 1925-1995 – London Bird Report No. 60 for 1995: 170-178
Sanderson, R. (1999) – Birds in Buckingham Palace Gardens – The London Naturalist, No. 78, Suppl.: 61-76.
Summers-Smith, J.D. (2003) – Decline of the House Sparrow: a review – British Birds. 96: 439-446.
Summers-Smith, J.D., Thomas, D.K. (2002) – House Sparrow – In: Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G., & Baillie, S. (eds.) – The Migration Atlas: movements of birds in Britain and Ireland – Poyser, London.
Tully, J., Bland, R. (2002) – Quoted in Crick *et al.* 2002.
Woods, M., McDonald, R.A. & Harris, S. (2003) – Predation of wildlife by domestic cats *Felis catus* in Great Britain. Mammal Review 33: 174-188.
Vincent, K.E., Peach,W. & Fowler, J.A. (2002) – An investigation into the cause of population decline of the House Sparrow (Passer domesticus) in urban Britain – Presented at British Ecological Society Winter Meeting, December 2002.
Woods, M., McDonald, R.A., Harris, S. (in press) – Predation of wildlife by domestic cats *Felis catus* in Great Britain – Mammal Review.

APPENDIX 1. Some Comparative Data on Urban Birds

Species	General Comments	Hamburg cf 1960-70s with 1990s[2]	London 1994-1999[3]	Main Food[4]		Nest[4]
				Adult	Nestling	
1	2	3	4	5	6	7
Sparrowhawk	Has increased where there are parks and large gardens (trees)			Birds (House Sparrow frequent)	Birds (House Sparrow frequent)	Tree, sometimes on foundation of old nest of other species
Feral Pigeon	No evidence of negative correlation with House Sparrow			Vegetable – seeds, scraps[5]	Vegetable – (crop milk)	Ledges on buildings
Collared Dove[1]	Has increased where there are large gardens		+35%	Vegetable, including scraps[5] (mainly from ground}	Vegetable – (crop milk	Tree or ledge on buildings
Dunnock[1]	Mainly parks and residential areas with large gardens		+5%	Invertebrates on ground, seeds in winter	Largely invertebrates	Thick vegetation – hedgerows, creepers on walls
Robin[1]	ditto	Increased 4-4.5 times	+15%	Invertebrates on ground, fruit and seeds in winter	Mainly invertebrates	Low bush or bank
Blackbird[1]	ditto	+50%	-25%	Mainly invertebrates on ground, scraps[5]	Mainly invertebrates	Cup nest in bush, ledge

1	2	3	4	5	6	7
Blue Tit[1]	ditto	Increased 2-2.5 times	+25%	Invertebrates, vegetable matter	Larvae and aphids from foliage	Hole in tree or wall, nest box
Great Tit[1]	ditto		+63%	Invertebrates, vegetable matter	Moth larvae from foliage	Hole in tree, nest box
Magpie[1]	ditto	Increase 10 times	+22%	Animal matter, carrion, nestlings, invertebrates, scraps[5]	Mainly invertebrates	Trees
Chaffinch[1]	ditto		+5%	Vegetable matter, invertebrates	Mainly invertebrates from trees	Cup nest, trees, hedgerows
Greenfinch[1]	ditto		-6%	Mainly vegetable matter (seeds)	Vegetable matter, but also invertebrates	Cup nest in thick hedgerows, trees
House Sparrow[1]	Major decline in town centres and residential areas with large gardens	-50%	-50%	Seeds, scraps[5]	Invertebrates essential for first few days	Hole, usually in man-made structure, nest boxes, creepers on walls, thick hedges

[1] BTO Garden BirdWatch 'Top Ten'.
[2] Mitschke, *et al*. 2000.
[3] Extracted from British Trust for Ornithology Breeding Bird Survey (A Prowse. pers. comm.)
[4] Data from Cramp & Simmons 1980, Cramp 1985, Cramp 1988, Cramp & Perrins 1993, Cramp & Perrins 1994.
[5] Bread and other foodstuffs inadvertently or deliberately provided by man.

APPENDIX 2. Number of pairs of small "Top Ten" passerines nesting in Buckingham Palace Gardens, London (Sanderson 1999)

Species	Nesting Pairs	
	1961	**1997**
Dunnock	5-7	1-2
Robin	4-5	5
Blackbird	10-15	8-9
Blue Tit	3-4	6-8
Great Tit	2-3	2-3
Greenfinch	5-7	0
Total pairs	**27-39 (mean 34)**	**22-27 (mean 24.5)**
House Sparrow	5-10	1

Note. Chaffinch has been omitted as it is not mentioned in the text and only appears in parenthesis in the summary Table.

SHORT NOTES

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NESTING OF THE SPARROWS *PASSER SPP.* IN THE WHITE STORK *CICONIA CICONIA* NESTS IN A STORK COLONY IN KŁOPOT (W POLAND)

Nesting of the sparrows *Passer spp.* in the White Stork *Ciconia ciconia* nests is a well known phenomenon, but there are not many papers about that. Usually, there are only short notes in monographic or popular articles or books, both about storks (e.g. Strojny 1983, Jakubiec, Szymoński 2000) and sparrows (e.g. Nankinov 1984, Cramp, Perrins 1994). There is only one paper, treating in details occurrence of sparrows' nests in the White Stork nest (Indykiewicz 1998).

The aim of this paper is to give a preliminary description of this phenomenon in one of the biggest White Stork colonies in Poland – in Kłopot (western Poland).

STUDY AREA, MATERIAL AND METHODS

Research was carried out in Kłopot village (lubuskie land, western Poland), where there is one of the biggest White Stork colonies in Poland (Jerzak *et al.* 2004). The study area is located in the Valley of Odra (Oder) River and is surrounded by arable fields, meadows and pastures and wetlands (detailed information is given in Tryjanowski *et al*. 2005).

Between 17-25 April, 2003 forty natural stork nests or those on artificial platforms were inspected. There were: 16 stork nests located without special artificial platforms on roofs, 6 nests with platforms on roofs, 7 nests with platforms located on electricity poles and 6 and 5 empty platforms situated on the roofs and poles, respectively. During control following facts were noted: occupation by the stork's breeding pair, number of resident breeding pairs of House- and Tree Sparrows (*Passer domesticus* and *P. montanus*) (told by number of singing males or individuals or pairs seen with the nest material) and location of the "entrance" to the sparrows' nests.

RESULTS AND DISCUSSION

In the year 2003, 16 breeding pairs of House Sparrow and l pair of Tree Sparrow, in 9 stork nests or empty artificial platforms were found. Sparrows were using 3 types of places as a nesting space: a) between sticks in large old stork nest on building roofs (2 stork nests with 6 occupied sparrow nests); b) between sticks in stork nest on electricity poles (2 stark nests with 4 occupied sparrow nests) and c) between metal or wooden construction of the artificial platforms situated on the electricity poles (5 platforms with 7 occupied sparrow nests). The entrances to the sparrow nests were situated: a) at the side of stork nests – in case of stork's nests on the roofs, and b) from the bottom of platforms – in case of storks nest on the poles.

Results obtained in Kłopot are similar to that, obtained by Indykiewicz (1998). The largest number of sparrow nests were found in stork nests or platforms located on the electricity poles. There were only two stork nests situated on the roofs that were occupied by sparrows. These results, at least partly, confirm his explanations of that phenomenon. The first, storks' nests or platform provide good, usually covered niche for sparrows to build their nests. And the second, these places are safe and secure against predators such as cats *Felis catus* or martens *Martes spp.* that frequently hunt for birds and their nests. It seems that presence of the storks on the nest isn't an important factor for sparrows. In Kłopot, sparrows were using both occupied and empty nests or platforms. Probably, the most important thing

is the fact that the nests on the poles are almost inaccessible for ground predators. On the other hand, there were no sparrow nests in platforms or small nest (both occupied or not by storks) located on the roofs within easy reach of predators.

The small number of stork nests situated on the roofs and occupied by sparrows can be explained by their construction. They were usually old, quite large nests that had been used for many years. Material constructing them (mainly sticks and soil) is very dense, compact and hard and because of that, does not supply good spaces for nest building for sparrows.

In addition to House- and Tree Sparrow nest, two nests of Starling *Sturnus vulgaris*, were also found in two stork nests located on electricity poles.

REFERENCES

Cramp S., Perrins C.M. [eds.] (1994) – The birds of the Western Palearctic. Vol. VIII – Oxford University Press, 906 p.

Indykiewicz P. (1998) – Breeding of the House Sparrow *Passer domesticus*, Tree Sparrow *P. montanus*, and Starling *Sturnus vulgaris* in the White Stork *Ciconia ciconia* nests – Not. Ornit., 39: 97-104 (in Polish, English summary).

Jakubiec Z., Szymoński P. (2000) – [Stork and storkies] – PTPP „proNatura", Wrocław, 144 p. (in Polish).

Jerzak L., Radkiewicz J., Bocheński M. (2004) – Long-term dynamic of white stork population and breeding success in colony in the village Kłopot near Oder, W Poland – Zeszyty Naukowe UZ (Inżynieria Środowiska), 131: 159-164 (in Polish, English summary).

Nankinov D.N. (1984) – Nesting habits of Tree Sparrow *Passer montanus* (L.) in Bulgaria – International Studies on Sparrows, 11 (1): 47-70.

Strojny W. (1983) – [White Stork] – KAW, Wrocław, 56 p. (in Polish).

Tryjanowski P., Jerzak L., Radkiewicz J. (2005) – Effect of water level and livestock on the productivity and numbers of breeding white stork – Waterbirds (in press).