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Jörg BÖHNER[1], **Klaus WITT**[2]

[1]Bodestr. 5c, D-14513 Teltow, Germany, email: joerg.boehner@tu-berlin.de
[2] Hortensienstr. 25, D-12203 Berlin, Germany, email: klaus.witt@gmx.de

DISTRIBUTION, ABUNDANCE AND DYNAMICS OF THE HOUSE SPARROW *Passer domesticus* IN BERLIN

ABSTRACT

The paper summarizes the current knowledge on the distribution, abundance and dynamics of the House Sparrow *Passer domesticus* in Berlin, the German capital with a size of 892 km^2 and about 3.4 million inhabitants. Main sources of information are studies conducted by the Berlin Ornithological Working Group (BOA), and its predecessors in the formerly divided Berlin, which include two large atlas works, a detailed grid-net census in the south-western part, two large-scale breeding season counts, continuous winter counts, as well as several smaller investigations on the species' abundance at specific sites in the city.

The distribution of the House Sparrow covers about 88% of the city, with small gaps mainly in closed forests and agricultural areas. Data from both distribution atlases (East and West Berlin) and from a grid-net census show that densely built-up areas are the most preferred habitat type. Breeding season counts in 2001 revealed highest abundances in new high-rise blocks of flats (on average 95 breeding pairs (bp) /10 ha) and old blocks of flats (81 bp/10 ha) and considerably lower values for small villages within the city area, parks/gardens, industrial areas, and residential areas. A repetition of the counts in 2006 gave similar results. Built-up areas are also the stronghold of the House Sparrow during winter time, with highest densities recorded in areas with old blocks of flats.

Based on the breeding season counts the total number of House Sparrows in Berlin was calculated as 135,000 breeding pairs (or 16 bp/10 ha) in 2001 and 119,000 breeding pairs (or 13 bp/10 ha) in 2006. Both values are surprisingly high in comparison with other

large European cities. The difference between 2001 and 2006 is considered as normal fluctuation and not a decline, a view supported by the annual winter counts conducted during that period. Furthermore, the long-term winter data since 1993/94 as well as an estimate for the entire population at the beginning of the 1990s (100,000 to 200,000 bp) strongly indicate stable numbers of House Sparrows in Berlin for at least the last 15 to 20 years.

It is not clear why Berlin differs so much from cities such as Hamburg, London, and Warsaw, where considerably lower numbers of House Sparrows were found and where the species has been declining more or less strongly in the recent past. Food (natural and anthropogenic) and nesting sites (especially crevices and cavities at buildings) are still abundant in Berlin, while recent studies show a sufficiently high reproductive success of the species also.

INTRODUCTION

The House Sparrow *Passer domesticus* is closely associated with man and inhabits mainly farmland, villages, and urban areas, where buildings play a key role by providing suitable nesting sites such as small cavities and crevices. At least until the first half of the last century the House Sparrow was certainly one of the most numerous species in Europe, often regarded even as a pest bird. However, information about its actual numbers at that time is rare, probably because the species was so wide spread and abundant that ornithologists rarely paid attention to it. As recently as the 1950s and 1960s only very general statements about its abundance in Germany can be found (Hudde in Glutz von Blotzheim & Bauer 1997). Data for Europe until 1975 are summarized by Pinowski and Kendeigh (1977).

The House Sparrow has declined in Europe, especially in the north-western parts, since the 1970s or even earlier. It is now considered a species of conservation concern (Bauer and Berthold 1996, BirdLife International 2004a, b, Engler and Bauer 2002, Indykiewicz and Summers-Smith in Hagemeijer and Blair 1997). In Germany it is classified as near threatened („Vorwarnliste") in the current Red Data List of breeding birds (Bauer et al. 2002). Despite a growing number of studies in recent times, the main reasons why numbers declined in some areas are still disputed (Engler and Bauer 2002, Summers-Smith 2003a).

The overall decrease of the species is evident not only in rural areas but also in cities. Examples in Germany are Hamburg, Cologne, Duesseldorf, and Bielefeld, among others (Laske et al. 1991, Leisten 2002, Mitschke and Baumung 2001, Mitschke and Mulsow 2003, Skibbe and Sudmann 2002), and a similar decline was reported for cities in other countries, e. g. Warsaw (Węgrzynowicz 2006) and London (Baker 2005). A loss of suitable nesting sites in modern buildings or after renovation and an insufficient nestling diet are discussed as main causes for the decline in urban areas, but other factors may also play a role (Summers-Smith 2003a, Vincent 2005).

Prior to 1990 in Berlin, the House Sparrow was not specifically in the focus of local ornithologists. Nevertheless, general bird counts, notes on flocks, syn-ecological census studies, and extensive atlas work in both parts of the city have provided a lot of information about the abundance and distribution of the species within the city's boundaries (Braun 1985, 1999, Bruch et al. 1978, Degen and Otto 1988, Frädrich and Otto 1984, Ornithologische Arbeitsgruppe Berlin (West) 1984, Otto and Recker 1976, Witt 1978). Since the unification of the city in 1990 the Berlin Ornithological Working Group (Berliner Ornithologische Arbeitsgemeinschaft, BOA) initiated several projects which included the House Sparrow as a species of special interest, e. g. large-scale counts during the breeding season. This was also in response to the known decline in other cities. In the present paper we will summarize these data and give an overview of the current distribution, abundance and dynamics of the species in Berlin.

THE CITY

Berlin is situated in the north central European lowlands, at the confluence of the rivers Spree and Havel. Its history and structure is described in more detail elsewhere (e. g. Otto and Witt 2002, Witt 2000, 2005a), so only a short overview is given here. The recent boundary of Berlin dates back to 1920, when a number of villages and small towns outside the old city were incorporated to form Greater Berlin. This late development of a national capital opened the chance to conserve much greenery within its built-up area. People approaching Berlin by air nowadays are astonished to see the diversity of greenery bordering the streets, green places, belts and park lots. These aspects are not separately listed in the statistics of land use in Tab. 1.

For the House Sparrow the built-up areas are the essential habitat in Berlin, the structure of which, however, is not homogeneous. In central parts of the city dense stands

of block-buildings are typical which were erected mainly during the industrial revolution at the end of the 19th century, but partly destroyed during world war II and then rebuilt in different ways. In Berlin (West) the original structure was more or less conserved, whereas in Berlin (East), the capital of the former GDR, many houses still existing after the war were pulled down to construct buildings in form of higher ribbon development. The adjacent residential areas are dominated by lower and more or less single housing with small gardens, which may be bordered by areas of allotment gardens.

Table 1.
Land use in Berlin (year 2001) (Statistisches Landesamt Berlin 2001)

Type of land use	Area (km^2)
Built-up area (including traffic area)	594
Forests	159
Water bodies	59
Farmland	47
Other	33
Total	892

During the 1960s and 1970s demands for new flats for living resulted in the construction of suburbs with high-rise buildings, with much open space in between, at the outskirts of the western city and soon after, in the 1980s, in the eastern part as well. House Sparrows very quickly detected these areas as suitable places for breeding and colonised them in increasing numbers.

DISTRIBUTION

The first knowledge about the large-scale distribution of the House Sparrow in Berlin derived from two atlas studies in the late 1970s and the early 1980s, conducted separately in the then still divided West and East Berlin (Degen and Otto 1988, Ornithologische Arbeitsgruppe Berlin (West) 1984). The atlas maps indicated the presence/absence of a given species on a specified grid system. In both studies the grids were based on geographic co-ordinates, with a cell area of approximately 1 km^2. The western part of Berlin (480 km^2) was covered by 431 complete cells and 89 partial ones along the border of the political community Berlin (West). The eastern part (403 km^2) was covered by 412 cells. For the House Sparrow a nearly complete distribution over the whole area of the city was found, with distribution indices (no. of occupied cells as percentage of

all cells) of 89% in the west and 87% in the east. The respective figure for the entire city is 88% of 843 investigated cells (Witt 2005a). Unoccupied cells were mainly located in closed forests, airports, and agricultural areas. These results documented a wide distribution of the House Sparrow, topped only by a number of city birds also inhabiting forests, e. g. Blackbird *Turdus merula* and Great Tit *Parus major*. The distribution pattern from the early 1980s is still valid today, slightly modified by the colonisation of some formerly unoccupied cells at the eastern edge of the city. These areas were used as farmland or irrigated fields at the time when the atlas data were gathered, but are now dominated by new high-rise blocks of flats (mainly the neighbourhoods of Hellersdorf and Marzahn).

The distribution of the House Sparrow, and other species, was studied in more detail on an area of about 110 km^2 in the southwest part of Berlin between 1989 and 1991 (Witt 1997). For this purpose, the grid cells used in the atlas work described above were subdivided into 4 cells of about 26 ha, resulting in a total of 419 sub-cells. The number of House Sparrow breeding pairs (bp) in each sub-cell was estimated according to a given set of abundance classes. In addition, the areas covered by 14 habitat types were estimated for each sub-cell. From these results a distribution map of the species' abundance was constructed and the data were checked for correlation with habitat characteristics. In general, and as could be expected from the former atlas study, the built-up areas proved to be the main House Sparrow habitat. A detailed co-ordination analysis showed that blocks of houses constructed as ribbon development best explained the distribution pattern of the species, followed by open and closed development.

Another aspect of the study was to calculate the total number of House Sparrows for the complete study area of 110 km^2 (about 12% of the entire city area), based on the estimated number of breeding pairs in each sub-cell. This figure was then used to estimate the whole Berlin population of the species, for the fist time based on a large-scale data set. This topic will be dealt with in a later section.

BREEDING TIME HABITAT AND ABUNDANCE

The BOA decided to conduct a census of the House Sparrow during the breeding season 2001, the main aims of which were to investigate in detail the abundance of the species in different urban habitat types and to get a solid data base for a calculation of the recent total number of breeding pairs in Berlin (Böhner et al. 2003a, b). 35 study plots,

with an average size of 24 ha (SD = 6), were selected for systematic counts. These sites were widely distributed over the city (Fig. 1) and represented all major urban House Sparrow habitat types: villages (n = 3 plots), parks and gardens (7), industrial areas (2), residential areas (5), new high-rise blocks of flats (9) and old blocks of flats (9). Woods, water bodies, agricultural areas, and larger traffic areas, like highways and airports, were not included in the study because they hold only negligible number of House Sparrows. A detailed description of the investigated habitat types, which account for 54 % of the entire city area, is given in Böhner et al. (2003a) and Otto & Witt (2002).

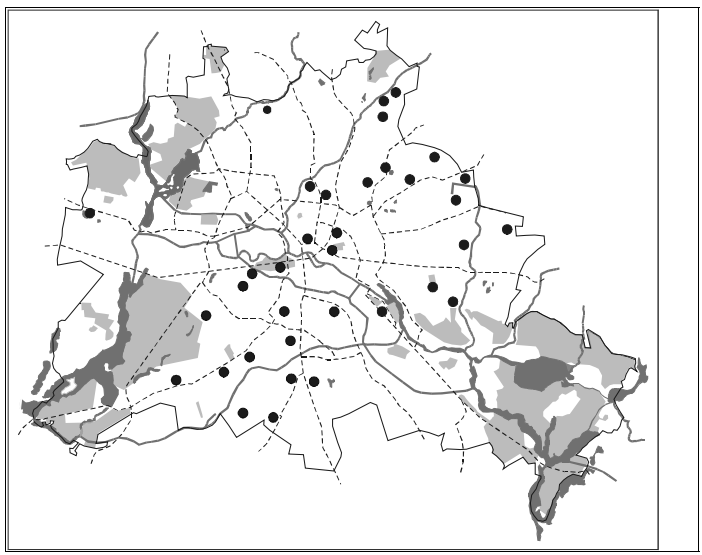

Figure 1. Distribution of the study plots investigated during the breeding season 2001. Woods and parks are shown in light grey, water bodies in dark grey, and main roads as broken lines.

Each plot was visited twice during the breeding season (in mid-March and mid-April) between sunrise and noon and all House Sparrows seen or heard were counted. In addition, on seven plots males and females were recorded separately. The higher number of individuals from the two counts on each study site was used for further analysis, because it may be assumed that each single count usually underestimates the true number of House Sparrows on the respective plot.

The separate counts for males and females revealed a clear bias for males, which made up 63%, on average, of all seen or heard individuals. However, as the true sex ratio

in the House Sparrow may be assumed to be nearly 1:1 (see review by Hudde in Glutz von Blotzheim and Bauer 1997), this result indicates that females were underestimated, probably because they spend more time incubating and are less conspicuous in plumage and behaviour than males. Since the true sex ratio is close to 1:1, the number of males on each plot (63%) was multiplied by 2 to compensate for the underestimation of females and to calculate the true number of individuals present. More details about the analysis are given in Böhner et al. (2003a, b).

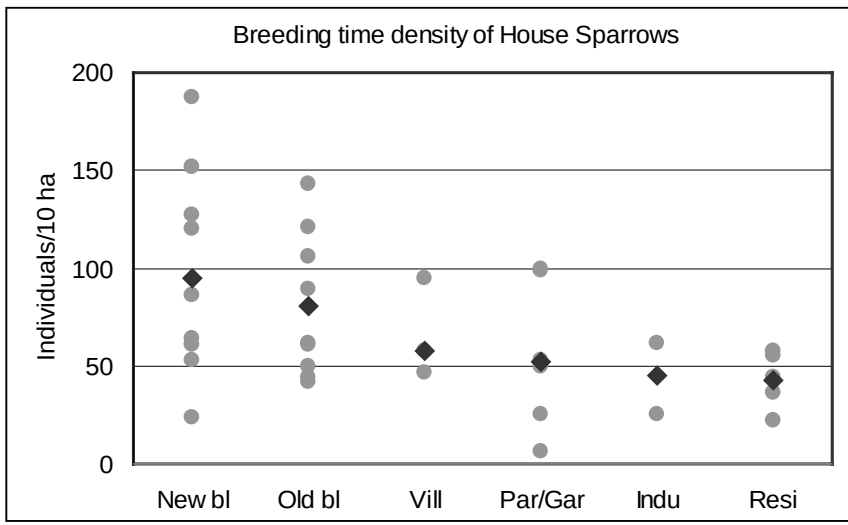

Figure 2. House Sparrow densities in urban habitat types investigated in 2001 (without the Zoological Garden, see text). New bl = new high-rise blocks of flats, Old bl = old blocks of flats, Vill = villages, Par/Gar = parks and gardens, Indu = industrial areas, Resi = residential areas. ● = study plot, ◆ = overall density of the respective habitat type (no. of individuals of all plots combined per 10 ha). The habitat types differed significantly ($p<0.01$, chi^2 test, df = 5).

House Sparrows were found on each plot, with significant differences between habitat types ($p<0.01$, chi^2 test, df = 5); see Fig. 2. The data confirmed the results already indicated by the grid net census at the beginning of the 1990s (Witt 1997), identifying built-up areas as the most preferred habitat of the species. New and old blocks of flats had significantly higher densities, with 95 and 81 individuals/10 ha, respectively. These were also the only habitat types where more than 100 ind/10 ha could be found on single plots. Villages followed with 58 ind/10 ha, then parks and gardens (52 ind/10 ha), industrial areas (45 ind/10 ha), and with the lowest value residential areas (43 ind/10 ha). These

preferences are in general agreement with those indicated by a recent and comprehensive analysis of House Sparrow habitat associations in England (Chamberlain et al. 2007), although a direct comparison of single habitat types between the two studies is difficult due to differences in the categorization used.

The data for two plots needs further explanation. First, the highest number of House Sparrows on any plot was found in the Zoological Garden with 449 ind/10 ha. This was mainly due to the food provided for the Zoo animals, which in many cases is available for free-living birds. This extraordinary value is clearly an outlier in a statistical sense. Therefore, to avoid any unrealistic high abundance calculated for the habitat type parks/gardens we excluded this plot from further analysis. Second, a slightly different survey method was used for the small village of Lübars, where for logistic reasons only singing and displaying males were counted in 2001. We accepted these results as the minimum number of House Sparrows present on that site, because data from villages were scarce (only 3 plots). It seems clear, however, that this different counting method resulted in a density too low for villages in general.

The BOA conducted this large-scale census again in 2006 (with a few additional counts in 2007), i. e. 5 years later, using exactly the same method. Again 35 plots were visited, 27 of which had already been investigated in 2001. The results confirmed the clear distinction between new and old blocks of flats on the one side and parks/gardens, industrial areas, and residential areas on the other. Densities for the blocks of flats were similar in both years, whereas there were slightly lower values for the latter habitat types (Table 2).

Table 2.
House Sparrow densities in 2006 (individuals/10 ha, all study plots combined), compared to 2001. Numbers in brackets indicate the number of plots investigated in 2006. Values for parks/gardens were calculated without the Zoological Garden (see text).

Habitat types	2006	2001
New blocks of flats (8)	95	95
Old blocks of flats (8)	76	81
Villages (2)	106	58
Parks/gardens (4)	35	52
Industrial areas (7)	34	45
Residential areas (5)	37	43

The notable exception from the general pattern described above were villages, which in 2006 ranked first. However, this may be due to the fact that counts for villages

covered only two plots, one of which was again Lübars, with the very high density of 248 ind/10 ha this time. The 2006 value was valid because the Lübars count was conducted using the same methodology as all other sites. However, because of the extensive horse keeping facilities in Lübars we assume that the House Sparrow density there was not representative for Berlin villages in general and access to food was more like that found in the Zoo plot where the density was 267 ind/10 ha.

WINTER TIME HABITAT AND ABUNDANCE

The BOA started a winter census program in 1993/94 during which House Sparrows, among other species, were counted according to the following rules (Witt 1995): (1) select a 5 ha plot of an urban „homogeneous" habitat, (2) count all individual birds seen or heard during one hour, and (3) do four counts at given dates between the beginning of December and the end of February.

From the start of the project up to the winter 2006/07 a total of 111 plots was investigated, distributed widely over the city. Plots on farmland, wetland, forest, etc., typically holding no House Sparrows, were excluded from the analysis, leaving 84 plots of the following specific urban habitat types: old blocks of flats (n = 25 plots), new high-rise blocks of flats (10), residential areas (17), allotment gardens (5), and green areas (parks, cemeteries) (27). Please note that this classification of habitat types matches the one used for the breeding season counts, except that allotment gardens are treated here as a separate category. Industrial areas and villages were not investigated.

Figure 3 shows the maximum number of House Sparrows recorded during the 4 winter counts (as for the breeding season census, the maximum number counted was assumed to best indicate the true number of individuals in each plot). There were significant differences between the five habitat types ($(p<0.01$, chi^2 test, df = 4). Old blocks of flats were most densely populated, followed by new blocks of flats, residential areas, allotment gardens, with the lowest values in parks and cemeteries. Notable is the pronounced variation within each habitat type, as also indicated by the mean and quartile values given in Tab. 3.

Table 3.

House Sparrow winter abundance in different urban habitat types.

	Individuals per 5 ha			
	25% Quartile	Median	75% Quartile	No. of plots
Old blocks of flats	35	66	87	25
New high-rise blocks of flats	24,5	40,5	100	10
Residential areas	14	25	54	17
Allotment gardens	9	21	40	5
Parks/cemeteries	0	3	8	27

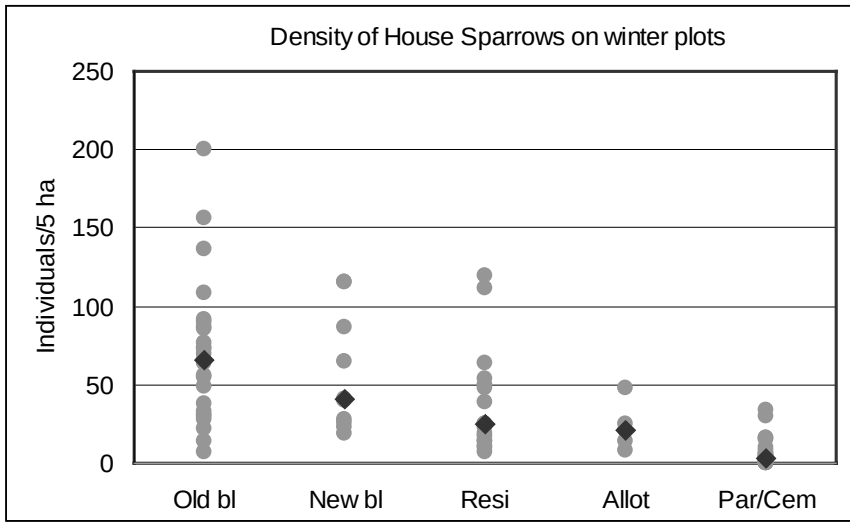

Fig. 3. House Sparrow numbers on 5 ha plots during winter time for urban habitat types: Old bl = old blocks of flats, New bl = new high-rise blocks of flats, Resi = residential areas, Allot = allotment gardens, Par/Cem = parks and cemeteries. ● = study plot, ◆ = median value of the respective habitat type. The habitat types differed significantly ($p<0.01$, chi^2 test, df = 4).

To compare the data in Table 3 with the breeding season data from Table 2, two points must be considered: (1) The results of the breeding season census show the maximum number of individuals for plots of about 24 ha size as the number of ind/10 ha, whereas the winter data are maximum numbers for 5 ha plots given as ind/5 ha (this is a new analysis of the winter data as compared to Witt (2005b), where geometric means were calculated over all visits of a winter period). Hence, the winter data must be multiplied by 2 for a direct comparison. (2) Böhner et al. (2003a) calculated the average breeding season density for any habitat type by summing up the number of individuals of all respective

plots and then standardized this value to 10 ha (see Fig. 2), whereas the respective winter time value presented here is a true mean (median) for all single plots. For a better direct comparison with the winter data, medians for the breeding season were additionally calculated and are as follows: new blocks of flats – 86 ind/10 ha, old blocks of flats – 62, parks/gardens – 51.5, and residential areas – 44.

The most densely populated habitat types of the House Sparrow during the breeding season hold equivalent (new blocks of flats) or even considerably more numbers (old blocks of flats) during winter. Similar values in both seasons are also found for the residential areas. If the breeding season data for parks/gardens are compared with the winter time data of only the allotment gardens, the values match quite well. The very low winter numbers in parks/cemeteries are hard to compare with breeding season data, mainly due to the small number of plots of this habitat type. If there are no buildings in parks or cemeteries, House Sparrows may be completely absent as a breeding species or breed only in low numbers in nest boxes or other cavities. These results are confirmed by data from Kübler & Zeller (2004) who studied winter birds in Berlin along an ecological urban gradient. They found House Sparrow abundances comparable to the results of the BOA winter program for new high-rise blocks of flats and a residential area, and could not detect House Sparrows in their investigated park.

Comparing the winter number of House Sparrows with the respective plot area covered by buildings revealed a highly significant positive correlation ($r = 0.36$, $p < 0.01$), which was also found for the number of House Sparrow individuals and the number of places where humans actively provided bird food ($r = 0.43$, $p < 0.001$). This means that during the winter House Sparrows prefer areas with many buildings and a lot of feeding places. The two correlations, however, are probably not independent of each other, because a growing number of houses usually results in an increased number of people providing bird food.

POPULATION SIZE

Counts of House Sparrows on several sites in Berlin have been conducted since the 1970s. However, the semi-quantitative grid census conducted from 1989 to 1991 first allowed an accurate calculation of the number of House Sparrows in the city. Based on the estimated number of breeding pairs in the grid cells, Witt (1997) calculated 15,000 to 30,000 breeding pairs for the whole census area of about 110 km^2 in the South-West of the

city, with17 bp/10 ha as the mean density of all occupied cells. From these values 100,000 to 200,000 breeding pairs were estimated to live in Berlin (Witt 2000).

The BOA census during the breeding season 2001, which was repeated 2006, provided an even more accurate basis because true counts, not estimates, were made in 35 plots of a definite size. Because (1) these plots represented all major House Sparrow habitat types in Berlin and (2) the overall area of each habitat type in the city is known, a calculation of the House Sparrow population in Berlin seemed possible. Extrapolating the recorded densities (see Table 2) to the entire area of the respective habitat type in Berlin revealed the following results: Industrial areas held 66,000 House Sparrows, new blocks of flats 63,000, residential areas 55,000, old blocks of flats 48,000, parks/gardens 37,000, and villages 3,000. Thus 272,000 birds inhabit Berlin, and we may assume that this figure corresponds to roughly 135,000 breeding pairs. The respective densities were 16 bp/10 ha for the entire city area (892 km^2) or 29 bp/10 ha if only the area covered by the six House Sparrow habitat types (478 km^2) was taken into account.

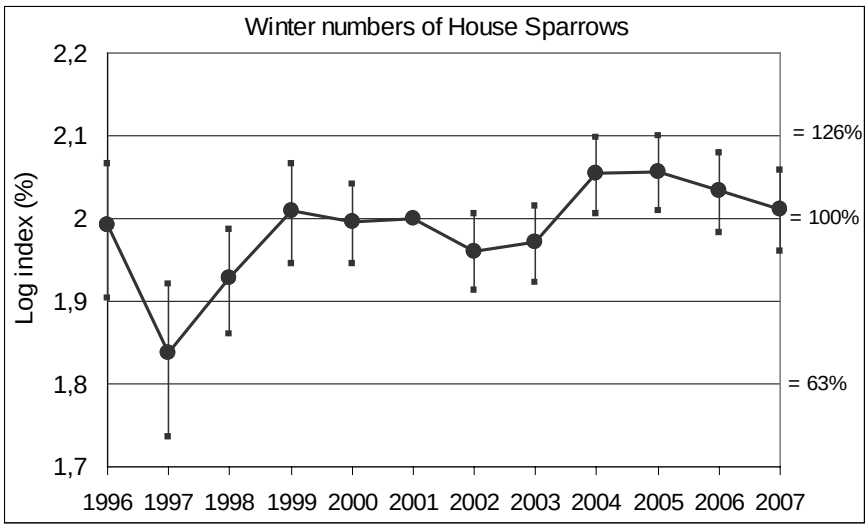

Fig. 4. Log percentage change of House Sparrow numbers in winter given as a chain index calculated by TRIM, with 2001 as reference year (= 100% or log index = 2). Vertical lines indicate error bars.

A density of 16 bp/10 ha across the whole city is surprisingly high and higher than the values calculated for other large cities. Mitschke and Baumung (2001) reported 4 bp/10 ha for Hamburg, Skibbe and Sudmann (2002) 2 to 4 bp/10 ha for Cologne, and Leisten

(2002) 0.8 bp/10 ha for Duesseldorf. We do not know of any calculation for the overall number of House Sparrows within the city boundaries of London where the species has declined significantly (Baker 2005), but it can be assumed that the recent density there was below the values in Hamburg or Cologne (Summers-Smith, pers. comm.). For Warsaw, Luniak et al. (2001) report 10-30 bp/10 ha, based on data from 1986 to1990, but this figure is lower now (about 6-19 bp/10 ha) when the new results of Węgrzynowicz (2006) are taken into account, indicating a recent decline by 42%. Another interesting case of a large eastern European city is Lvov, Ukraine, where the House Sparrow density across the entire city area is about 11 bp/10 ha (calculated from the data in Bokotey and Gorban 2005), also below the respective value for Berlin.

With the 2006 data, from the repetition of the breeding time survey, we calculated 237,000 individuals, or 119,000 bp, for Berlin, corresponding to a density of 13 bp/10 ha for the city area and 25 bp/10 ha for the combined area of the six House Sparrow habitat types.

POPULATION DYNAMICS

House Sparrow numbers have declined in several German cities in the past. A comparison of the results of the breeding season count from 2006 with those from 2001 reveals a decline of -16,000 breeding pairs, or -11.9%. The numbers calculated for these two years are based, however, on slightly different sets of study plots. However, 27 sites were investigated in both years. In 2001 a total of 5,985 House Sparrows was counted on these plots whereas the respective number in 2006 was 5,027, a difference of -958 individuals, or -16.0%. This value was largely dominated by the results for one specific plot, the Zoological Garden, where 546 individuals less were recorded in 2006, which accounts for as much as 57.0% of the overall difference for all 27 plots. In spring 2006 cases of avian influenza were detected in Germany and federal regulations demanded that poultry and other groups of birds be kept inside. As a consequence, less food was provided in outdoor enclosures of the zoo, leading to a pronounced reduction in the number of House Sparrows on that plot. If the Zoo is excluded due to this abnormal situation, the difference between 2001 and 2006 for the remaining 26 sites is just -412 individuals, or -8.9%. This is a value within the normal range of annual fluctuations of bird populations, which does not argue for a decline of the House Sparrow in Berlin.

The House Sparrow is a year-round sedentary species (see Hudde in Glutz von Blotzheim and Bauer 1997) and we have good reason to assume that the Berlin population during the reproductive season is largely identical with the birds found in the city during the winter. Witt (2005b) examined the changes in the population of House Sparrows in Berlin between 1996 and 2004. The statistical analysis used in that paper (TRIM = Trends & Indices for Monitoring Data, Statistics Netherlands) was based on the sum of all counted individuals in a given winter period, to improve the statistical weight. The trend was not significantly different from zero indicating stable numbers of House Sparrows.

However, the sum of all counts on a plot during the winter period may include individuals counted up to four times, because House Sparrows are rather sedentary and often settle, e. g., near a winter feeding place. To avoid such a multiple counting, a new analysis is presented here which also extends the investigated period to 2007. The maximum number of individuals from the four counts on each plot was used for the trend analysis. 27 plots could be analysed, for which pair wise data from consecutive years were available and for which the numbers of individuals exceeded 10 at least once in a given series. The following habitat types were investigated, arranged in the order of decreasing mean number of plots (see Witt 2005b): zone of blocks of flats, with no distinction between old and new blocks (n = 13 plots), residential areas (6), allotment gardens (4), and different green areas (many plots of this type hold no or almost no House Sparrows) (4).

The number of plots investigated continuously over the years was 3 in 1996 and 1997, 7 in 1998, 8 in 1999 and 13-18 from 2001 onwards. From the annual data a percentage chain index was calculated using the TRIM analysis, with the year 2001 as reference (= 100%). Figure 4 shows the annual change in the index on a log transformed scale. House Sparrow numbers fluctuated over the years between 80% and 115%, with a slightly lower value for 1997. There was an overall positive trend of 2.5% ± 1.4% per year, which is not significant. This supports the view that House Sparrow numbers in Berlin were stable, not only between 2001 and 2006, but also for the longer period 1996 to 2007. This result conforms to the earlier TRIM analysis given by Witt (2005b).

Based on the grid census from 1989 to 1991 Witt (1997) estimated 100,000 to 200,000 breeding pairs whereas the counts in the breeding season 2001 (Böhner et al 2001a, b) and 2006 (Böhner and Schulz in prep) showed 135,000 and 119,000 breeding pairs, respectively. Both latter values are within the range indicated by the earlier grid census.

The large-scale grid census at the beginning of the 1990s, the counts during the breeding seasons 2001 and 2006, and the winter counts since 1996 indicated high and stable numbers of House Sparrows in Berlin for 15 to 20 years. We do not have any direct measurement of species' dynamics prior to that time but it is unlikely that any serious and city-wide decline of the species would have been missed, given the extensive ornithological field work in Berlin since the 1960s.

Summing up, we did not find any indication of a decline such as documented for several European cities during the last decades (De Laet and Summers-Smith 2007, Summers-Smith 2003a, b, Węgrzynowicz 2006). There have been both decreases and increases locally in the city (Braun 1999, Otto and Schulz 2002, Schwarz et al. 1992, Otto 2003). However, these changes appear to have balanced each other in the past, resulting in stable numbers of the species.

It is not clear why the situation for the House Sparrow in Berlin seems to be largely better in Berlin than in other cities. The following statements can be made: (1) Nest sites are still abundant, given the extensive amount of houses of various ages and states. Furthermore, House Sparrows in Berlin readily accept nest boxes (Grasnick 2007) which may not necessarily be the case in other cities (e. g. Warsaw, Luniak 2005 and pers. comm.).

(2) There is no food shortage. House Sparrows make extensive use of food provided directly or indirectly by humans (waste, spilled meals, bird food) and feed on grains in the small but often untouched areas of grass still found along many road sides. There is also no indication that invertebrates, an important nestling diet, are in short supply, as can be concluded from the results by Feige (2007) and Grasnick (2007) on nestling mortality.

(3) Two recent studies on the reproduction of the species in the built-up areas of Berlin (Feige 2007, Grasnick 2007) indicate that the breeding success is at least high enough to balance mortality rates as given in the literature (Hudde in Glutz von Blotzheim & Bauer 1997).

(4) House Sparrows are well known to the human inhabitants of Berlin, the great majority of which has a positive attitude towards them (Kübler 2005).

These factors could allow the species to maintain its population in the city to the present day.

Acknowledgements

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