Results of the 6th International White Stork Census in Austria 2004

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Zusammenfassung

Im Rahmen des Internationalen Weißstorchzensus 2004 wurde in Österreich eine vollständige Bestandserfassung des Weißstorchs durchgeführt. Zu diesem Zweck wurden Fragebögen an die Storchengemeinden, HorstbesitzerInnen oder interessierte AnrainerInnen verschickt.

Insgesamt wurden in Österreich 395 besetzte Weißstorchhorste gezählt, aus denen 691 Jungvögel ausflogen. Davon entfielen 155 HPa auf das Burgenland, 118 HPa auf Niederösterreich, 110 HPa auf die Steiermark, 6 HPa auf Oberösterreich, 4 HPa auf Kärnten und 2 HPa auf Vorarlberg. Der relative Bruterfolg (JZa:) betrug in Österreich 1,75, im Burgenland 1,69, in Niederösterreich 2,14 und in der Steiermark 1,45 ausgeflogene Jungvögel pro Horstpaar.

Als Horststandorte werden in Österreich vor allem Gebäude (Schornsteine) genutzt, lediglich in den March-Thaya-Auen überwiegen die Baumbruten. Im Südburgenland und der Südsteiermark haben Masten einen hohen Anteil an den Horststandorten.

Die Entwicklung zwischen 1994 und 2004 wird dargestellt. Im Vergleich zum letzten Internationalen Zensus im Jahr 1994 stieg der Weißstorchbestand um 13 % an, wobei der höchste Zuwachs von 20 % in der Steiermark festgestellt wurde. Im Jahr 1999 wurde mit 415 Horstpaaren der höchste Bestand seit Beginn der Zählungen registriert. Der Bruterfolg unterlag starken Schwankungen. 1994, 1996 und 2000 wurden besonders viele Jungvögel flügge, im Störungsjahr 1997 sehr wenige. Nach 2000 sank der Bruterfolg kontinuierlich ab.

Summary

In 2004, a complete survey of the Austrian population of the White Stork was carried out, within the framework of the International White Stork Census. To this end, questionnaires were sent to towns and villages where Storks nest, addressed to nest owners and to interested residents. In total, 395 occupied Stork nests were counted in the country, from which 691 young birds fledged. 155 nests were occupied in Burgenland, 118 in Lower Austria, 110 in Styria, 6 in Upper Austria, 4 in Carinthia and 2 in Vorarlberg. Productivity in Austria was 1.75 fledged young per nesting pair. The corresponding figures for individual provinces were 1.69 for Burgenland, 2.14 for Lower Austria and 1.45 for Styria.

Chimneys represent the most common type of nesting site in Austria; only in the March-Thaya forests are nests in trees more common than on human structures. In southern Burgenland and southern Styria, electricity pylons provide a high proportion of nesting sites.

The development of the Stork population from 1994 to 2004 is described. Compared with the 1994 census, the population has risen by 13%, with the greatest increase (+20%) recorded in Styria. In 1998, more nesting pairs (415) were found than at any time since the start of systematic counts. There were marked fluctuations in productivity. In 1994, 1996 and 2000 particularly large numbers of young left the nests, whereas in 1999 there were extremely few. Productivity has fallen steadily since 2000.

Introduction

In Austria, the White Stork breeds in the plains and hill country, particularly in the south and south-east of the country (Fig. 1). On returning to its breeding areas, the species requires areas that are already free of snow, so it generally avoids the alpine region. Significant populations are found in the three easternmost provinces: Burgenland, Lower Austria and Styria. Only a few pairs breed in Carinthia, Upper Austria and Vorarlberg.

The White Stork population in Austria has been monitored annually since 1976 (SCHIFTER & SCHIFTER 1990, RANNER & TIEFENBACH 1994, KARNER & RANNER 1999). Before then, there is information from the years of international censuses, as well as from some additional years (e.g. ASCHENBRENNER 1972).

Since 1958, counts have been co-ordinated by the Austrian department of the International Council for Bird Conservation (ICBC) together with the Austrian Ornithological Society – now BirdLife Austria. Following the break up of the Austrian department of the ICBC during the restructuring of the ICBC to form BirdLife International, BirdLife Austria assumed the task of co-ordinating the White Stork censuses in Austria, from 1993 onwards. Support for the 2004 census and for interpreting the data was generously provided by the Federal Ministry of Agriculture, Forestry, Environment and Water Management.

Materials and Methods

For the annual counts, questionnaires relating to each known nest site are distributed at the start of the breeding season to the local authorities, or to "nest owners", or interested residents. The questionnaires request information relating to occupancy, date of arrival, breeding phenology, breeding performance, and the cause of death of any Storks that may die. In Styria, the information is collected in collaboration with volunteers from the Mountain and Nature Protection Agencies in the various districts. The questionnaires are evaluated at the end of each year by BirdLife Austria; in Styria, this function is carried out by the co-ordinator of the Styrian counts, Helmut Haar. Missing data are obtained by telephoning local authorities or "nest owners". In 2004, it was hoped also to identify newly occupied nest sites, and sites that had been reused following a gap of several years. Several methods were used:

An announcement in the quarterly publication "*Vogelkundliche Nachrichten aus Ostösterreich*" requested ornithologists in Vienna, Lower Austria, Burgenland and Styria to send data to enable the filling in of any gaps. Circular letters were sent to all biology teachers at secondary and higher schools in areas where White Storks could potentially breed, asking them to report their observations. In Burgenland, similar letters were also sent to the nature protection officers of the individual districts. In addition, the media carried information about the International White Stork Census and requests for people to report new nests. Municipalities with previously occupied nests were asked whether Storks had returned.

Furthermore, in 2004, areas from which previous information is known to have often been incomplete were visited in mid-July, shortly before young storks leave the nest. At this stage, there is only a low risk that young birds will die before they leave the nest. In cases where information from visits was hard to interpret, e.g. where the nest was unoccupied but well built, local residents were asked for information.

Overall, it seems safe to assume that Austria's White Stork population in 2004 was essentially completely surveyed.

Furthermore, the census was accompanied by work with the media aimed at informing the public about the life of the White Stork, the international survey, population trends, and threats posed by habitat loss.

Results

The Austrian White Stork population in 2004

A total of 395 occupied White Stork nests (HPa) were counted in Austria, from which 691 young birds fledged (JZG). 155 nests were in Burgenland, 118 in Lower Austria, 110 in Styria, 6 in Upper Austria, 4 in Carinthia and 2 in Vorarlberg. As in previous surveys, Burgenland had the largest number of nests with 38% of the total. Styria and Lower Austria each held somewhat less than a third of the total number, with only a few pairs in the remaining provinces (Fig. 2).

Table 1 presents the results of the 2004 White Stork census. In Burgenland, the figures for each political district are given. Because of the smaller numbers of breeding pairs in Lower Austria and Styria, combined figures are shown for several districts in these provinces. For the remaining provinces with small numbers of White Storks (Upper Austria, Carinthia and Vorarlberg) only the total numbers are given.

There are very few large Stork colonies in Austria: most nests are on their own. In 2004, 65% of the nesting pairs were the only ones in a town or village, and only 16 towns or villages had 2 nests. A further 16 towns or villages had 3-6 nesting pairs. The only large colony is in Marchegg on the lower River March in Lower Austria, where, in 2004, 41 pairs bred colonially in trees at the edge of the riverine forest.

86% of the nests occupied in 2004 were below 400 m above sea level and 61% were below 300 m. The highest occupied nest was at 655 m above sea level.

Breeding success

296 of the total number of 395 nesting pairs successfully raised young (HPm), while 99 nests failed (HPo).

Breeding success varied widely between different provinces. In Styria, only 67% of the breeding pairs managed to fledge young; in Burgenland this figure was 71%; and in Lower Austria 88% of breeding pairs fledged young. The levels of productivity in the various provinces varied correspondingly (Fig. 3): in Lower Austria the figure of 2.2 fledged young per occupied nest (JZa) was relatively high, but the figure of 1.7 in Burgenland was rather low and productivity in Styria (1.46) was at a very low level. But even within the provinces the results were at times extremely variable.

In the two most northerly districts of Burgenland (Neusiedl and Eisenstadt-Umgebung), an average of 2.16 and 2.24 young birds fledged per occupied nest (JZa). These figures are relatively high for Austria. In Oberpullendorf and Oberwart, on the other hand, the levels of productivity were catastrophically low with only 1.09 and 1.42 fledged young per nest (JZa). The figure for Güssing was 1.79, which is somewhat less than the average, while in Jennersdorf a result of 2.33 fledged young per occupied nest represented a good result (although this number is based on only 9 nests). The results are shown in Fig. 4.

Approximately two-thirds of Stork nests in Lower Austria are located in the March-Thaya forests. Consequently, high productivity in this region largely determines the overall figure for the province. This was the case in 2004, where productivity in the March-Thaya forests was 2.16 fledged young per occupied nest (JZa). The other regions of Lower Austria also produced good numbers of young, with the exception of the Mostviertel (see Fig. 5).

Productivity in Styria in 2004 was very low. Particularly significant in this context is East Styria, which hosts the largest number of breeding pairs in Styria and where productivity of only 1.22 fledged young per pair was extremely low (see Fig. 6).

Nest sites

Most White Storks in Austria breed on buildings, mainly on chimneys. Trees comprise a large proportion of nest sites only in the

March-Thaya region. In southern Burgenland and southern Styria, on the other hand, electricity pylons also play an important role.

Detailed information on nesting sites for 2004 is available for Burgenland and Lower Austria (Tab. 2). It can be seen that in Burgenland the proportion of nests on pylons increased from north to south. The same is true for Styria, where electricity pylons are particularly heavily used in the southernmost district of Radkersburg (RANNER & TIEFENBACH 1994).

Developments in the past 11 years

Overall population

A large quantity of data is already available on the development of the White Stork population in Austria (e.g. SCHIFTER & SCHIFTER 1990, RANNER & TIEFENBACH 1994). Therefore the following section concentrates on data gathered since the previous international census in 1994 (see Tab. 3 and Fig. 7).

Following a large decline in the Austrian White Stork population during the 1980s (in 1991 only 245 breeding pairs were recorded), the population started to increase in the early 1990s. In 1994 and 1995, more breeding pairs (350 and 338, respectively) were counted than ten years previously (KARNER & RANNER 1999): in 1984 there had been 319 pairs. This positive trend has clearly continued: in the 2004 census 395 nests were occupied by White Stork pairs, 45 more than in 1994 (a gain of 13%) and 57 more than in 1995.

The trend over the last ten years shows a slight upward trend (Fig. 7). As early as 1996 there were 396 nesting pairs, and following a slight drop to 345 pairs in 1997 and a slight rise to 366 pairs in 1998, the year 1999 produced 415 pairs, the largest number of breeding White Storks in Austria since counts began. This high level was almost sustained in the following two years, both of which produced counts of over 400 pairs. 2002 and 2003 were poorer, but with 366 and 360 pairs they were both still above the values of the previous census year. Finally, in 2004 the population was 395 nesting pairs and had thus again nearly attained the "400" level.

The greatest increase in population between 1994 and 2004, with 19 additional nesting pairs (+20%), was recorded in Styria (Fig. 8). In 1999, a total of 112 nesting pairs almost reached the all-time maximum of 113 pairs recorded in 1981. Numbers in 2004 (110 pairs) were only slightly lower.

There was also a marked increase in Burgenland (+11%) during this period, although not as great as that in Styria (Fig. 9). The maximum number here was 167 breeding pairs in 2000.

The smallest increase was to be found in Lower Austria, where only 3 additional nests (ca. 2.5%) were occupied compared with 1994. Peak numbers here were reached as long ago as 1996, when 142 breeding pairs were recorded (Fig. 10). The Lower Austrian population was also very high in 1999, when 134 White Stork pairs bred in the province. However, since that time the population has decreased.

In the rest of the country, the trend has been positive. Upper Austria hosted 6 nesting pairs in 2004 – three in the Mühlviertel, two in the Innviertel and one in the Machland – compared with only 2 pairs in 1994. Two pairs are continuing to breed in Vorarlberg, while the occupation of Carinthia, which started with two nesting pairs in 1996, has proven to be lasting: in 2004 a total of 4 nesting pairs were recorded in this province.

Breeding success

Table 4 shows the development of the overall breeding output (number of fledged young, JZG) and Figs. 11 and 12 show productivity (total number of fledged young per nesting pair, JZa) for the period 1994 - 2004. Following three years with large numbers of young (1994-1996) only 407 young fledged in 1997. In 1999, when the record number of 415 nesting pairs was recorded, productivity was very low, with only 1.64 fledged young per nesting pair. By comparison, the following two years were much better, with around 2 young fledged per nesting pair. The past three years have seen rather low levels of productivity in Austria, although it is notable that the trend in Lower Austria in the past two years is different from that in Styria and Burgenland.

Discussion

Overall, there has been an upward trend in numbers of White Storks breeding in Austria between 1999 and 2004, although the figures have been subject to the slight fluctuations typical of White Stork populations in central Europe. The Styrian population in particular has benefited from the longstanding protection measures offered by BirdLife Styria's White Stork project, and numbers have risen steadily over the past 11 years. The three peak years of the survey period, with a total of more than 400 breeding pairs in Austria, followed exactly five years after two seasons with particularly high levels of productivity (1994 and 1996, see Fig. 11). Because White Storks reach maturity at 4-5 years of age, there is a clear connection between the high levels of chick production in these years, and the record-breaking populations at the turn of the century. This finding makes it clear that such years with high numbers of fledged young are of immense importance for the population of the White Stork in Austria. In 2000, an exceptionally high number of White Storks fledged in Austria, which may partially account for the recent rise in population in 2004.

Nevertheless, the two following years 2005 and 2006, which are not included in the results of the present work, were catastrophic for the White Stork population: many nests remained unoccupied, or were occupied only very late in the season (preliminary analysis suggests that the population was only 312 and 314 nesting pairs and produced only 478 and 531 fledged young respectively). Explanations must be sought in unfavourable conditions either in the wintering areas or on migration routes, because in 2005 it seems that the whole of the eastern population was affected (K.-M. Thomsen, personal communication). The next two years will show whether there have been high levels of mortality of non-breeding Storks the effect of which can only be overcome slowly, or whether the good results of 2004 are again attained or even exceeded. In addition, productivity has been falling steadily since 2001, and in the 2004 census year it was only 1.75 fledged young per nesting pair. Taken in conjunction with the two poor years of 2005 and 2006, this represents grounds for concern for the next ten years.

The reasons for the large fluctuations in productivity of White Storks in Austria have not yet been analysed in detail. For the March-Thaya forests, there is a clear relationship with the spring floods (ZUNA-KRATKY et al. 2000): if these do not take place, it seems that there is then often a shortage of food, whereas "good floods" provide optimum conditions for raising a large number of young. This may explain higher productivity in Lower Austria in 2004. In the remainder of the country there appears to have been a general negative influence of cold and wet spring weather, although this has not be analysed closely.

The results of the latest census thus give rise to mixed feelings for the future. On the one hand, the census demonstrates the recent increase in the population of the White Stork in Austria. On the other hand, it is feared that low productivity in the past few years coupled with the two disruptive years following the last census will have negative effects on the population in the near future.

Acknowledgements

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Helmut Haar: co-ordination in Styria (counts performed by H. Ehrlich, F. Harb, R. Jemetz, J. Mühlbacher, A. Plaschzug, H. Rosenthaler, H. Sindler, G. Tritthart, J. Weinhofer)

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Georg Frank and the Nationalpark Donau-Auen: Donau forests

Otto Samwald: Güssing and Jennersdorf districts

Dietmar Lukitsch and Ernst Hegedüs: Oberwart district

Franz Gombocs: Oberpullendorf district
Andreas Ranner: districts of Eisenstadt Umgebung, Oberpullendorf, Oberwart, Donau, Bucklige Welt

Michael Dvorak, Beate Wendelin: Neusiedl district

Corinna Botzi: Apetlon

Günter Weber and Dieter Manhart: Waldviertel

Peter Rass: co-ordination in Carinthia

Karl Billinger: Innviertel

Karl Zimmerhackl and the ÖNJ Haslach: Mühlviertel

Erika Ritter: Vorarlberg

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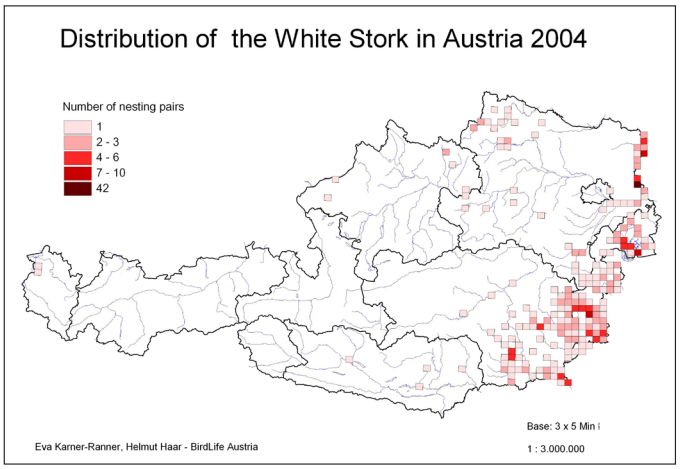

Fig. 1. Distribution of the White Stork in Austria, 2004
Verbreitung des Weißstorchs in Österreich.

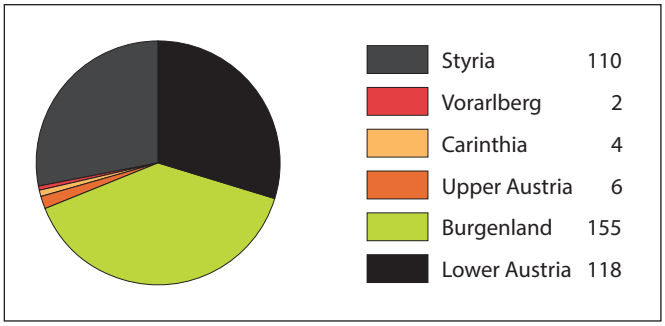

Fig. 2. Breeding population of the White Stork (HPa) in the provinces of Austria.
Anteil der Weißstorchpaare (HPa) in den Bundesländern Österreichs.

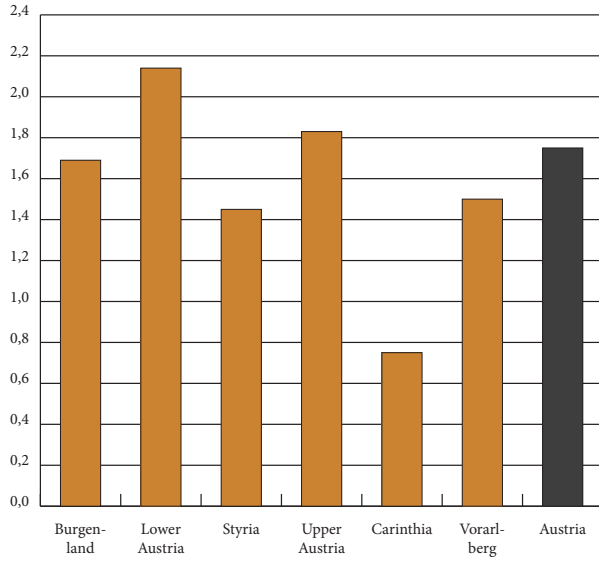

Fig. 3. Productivity (JZa) in the individual provinces and in the whole country in 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in den einzelnen Bundesländern und im gesamten Land 2004.

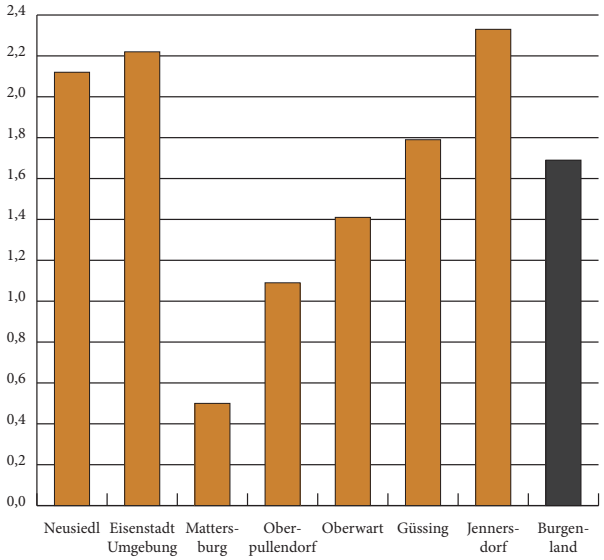

Fig. 4. Productivity (JZa) in the districts of Burgenland (listed in north-south direction) and in the entire province in 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in den Bezirken des Bundeslandes Burgenland (sortiert in Nord-Süd-Richtung) und im gesamten Bundesland 2004.

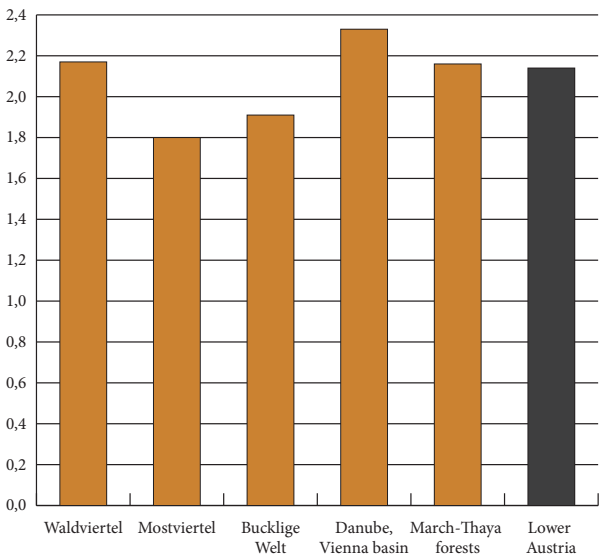

Fig. 5. Productivity (JZa) in regions of Lower Austria and in the entire province in 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in den Bezirken des Bundeslandes Niederösterreich und im gesamten Bundesland 2004.

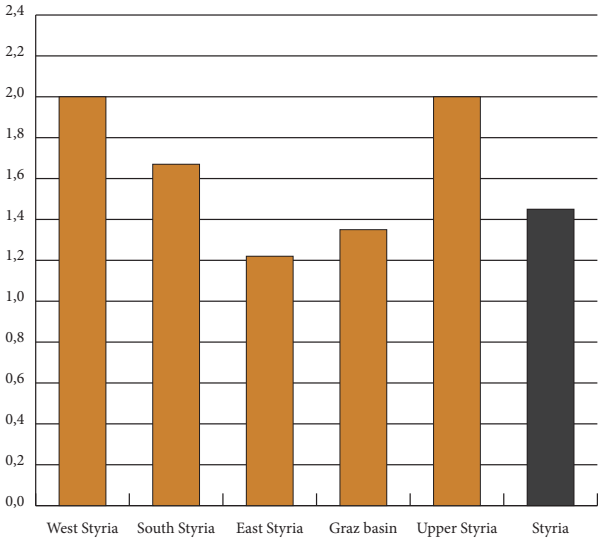

Fig. 6. Productivity (JZa) in regions of Styria and in the whole province in 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in den Bezirken des Bundeslandes Steiermark und im gesamten Bundesland 2004.

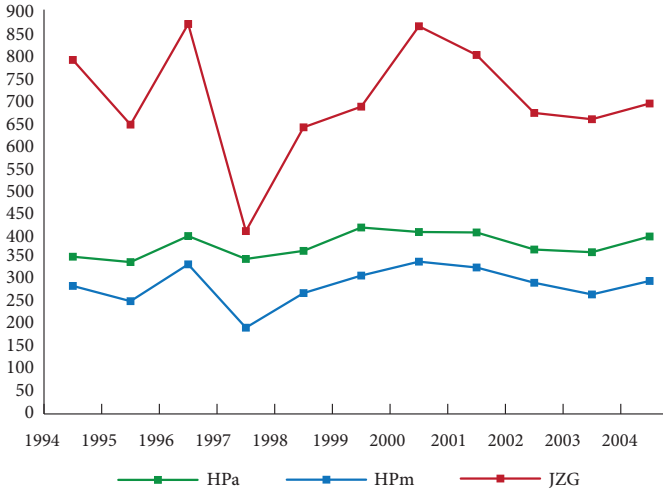

Fig. 7. Development of the White Stork population ((HPa: total nesting pairs; HPm: pairs with fledged young) and overall productivity (JZG) in Austria 1994 – 2004.

Bestandsentwicklung des Weißstorchs (HPa: alle Nestpaare; HPm: Paare mit flüggen Jungen) und die Gesamtzahl der ausgeflogenen Jungvögel (JZG) in Österreich 1994 – 2004.

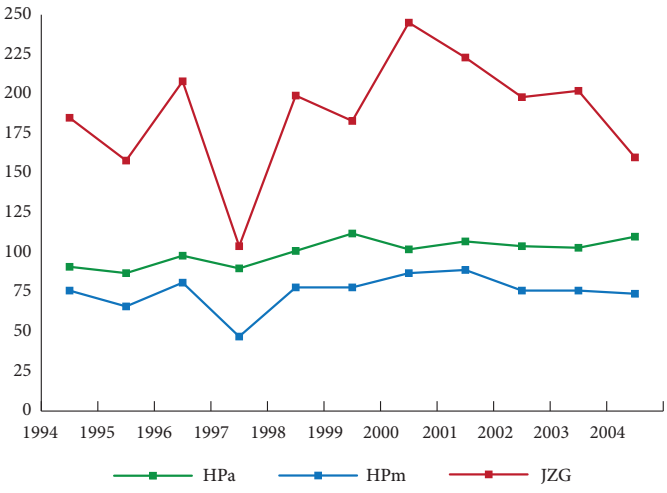

Fig. 8. Development of the White Stork population ((HPa: total nesting pairs; HPm: pairs with fledged young) and overall productivity (JZG) in Styria 1994 – 2004.

Bestandsentwicklung des Weißstorchs (HPa: alle Nestpaare; HPm: Paare mit flüggen Jungen) und die Gesamtzahl der ausgeflogenen Jungvögel (JZG) in der Steiermark 1994 – 2004.

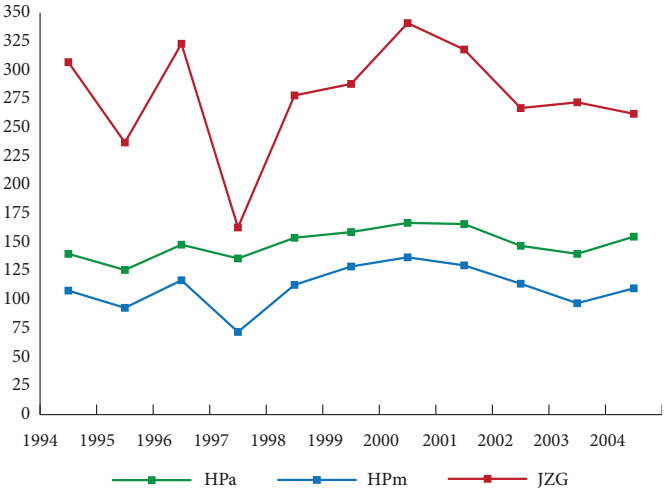

Fig. 9. Development of the White Stork population ((HPa: total nesting pairs; HPm: pairs with fledged young) and overall productivity (JZG) in Burgenland 1994 – 2004.

Bestandsentwicklung des Weißstorchs (HPa: alle Nestpaare; HPm: Paare mit flüggen Jungen) und die Gesamtzahl der ausgeflogenen Jungvögel (JZG) im Burgenland 1994 – 2004.

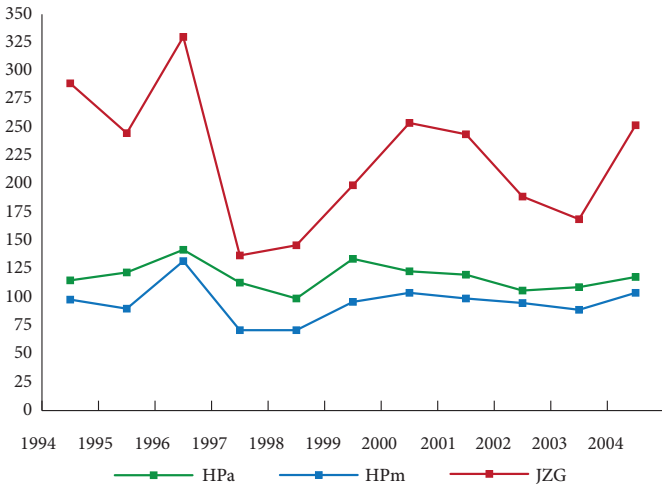

Fig. 10. Development of the White Stork population (HPa: total nesting pairs; HPm: pairs with fledged young) and overall productivity (JZG) in Lower Austria 1994 - 2004.

Bestandsentwicklung des Weißstorchs (HPa: alle Nestpaare; HPm: Paare mit flüggen Jungen) und die Gesamtzahl der ausgeflogenen Jungvögel (JZG) in Österreich 1994 – 2004.

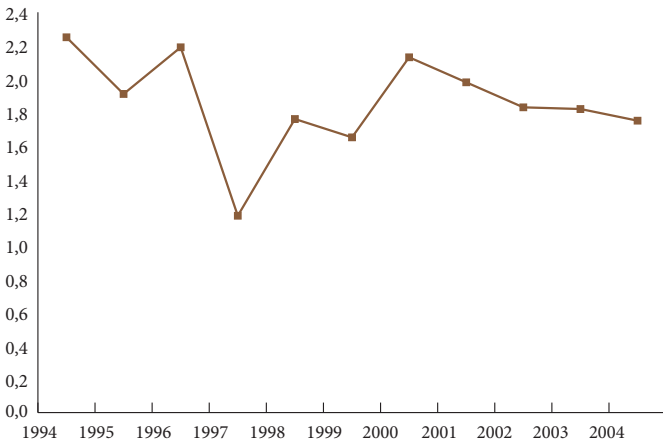

Fig. 11. Productivity (JZa) of the White Stork in Austria 1994 – 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in Österreich 1994 – 2004.

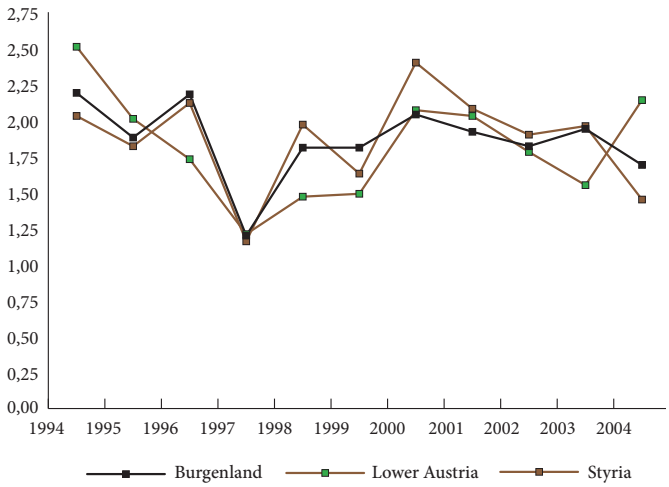

Fig. 12. Productivity (JZa) of the White Stork in Burgenland, Lower Austria and Styria 1994 – 2004.

Gesamtbruterfolg (JZa) des Weißstorchs in den Bundesländern Burgenland, Niederösterreich und Steiermark 1994 – 2004.

Tab. 1. Results of the 2004 White Stork census in Austria (HPa: total nesting pairs; HPm: nesting pairs with fledged young; JZG: fledged young; JZa: young fledged per occupied nest).

Ergebnisse des Internationalen Weißstorchzensus 2004 in Österreich (HPa: alle Nestpaare; HPm: Paare mit flüggen Jungen; JZG: Gesamtzahl der ausgeflogenen Jungvögel; JZa: Gesamtbruterfolg).

	HPa	HPm	JZG	JZa
Neusiedl	26	20	55	2.12
Eisenstadt Umgebung	18	15	40	2.22
Mattersburg	2	1	1	0.50
Oberpullendorf	22	11	24	1.09
Oberwart	49	34	69	1.41
Güssing	29	21	52	1.79
Jennersdorf	9	8	21	2.33
Burgenland total	155	110	262	1.69
Waldviertel	18	15	39	2.17
Mostviertel	5	4	9	1.80
Bucklige Welt	11	8	21	1.91
Danube, Vienna basin	9	7	21	2.33
March-Thaya forests	75	70	162	2.16
Lower Austria total	118	104	252	2.14
West Styria	13	11	26	2.00
South Styria	27	21	45	1.67
East Styria	51	30	62	1.22
Graz basin	17	10	23	1.35
Upper Styria	2	2	4	2.00
Styria total	110	74	160	1.45
Upper Austria	6	4	11	1.83
Carinthia	4	2	3	0.75
Vorarlberg	2	2	3	1.50
AUSTRIA TOTAL	395	296	691	1.75

Tab. 2. Nesting sites of the White Stork in Burgenland and Lower Austria in 2004.

Nistplatzwahl des Weißstorchs im Burgenland und in Niederösterreich 2004.

	Building	Pylon	Tree	Observ. tower
Neusiedl	25	1	0	0
Eisenstadt Umgebung	17	3	0	0
Mattersburg	0	1	1	0
Oberpullendorf	16	8	0	0
Oberwart	24	26	0	0
Güssing	13	12	0	0
Jennersdorf	7	2	0	0
Burgenland overall	102 (65 %)	53 (34 %)	1	0
Waldviertel	15	0	0	0
Mostviertel	5	0	0	0
Bucklige Welt	10	1	0	0
Danube / Vienna basin	6	1	1	0
March-Thaya forests	6	4	53	9
Lower Austria overall	42 (38 %)	6 (5 %)	54 (49 %)	9 (8%)

Tab. 3. Development of the White Stork population (HPa: nesting pairs) in Austria 1994 – 2004.
Entwicklung des Weißstorchbestandes (HPa: alle Nestpaare) in Österreich 1994 – 2004.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Austria	**350**	**338**	**396**	**345**	**363**	**415**	**405**	**404**	**366**	**360**	**395**
Burgenland	140	126	148	136	154	159	167	166	147	140	155
Lower Austria	115	122	142	113	99	134	123	120	106	109	118
Styria	91	87	98	90	101	112	102	107	104	103	110
Upper Austria	2	2	4	4	5	5	7	7	5	4	6
Carinthia	0	0	2	1	2	2	2	2	2	2	4
Vorarlberg	2	1	2	1	2	3	4	2	2	2	2

Tab. 4. Total number of fledged White Storks (JZG) in Austria 1994 – 2004.
Gesamtzahl ausgeflogener Jungvögel (JZG) in Österreich 1994 – 2004.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Austria	**788**	**644**	**868**	**407**	**638**	**684**	**863**	**799**	**670**	**656**	**691**
Burgenland	307	237	323	163	278	288	341	318	267	272	262
Lower Austria	289	245	330	137	146	199	254	244	189	169	252
Styria	185	158	208	104	199	183	245	223	198	202	160
Upper Austria	4	4	2	2	8	12	10	8	9	8	11
Carinthia	0	0	3	1	4	2	7	4	5	3	3
Vorarlberg	3	0	2	0	3	0	6	2	2	2	3

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