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„International Studies on Sparrows" since 1967

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HISTORY OF THE WORKING GROUP ON GRANIVOROUS BIRDS PRODUCTIVITY TERRESTRIAL SECTION OF THE INTERNATIONAL BIOLOGICAL PROGRAMME (LATER INTERNATIONAL ASSOCIATION FOR ECOLOGY)

Success of the two „International Polar Years 1932-33 and 1982-83" and of the „International Geophysical Year 1957-58" drew the attention of ecologists to advantages of international research. The rapidly growing ability of man to change habitats on the Earth, coupled with rapid changes in the natural environment as a result of human management, further augmented by increasing growth rate of the human population, initiated biological investigation on a global scale. Successive presidents of the International Council for Scientific Union (ICSU) and the International Union of Biological Sciences (IUBS) (R. Peter, G. Montanelli and C.H. Waddington) made the first steps towards this end. After many discussions at the meeting of the ICSU Executive Committee in Lisbon in 1960, a committee was elected with a goal to develop an international research programme named „International Biological Programme" (IBP). This preparatory committee held its first meeting in Cambridge (UK) in March 1961, and drew up a document on possible subjects to be dealt with by the IBP. Successive meetings of the planning committee yielded a detailed IBP programme and its structure. The subject of IBP was defined as „The Biological Basis of Productivity and Human Welfare". Its objective was to ensure the worldwide study of (a) organic production on the land, in fresh waters, and in the seas, and the potentialities and uses of new as well as of existing natural resources and (b) human adaptability to changing conditions. The programme did not range through the entire field of biology but was limited to the basic studies related to biological productivity and human welfare (Worthington 1975).

The IBP was headed by a President and four Vice-Presidents elected for four years, several representatives of different international organisations, several elected activists of the IBP, and a publishing committee composed of three members. This body formed a Special Committee for IBP (SCIBP) and a Central Office of IBP for administration in London. The IBP was divided into Sections: 1) Productivity Terrestrial (PT); 2) Process Studies (PP); 3) Conservation Terrestrial (CT); 4) Productivity of fresh water; 5) Productivity of Marine; 6) Human Adaptability (HA); 7) Use and Management of Biological Resources (UM). The sections were headed by conveners. The whole decade of the IBP was divided into 3 periods: Phase I – Preparation (1964-1967), Phase II – Operation, and Phase III – Synthesis and Transfer. The Programme was implemented in 98 countries by many thousands of scientists. Thousands of papers were published and many books. The crowning achievement of the IBP was about 40 syntheses issued by the Cambridge University Press (Wortington 1975).

We are most interested in the Section PT „Productivity Terrestrial" as a part of it was the Working Group on Granivorous Birds (WGGB), whose history I present here. The goal of PT Section was focused on the functioning of the major biomes of the world, such as forests, savannas, deserts and tundra, relatively little disturbed by humans, as compared with man-made ecosystems, for example, rice fields. The investigation comprised primary productivity, secondary productivity, trophic chains and energy flux. The results provided a basis for model and system studies in ecology (Worthington 1975). The convener of the PT Section was Professor J.B. Cragg from the Canada IBP.

Poland participated in the IBP very actively from the beginning of the Programme. In 1964, Professor Kazimierz Petrusewicz, Director of the Institute of Ecology PAS, was appointed a Vice-President of the IBP. He prompted the workers of the Institute to join the IBP studies. In 1960, I initiated the study on the ecology of sparrows, in particular on Tree Sparrows *Passer montanus*, as a part of my thesis for Assistant Professor. Both the House Sparrow *Passer domesticus* and the Tree Sparrow are widely spread, so they were convenient objects of international studies. Moreover, as with other species of granivorous birds, they were of great economic importance in many parts of the world. I sent out a proposal for collaboration as a part of the IBP to ornithologists dispersed over different countries and I received more than 100 positive replies from all continents, except South America (Fig. 1).

To my knowledge, F. J. Turček (Czechoslovakia) sent my appeal to Margaret M. Nice (USA), who conveyed it to Professor S.C. Kendeigh (USA). This had important consequences for the WGGB. Prof. Kendeigh had conducted studies on various aspects of the ecology of the House Sparrow since 1922, especially on bioenergetics of this species, and he enthusiastically supported the inclusion of Passer to the IBP. Kendeigh was one of the pioneers of nature conservation and ecology in the USA. He had several thousand students, including 57 post-graduate students, and among them such distinguished scientists as the two Odums, Whittaker and Zar, working in different parts of the USA. The involvement of this eminent scientist in WGGB encouraged other scientists to join the Group. On 31 May 1966, the Group obtained its official approval as a project of the International Biological Programme. A central steering committee was organized at the Fourteenth International Ornithological Congress, on 27 July 1966, in Oxford, England. The committee included Professors R.F. R.F Johnston and S.C. Kendeigh of the USA, Dr. J.D. Summers-Smith of England, Dr. F.J. Turček of Czechoslovakia and Dr. J. Pinowski of Poland as chairman.

In order to develop and encourage the work of the Group, and to serve as a medium for the exchange of ideas and reports, the Ecological Committee of the Polish Academy of Sciences began issuing a periodical entitled „International Studies on Sparrows". This bulleting was published in 31 volumes, most recent of which appeared in 2006. This bulletin began under the auspices of IBP, continued under the Institute of Ecology and from volume 32 is issued through the Faculty of Biological Sciences, University of Zielona Góra.

More than one hundred investigators in 25 different countries participated in this Working Group. During the IBP, the WGGB paid more attention to productivity of granivorous birds in various ecosystems. The productivity, measured as the number of fledglings per female per year, changed from year to year, and from place to place. The most variable elements of productivity were mortality of eggs and nestlings. Emphasis was placed on analyzes of the components in the daily energy budget throughout the year and on attempts to provide equations of general application. Current efforts to document and understand the structure and function of ecosystems are founded on population dynamics, on energy flow patterns and rates, and on the relevant environmental parameters. These factors were modeled by computer, which makes possible the quantification of energy demands, food consumption and the potential impact of avian consumers in ecosystems. We also investigated methods of evaluating the economic impact of birds on cereals grains, conditions under which bird species become destructive, management techniques and control strategies.

Interest in the program has also been maintained by a number of national and international conferences. On 3 September 1969, Prof. S.C. Kendeigh chaired a half-day symposium at the meeting of the American Ornithologists' Union at Fayetteville, Arkansas, USA (Kendeigh 1973). The first general meeting of the WGGB was held on 6-8 September 1970 at the Hague and at Arnhem in the Netherlands. The proceedings were published in book form in Poland under the edithorship of the late Prof. S.C. Kendeigh and Dr. J. Pinowski (Kendeigh & Pinowski 1973).The second general meeting of the WGGB was held at the Institute of Ecology of the Polish Academy of Sciences at Dziekanów Leśny near Warsaw, on 3-7 September 1973. The purpose of this session was to organize and begin to work on a synthesis volume covering the research findings of the WGGB over the seven year span in which the IBP Programme had been active. Preliminary outlines of chapters were prepared, chapter editors selected, and chapter contents discussed. Dr. J. Wiens organized the next working session at Oregon State University, Cornwallis, Oregon, USA, on 10-12 July 1974. This meeting was intended to consolidate and integrate the thinking of North American collaborators from the USA and Canada. This meeting was followed by one arranged by Dr. M.I. Dyer at Colorado State University, Fort Collins, Colorado, USA on 7 – 12 October 1974. Thirteen collaborators from seven countries participated. The last meeting of chapter authors, during the IBP, to prepare and coordinate the synthesis book manuscript was held at Szymbark, Poland, on 17-21 March 1975. The synthesis book was published by Cambridge University Press in 1977 with title „Granivorous Birds in Ecosystems" under the editorship of J. Pinowski and S.C. Kendeigh (Pinowski & Kendeigh 1977).

After the end of the IBP Programme, WGGB remained together and became part of the International Association for Ecology (INTECOL) in 1976 (Fig. 2). The bulletin „International Studies on Sparrows" was revived and international cooperation reinstituted. A symposium on the ecology of Passer was held by the WGGB during the 17th International Ornithological Congress in 1978 in West Berlin, organized by Professors R.F. Johnston and J. Pinowski, chaired by Professor C.R. Blem. The material from this symposium was published in the Proceedings of the Ornithological Congress. At the 18th Ornithological Congress from 16 – 24 August, 1982 in Moscow, the WGGB organized a round table discussion entitled „Granivorous Birds in Ecosystems", but proceedings were not published.

At the 19th Ornithological Congress, held on 22-29 June, 1986 in Ottawa, Canada, the WGGB held a round table discussion entitled „The role of granivorous birds in ecosystems". On 10-16 August during the IV International Ecological Congress in Syracuse, New York, USA, the WGGB also held a symposium. The materials from both meetings were published in 1990 under the title „Granivorous birds in the agricultural landscape", edited by J. Pinowski and J.D. Summers-Smith, and printed by the Polish Scientific Publisher Pinowski & Summers-Smith 1990).

In 1990 two symposia were organized. The 11th symposium of WGGB was held in Yokohama, Japan in 23-30 August, as part of the V International Congress of Ecology. This was organized in cooperation between J. Pinowski and K. Nakamura (Japan) and was entitled „Granivorous Birds as agricultural pests and epidemiological vectors". The next symposium of WGGB was held in New Zealand in December (2-9) to coincide with the 20th International Ornithological Congress in Christchurch . This meeting was entitled „Granivorous birds in arid, sub-arid and agricultural landscapes". It was organized by J. Pinowski and R.E. Mac Millen (USA).

In the Soviet Union, research on many aspects of the biology of the Tree Sparrow was begun in 1970 in order to produce a monograph on this species. The Tree Sparrow is common and present in high densities and can have important interactions with man, especially in Asian countries. Within the Soviet Union, 43 institutions have participated in this research. The Biological Institute of the Leningrad University organized special expeditions to Crimea, Azerbaydzhan, Astrakhan region, Kirgizia, Central Yakutsk, Primorsk and South Sakhalin. These studies included researchers from Bulgaria and Poland. The results of these studies were published by Leningrad University in a 281-page monograph in 1981 under the editorship of Dr. G. A. Noskov (Noskov 1981).

The symposium of the Group entitled „Effect of nestling history on survival of birds" was held at the VII International Congress of Ecology (Florence, 19-25 July, 1998). At the XXII International Ecological Congress (Durban, 16-22, 1998, South Africa), J. Pinowski and J. Cooper (England) organized a Round Table Discussion on „Zoonoses: diseases of human spread by birds; are they on the increase".

After the end of the IBP, when the WGGB became a part of the INTECOL, the programme of the Group was continued with emphasis on some problems. Little was hitherto known on the mortality of granivorous birds and its causes. That is why we decided to pay special attention to the mortality in future coordinated research, especially to predation, diseases, and pollution and their combined impact. Between 1986 and 1995, an investigation was carried out in city parks and suburban villages of Warsaw (Poland). Factors influencing mortality of eggs and nestling sparrows were investigated. The results of these studies were published in the form of two books (Pinowski, Kavanagh & Górski 1971, Pinowski, Kavanagh & Pinowska 1995).

The studies conducted as a part of WGGB by R.F. Johnson and his Colleagues provided strong circumstantial evidence that natural selection has operated on the introduced populations of House Sparrows and that winter weather can act as a powerful selective agent (Anderson 2006, review).

Over the 21 symposia of WGGB, including Yokohama 1990, Vienna 1994 and Durban 1998, the WGGB drew the attention of ecologists, veterinarians and physicians to the role of birds as vectors of zoonoses. This was many years before the epidemiological problems caused by the Western Nile virus and avian influenza. This appeal resulted in many studies sparrows in this respect (e.g. Juřicová et al. 1998). In summary, the Group organised 23 symposia or Round Table Discussions and the results were published in 7 books and several hundred scientific papers.

The Group has been concerned not only with scientific research but also with finances of the organisation and attendance at symposia. Many time-consuming activities of the Group are anecdotic now. For example, a charter airplane of the Polish Airlines „LOT" was to fly to New Zealand with participants of the symposium for a lower price than the regular airplane. Colleagues from western countries were to pay in their currency and those from the COMICON countries in their currency, thus enabling the participation of the latter. But history played a trick. If I remember well, Australia forbid flights over its territory without oxygen-masks, and the chartered airplane had no such device. Then the socialistic system collapsed in Poland, and the problem of charge in not exchangeable currency disappeared (Fig. 3).

The results also had a practical aspect as they helped to reduce damages caused by granivorous birds in Africa and India. The group was a convenient forum for discussions and negotiations among representatives of different governmental and non-governmental organisations dealing with the reduction of damage caused by granivorous birds in agriculture (e.g. Quelea). The group was a good school of international co-operation, facilitated the knowledge of culture of different countries, as J. B. Cragg put it at the end of the Introduction to the synthesis of the Group, "those who were present at the final editorial meeting of the Granivorous birds theme will long remember one of Czechoslovakia's scientists on the dynamics of *Passer domesticus* and *Passer montanus*, giving a recital which included selections from Dvořák and Chopin, on a violin constructed by one of the staff of Polish Research Station from wood grown in the grounds of the station".

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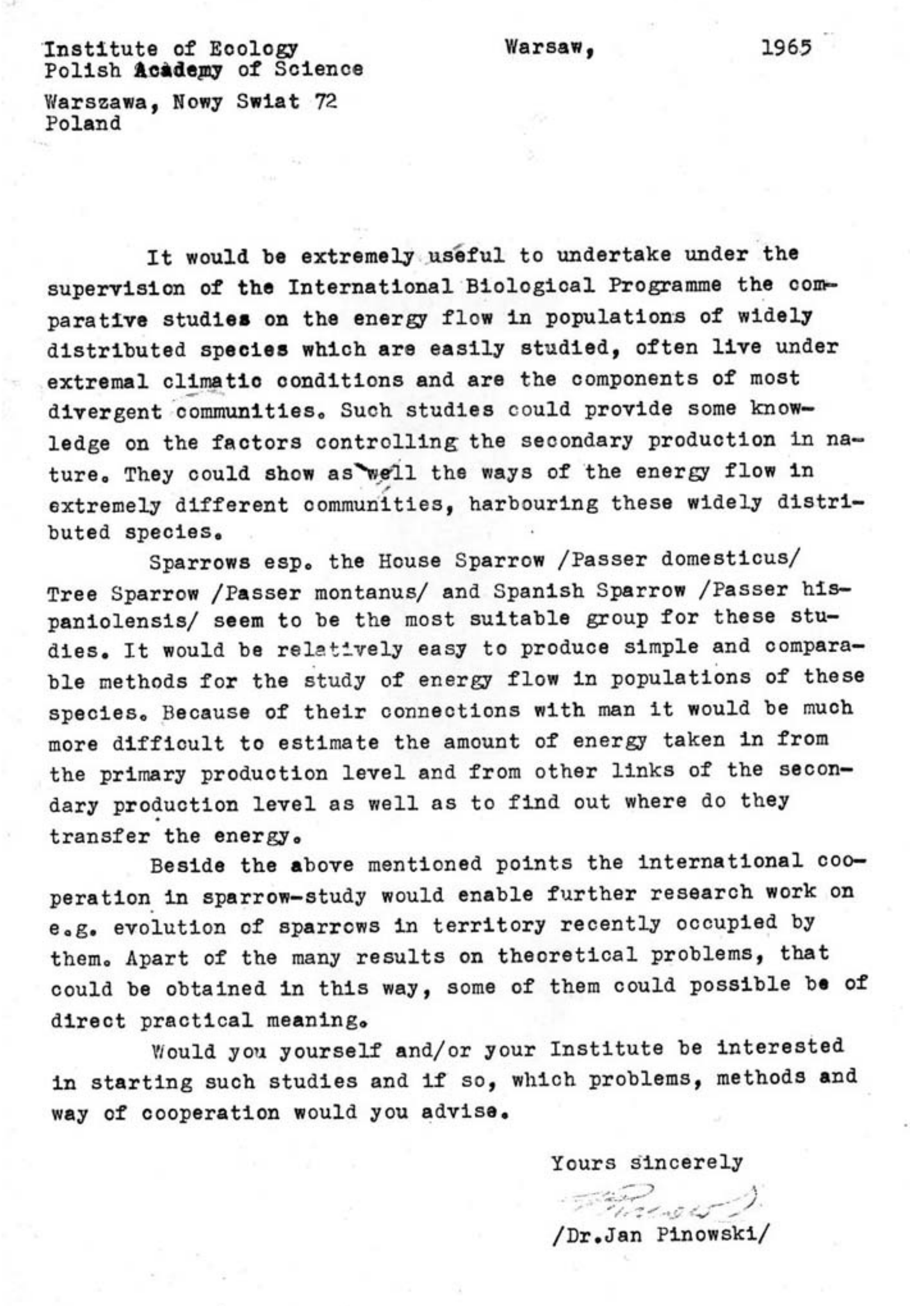

Institute of Ecology
Polish Academy of Science
Warszawa, Nowy Swiat 72
Poland

Warsaw, 1965

It would be extremely useful to undertake under the supervision of the International Biological Programme the comparative studies on the energy flow in populations of widely distributed species which are easily studied, often live under extremal climatic conditions and are the components of most divergent communities. Such studies could provide some knowledge on the factors controlling the secondary production in nature. They could show as well the ways of the energy flow in extremely different communities, harbouring these widely distributed species.

Sparrows esp. the House Sparrow /Passer domesticus/ Tree Sparrow /Passer montanus/ and Spanish Sparrow /Passer hispaniolensis/ seem to be the most suitable group for these studies. It would be relatively easy to produce simple and comparable methods for the study of energy flow in populations of these species. Because of their connections with man it would be much more difficult to estimate the amount of energy taken in from the primary production level and from other links of the secondary production level as well as to find out where do they transfer the energy.

Beside the above mentioned points the international cooperation in sparrow-study would enable further research work on e.g. evolution of sparrows in territory recently occupied by them. Apart of the many results on theoretical problems, that could be obtained in this way, some of them could possible be of direct practical meaning.

Would you yourself and/or your Institute be interested in starting such studies and if so, which problems, methods and way of cooperation would you advise.

Yours sincerely

/Dr.Jan Pinowski/

Figure 1. The letter sent to ornithologists with proposal for collaboration within the framework of the International Biological Programme.

NEWS FROM INTECOL WORKING GROUPS

Working Group on Agroecosystems

Chairman: Dr. Lech Ryszkowski, Research Center for Agricultural and Forest Environment, 60-809 Poznan, Bukowska 19, POLAND. The INTECOL Working Group on Agroecosystems, along with the Man and Biosphere Network on Landscape changes in Europe, organized a workshop on Fluxes in Agricultural Landscapes, held 13-17 October 1992 in Poznan, Poland. The goal of the seminar was to analyze the control mechanisms of physical (energy and matter) and chemical (plant nutrient, water and pollutant) fluxes, as well as the dispersion of biota, caused by changes in land-use patterns. The impact of socio-economical factors on land-use changes was also addressed. Topics were: 1) the influence of landscape structure on heat and water balance of watersheds; 2) the influence of landscape structure and land-use changes on dispersion and diversity of plant and animal communities; and 3) land-use changes caused by political and economic trends in Europe and possibilities of nature protection provided by application of landscape planning tools. Proceedings of the workshop will be published by the end of 1993 as Functional Apprisal of Agricultural Landscapes in Europe. Copies of the proceedings will be distributed by the Research Centre for Agricultural and Forest Environment, 60-809 Poznan, Bukowska 19, POLAND. The next symposium of the Working Group, "Functional Analysis of the Agricultural Landscapes", will occur during the VIth International Congress of Ecology in Manchester, UK in 1994. Contact persons are Dr. Frank B. Golley, Institute of Ecology, University of Georgia, Athens, GA 30602 USA and Dr. Lech Ryszkowski.

Working Group on Urban Ecology

Chairman: George Barker, English Nature, Northminster House, Peterborough PE1 1 UA, UK. The Working Group is part of the INTECOL-UNESCO-MAB International Network for Urban Ecology. In December 1992 an east-west European meeting was organized by the Polish Academy of Sciences and the Warsaw Agricultural University in conjunction with the Group. The aims were to review recent research in urban ecology and its practical application in Europe, and to look particularly at how countries in eastern Europe could be brought more closely into the Network's activities. Participants from Poland were joined by scientists from Byelorussia, Czechoslovakia, Finland, Germany, Italy, Sweden, Russia, the UK and Ukraine. The meeting looked at four themes: urban ecology in planning and education; research into and management of urban ecosystems; urban vegetation; and urban animals. Discussions concentrated on the theory of urban biocoenoses and the future activities of the Network in Europe. A volume of proceedings including the 21 papers and a selection of the 11 posters presented at the meeting will be published. Anyone establishing a national, regional or local group of the International Network is advised to contact George Barker to ensure that the group is registered and included on the Network mailing list and the distribution list for *Urban Wildlife News*, the working group's newsletter.

Working Group on Granivorous Birds

Chairman: Prof. Jan Pinowski, Institute of Ecology PAS, Dziekanów L. near Warsaw, 05-092 Lomianki, POLAND. The activity of the Working Group in 1992 centered on: 1. preparing for printing Granivorous Birds in Polluted Environments (edited by J. Pinowski and B. Kavanagh, 1993), the synthesis of studies on the effects of various factors (pesticides, heavy metals, pathogenic microorganisms) on mortality and development of eggs and nestlings of sparrows; 2. preparing, along with the Working Group on Diseases Transmitted to People and Livestock, the Symposium "Environmental Change and Disease Transmission from Birds to People and Livestock" for the XXIst International Ornithological Congress (IOC) in Vienna, Austria, August 21-27 1994. (Convenors are J. E. Cooper and J. Pinowski); 3. planning international studies on mortality of granivorous birds in the period from fledgling to maturity; and 4. publishing a volume of *International Studies on Sparrows* (Vol. 18, No 1-2, 1991) containing "Bibliography of the Genus Passer. XIV".

Plankton Ecology Group (PEG)

Chairman: Pr. Dr. Nicole Lair, Hydrobiologie des Eaux Douces, 63177 Aubiére Cedex - FRANCE. The last PEG meeting was held during the SIL Congress in Barcelona. Contributions to the PEG Workshop on "Diel Vertical Migrations" will be printed in the *Arch. Hydrobiol. Beth. Ergebn. Limnol.* at the beginning of 1993, and the

continued on page 5

Figure 2. INTECOL (International Association for Ecology) Newsletter often provided information on the activity of the WGGB.

POLISH ACADEMY OF SCIENCES,
INSTITUTE OF ECOLOGY.
Department of Vertebrate Ecology

Dziekanów Leśny near Warsaw,
P.O. Łomianki, 05-150 POLAND

Our Ref. ____________

Dziekanów Leśny, 20.04. 1990

Dear Colleague,

Polish Airlines LOT effer a cheap flight from Warsaw to Christchurch. A two-way ticket will cost 17018680 zł/ 9310 zł x 1828 USA dollar = 17018680zł/ in Polish złotych. In Poland it is pessible to exchange forints, roubel csechisch crown etc money to into Polish zlot es at any foreign exchange office / inany corner of stret/. Participation from localities ether than Warsaw from abroad can get a largely reduced ticket for flight to Warsaw.

Departure from Warsaw on 28 November 1990 at 20.00 pm arrive to Sydney Australia, on 30 November at 0.52, departure from Sydney at 0935am, arrive to Christchurch at 14.30 pm.

Departure from Christchurch on 15 December at 07.00 am, arrival to Sydney at 8.20 am., departure from Sydney on 15 December at 22.00 pm arrive to Warsaw at 14 December at 12.20 pm.

This cheap ticket will be available anly on the condition that a group of at least 10 people will declare buying it.

I am waiting for your answer.

Sincerely yours
Jan Pinowski
Professor of Ecology

Figure 3. The letter sent to ornithologists with information about a charter flight to the WGGB symposium at the 20th International Ornithological Congress held in Christchurch, New Zealand.

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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).

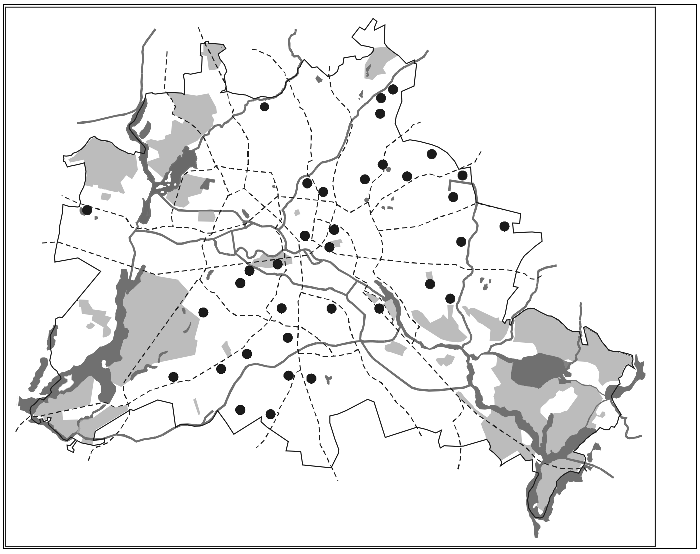

Figure 1. Distribution of the study plots investigated during the breeding season 2001. Woods and parks are shown in light grey, water bodies in dark grey, and main roads as broken lines.

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).

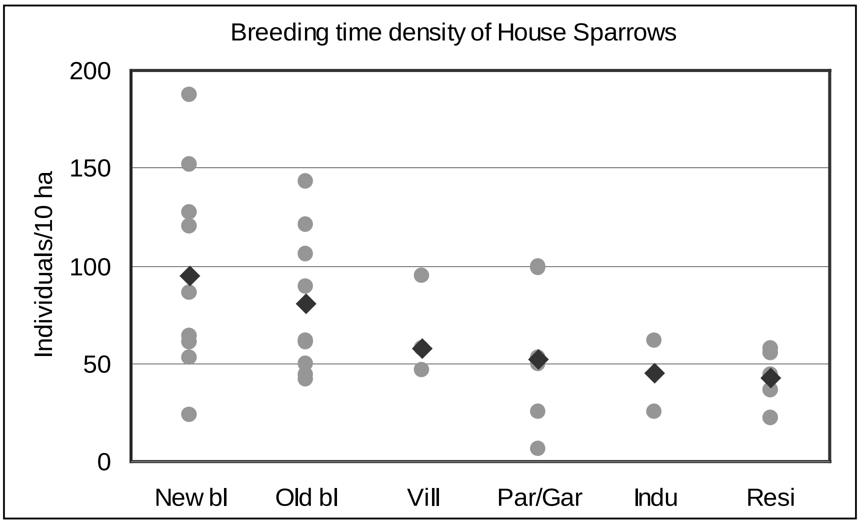

Figure 2. House Sparrow densities in urban habitat types investigated in 2001 (without the Zoological Garden, see text). New bl = new high-rise blocks of flats, Old bl = old blocks of flats, Vill = villages, Par/Gar = parks and gardens, Indu = industrial areas, Resi = residential areas. ● = study plot, ◆ = 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

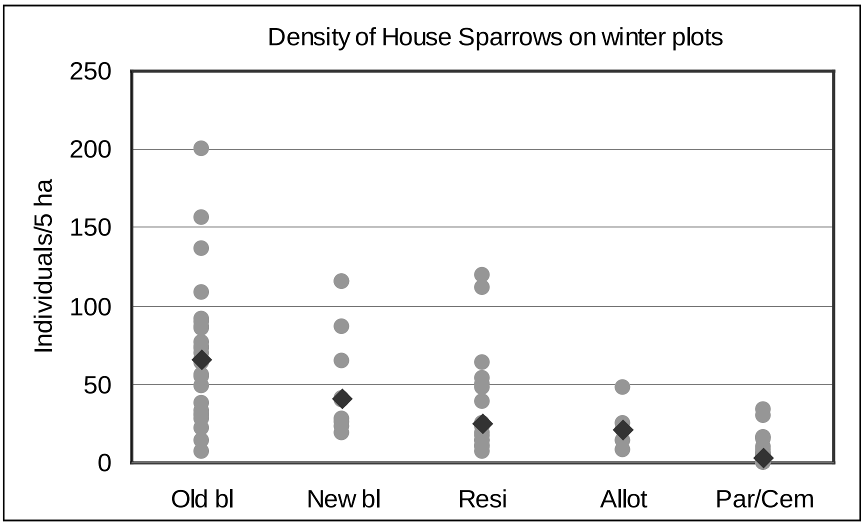

Fig. 3. House Sparrow numbers on 5 ha plots during winter time for urban habitat types: Old bl = old blocks of flats, New bl = new high-rise blocks of flats, Resi = residential areas, Allot = allotment gardens, Par/Cem = parks and cemeteries. ● = study plot, ◆ = median value of the respective habitat 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.

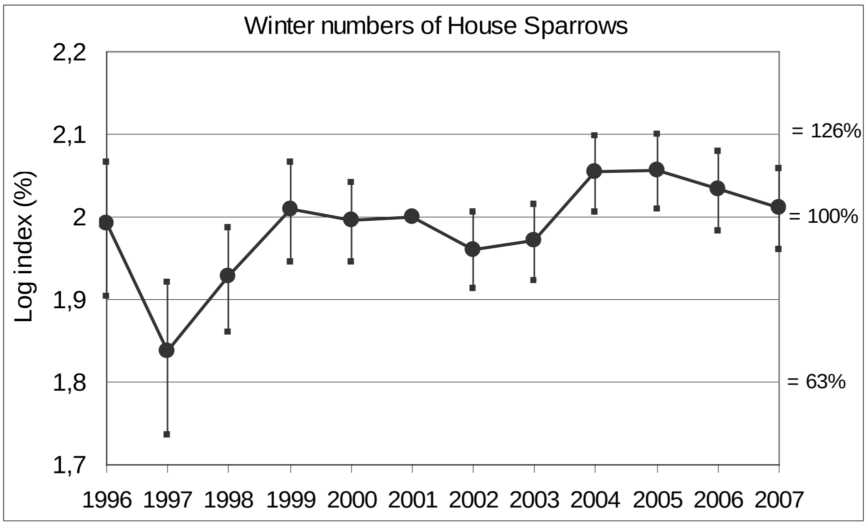

Fig. 4. Log percentage change of House Sparrow numbers in winter given as a chain index calculated by TRIM, with 2001 as reference year (= 100% or log index = 2). Vertical lines indicate error bars.

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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NESTING OF TREE SPARROW *Passer montanus* IN THE NEST OF BARN SWALLOW *Hirundo rustica*

During research on the breeding biology of Barn Swallows *Hirundo rustica* nesting in abandoned war bunkers in the Odra valley near Czerwieńsk (Lubuskie province) in 2005, I recorded the clutch of Tree Sparrow *Passer montanus* in the nest of a Barn Swallow. Bunkers, in which Barn Swallows nest, are small 2-3 rooms war shelters built before Second World War. Barn Swallows nesting inside attach their nests to walls (Czechowski 2004). The aforementioned nest was located in the flooded room (depth of water around 0,5 meter) located as a first nest from the entrance to the bunker. The nest was attached to the wall and propped up with the steel hook sticking out of the wall. Inspection during May revealed that the nest is undamaged and inlayed with weeds and straws without feathers lining.

On 3 June the nest was disturbed , with the lining removed and some pieces were hanging at the edge of the nest. There was one egg of a Tree Sparrow in the nest. On the next inspection (date?) revealed 5 eggs in the nest which was deepened and filled with significant amount of weeds. During nest inspections (on 20 and 27 June) I recorded 5 healthy nestlings of Tree Sparrow. On 27 June the plumage of nestlings was in „E" stage (Kania 1983). During the next inspection on 11 July I noted that the nest was empty which most probably indicated that the Tree Sparrows had fledged. I have not recorded any feathers, bird remains or any other circumstances in the surroundings of the nest which could prove that the clutch was lost. I have not recorded any adult Tree Sparrows near the nest during any of the inspections. The birds must have left the bunker while I was approaching it. Simultaneously, there were 5 breeding pairs of Barn Swallow in that bunker.

During observations on 21 July in the nest in question I recorded fresh lining from feathers and 1 egg of Barn Swallow, on 3 August there were 3 eggs. During inspection on 13 and 23 August I recorded that the nest is empty. I have not noted any signs of predators, the nest was not destroyed. Thus , I could not determine the cause of the clutch lost. The nest in question was built 2001 and every year Barn Swallows successfully bred there (in the period 2001-2003 – 1 brood a year, in 2004 – 2 broods).

During 5 years of research (2001-2005) I recorded single clutches of Tree Sparrows in ventilation holes in the outside walls of bunkers. However, previously I have never recorded any attempts of nesting inside the bunker.

The Tree Sparrow is quite flexible in choosing places for nesting. It nests in holes of trees, building under roofs, in lamps or in lower parts of the nests of larger bird species (Cramp, Perrins 1994, Nankinov 1984). Tree Sparrows' clutches were recorded in the nest of the following bird species Magpie *Pica pica* and other species of Corvids *Corvidae*, White-tailed Eagle *Haliaeetus albicilla*, Osprey *Pandion haliaetus*, Black Kite *Milvus migrans*, Grey Heron *Ardea cinerea* (Makatsch 1957, Cramp, Perrins 1994). Quite frequently, its nests were recorded in the nest of White Stork *Ciconia ciconia* (Makathsch 1957, Indykiewicz 1998, Bocheński 2005).

Clutches of Tree Sparrows were also recorded in burrows of Sand Martins *Riparia riparia* and Bee-Eaters *Merops apiaster* (Makatsch 1957, Nankinov 1984). Tree Sparrows' nesting locations were precisely described in Bulgaria by Nankinov (1984). This author observed them in the following swallows' nests: House Martin *Delichon urbicum* and Barn Swallow. Breeding of three species of sparrows in swallow nests were recorded: Tree Sparrow, House Sparrow *Passer domesticus* and Spanish Sparrow *Passer hispaniolensis.* The last one is the less common. As of the other two species, it is hard to say which one is the more frequent breeder in Barn Swallow's nest. In some colonies Tree Sparrow is more numerous, however House Sparrow can also be more frequent. In wall colonies, Tree Sparrow more frequently occupied House Martins' nests – based on the sample of 53 Tree Sparrow nests in the swallows' nest, 42 were originally owned by House Martin and 10 by Barn Swallow. Moreover, one clutch of Tree Sparrow was located in the nest originally owned by Crag Martin *Ptynoprogne rupestris* (Nankinov 1984). The author does not provide details on localization of the nest (type of the building, outside or inside) with respect to described cases of Tree Sparrows' nesting in Barn Swallow nest.

The appearance of the nest during the first inspection with 1 egg of Tree Sparrow (lining pulled out) may prove that the pair of Barn Swallows defended its nest. Nankinov

(1984) stated that often when taking over the nests by Tree Sparrows there were fights which resulted in pulling out the lining, damaging the nest or even destroying the clutch.

Based on the five years of research in the Odra valley, other less regular observations of Barn Swallows breeding in this region (G. Jędro – personal comm. and my own research) and quoted literature it may be concluded that successful broods of Tree Sparrows in the nest of Barn Swallow are rare.

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SPARROW HAWK *Accipiter nisus* ATTACKS SPARROWS *Passer sp.* ROOSTING IN WHITE STORK NESTS

Sparrow Hawks *Accipiter nisus* hunt for small passerine birds such as Sparrows *Passer sp.*, Tits *Paridae*, Finches *Fringillidae*, Starling *Sturnus vulgaris* and Thrushes *Turdidae.* It can also select bigger prey such as Dunlin *Calidris alpina*, Lapwing *Vanellus vanellus*, Redshank *Tringa totanus* and Pigeon *Columbidae*. However Sparrowhawks usually select prey based on availability in proportion to their relative abundance rather than selecting according to species (Cresswell 1995, Whitfield 2003a, Whitfield 2003b, Reif 2004). In winter Sparrow Hawks forage near settlements where numerous passerines gather for feeding (Newton 1986).

White Stork *Ciconia ciconia* nests are good sites for nesting and wintering passerines including House Sparrow *Passer domesticus*, Tree Sparrow *Passer montanus*, Great Tit *Parus major*, Reed Bunting *Emberiza shoeniclus,* Redstart *Phoenicurus phoenicurus*, Starling *Sturnus vulgaris*, Pied Wagtail *Motacilla alba*, Blackbird *Turdus merula,* Collard Dove *Streptopelia decaocto,* Wood Pigeon *Columba palumbus* and Magpie *Pica pica* (Indykiewicz 1998, Indykiewicz 2006, Kosicki et al. 2007). However White Stork nests are very exposed being located on electric poles, high chimneys and tops of buildings. Small passerine birds using these nests for resting or roosting are easily detected and subject to predation, especially before sunset when the raptors such as Sparrow Hawks hunt most intensively (Roth & Lima 2007).

This note reports observations conducted during winter season 2005/2006 and 2006/2007, in the agricultural landscape of western Poland near Leszno (51º51’N, 16º35’E) and Kościan (52° 05'N, 16° 39' E). This is an area of arable fields interspersed with meadows, pasture, human settlements, small forests and some rivers. The White Stork builds nests mainly on electricity poles (50%), chimneys and roofs of buildings (Kuźniak 1994) in this vicinity.

Observations were recorded at 33 White Stork nests in 2005/2006 and 36 nests in 2006/2007 winter seasons respectively. All nests were observed twice during the winter. Observations were made before sunset while the sparrows were flying into the White Stork nest. Sparrows roosting near these White Stork nests were also recorded. Sparrow Hawk attacks on Sparrows and the behaviour of the potential prey was noted.

House Sparrows roosted in 44.5% and 32.5% of nests in the first and second winter season, respectively. Tree Sparrows were observed in 10.5% and 7% of nests, respectively. Starling roosted on one occasion in the second winter season.

During the study period seven Sparrow Hawk attacks were observed. None of them was successful. All seven attacks were observed at the beginning of winter between the end of December and beginning of January.

On one occasion a female Sparrow Hawk stooped then sat on a White Stork nest trying to catch sparrows, but four Tree Sparrows approached and subsequently a flock of 30 Tree Sparrows roosted outside the nest. In the other six observations Sparrow Hawks did not sit on the white stork nest but hunted from the air.

During two observations some sparrows roosted in the nest while the others stayed outside. In two cases all of sparrows stayed out of the White Stork nest and roosted in the middle of bushes. During three further observations there were no sparrows recorded.

Flocks of sparrows sitting in bushes before the attack were very noisy. At the moment of the attack they became silent and hid in the middle of the bushes. After the attack they became noisy again.

Sparrow Hawks hunt around White Stork nests because they are conspicuous and harbour big flocks of passerine birds in winter. It is also possible that Sparrow Hawks hunt near White Stork nests because they forage near settlements in winter.

Sparrows make a decision to spend the night in big flocks in bushes where the temperature at night in winter is very low or run the risk of being attacked by raptors and cache into the Stork nest where the conditions are more favorable. The situation is further complicated because predation risk varies during the course of the day and is highest in the evening (Pravosudov & Lucas 2001). Therefore sparrows must also decide whether to spend more time feeding or hide in the nest earlier thus avoiding raptor attack. These phenomena deserve further study.

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