Numbers of the White Stork Ciconia ciconia in Ukraine in 2004-2005

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Zusammenfassung

Der 6. Internationale Weißstorchzensus wurde 2004 und 2005 durchgeführt. Die Informationen wurden mit Hilfe von Fragebögen und Zählungen gesammelt. Insgesamt wurden 12.625 Brutpaare registriert. Aufgrund der unvollständigen Erfassung wurde der Brutbestand in der Ukraine 2004 auf ca. 30.000 Brutpaare (HPa) hochgerechnet. Seit dem 5. Internationalen Zensus hat der Weißstorchbestand um etwa 60% zugenommen. Die derzeitige Grenze des Brutareales in der Südostukraine verläuft entlang einer Linie der Städte Bilovodsk - Stanichno-Luganske - Artemivsk - Maryinka -Pologi - Tokmak - Ivanivka. Auf der Krim nistet der Weißstorch im Nordteil entlang der Sivash Lagune. Die Zahl der Nester auf Elektromasten hat stark zugenommen, auf Bäumen und Gebäuden dagegen abgenommen. Die beiden Zensus-Jahre unterschieden sich beim Reproduktionserfolg. Im 2004 lagen die Reproduktionsparameter (JZa: 2,56; JZm: 2,83) nah an den mehrjährigen Mittelwerten. Im 2005 ist der Bestand um 15,8% gesunken und der Bruterfolg war sehr niedrig. Es handelte sich in der gesamten Ukraine um ein ‚Störungsjahr'. Die Population hatte sich erst 2007 wieder völlig erholt.

Summary

The Census was conducted using both survey years of 2004 and 2005. Information was obtained using questionnaires and field surveys. In total, 12,625 breeding pairs have been registered. The survey results allowed to apply a correction for incomplete detection and to estimate the whole population of White Storks in the Ukraine to be about 30,000 breeding pairs in 2004. Since the 5th Census during 1994/95, the population has increased by about 60%. The border of the White Stork's breeding range in south-eastern Ukraine could be established approximately along a line connecting the following towns: Bilovodsk - Stanichno-Luganske - Artemivsk - Maryinka - Pologi - Tokmak - Ivanivka. On the Crimean Peninsula storks breed in the northern part and along the lagoons of Sivash The percentage of nests located on poles has considerably increased, while the proportion of nests on buildings and trees has decreased. The breeding success differed considerably between the two census years. In 2004, the reproductive parameters (JZa: 2.56; JZm: 2.83) were close to long-term means. In 2005, number and breeding success of storks have strongly decreased. It was a "disturbance year" *(Störungsjahr)* in the whole country. Numbers of breeding pairs were 15.8% lower than in the previous year. Only in 2007, the population has fully recovered to the level of 2004.

The White Stork *Ciconia ciconia* is a widespread and very common bird species in Ukraine. Most of the population breeds in the north and west of the country; breeding density decreases to the south and east. The eastern edge of the breeding range passes through south-eastern regions of Ukraine and the Crimea, but this zone is not stable. The breeding range pulsates, but is gradually expanding eastwards (GRISHCHENKO *et al.* 1992; GRISHCHENKO 1996a, 2005). National White Stork censuses were carried out in Ukraine in 1931, 1958, 1974, 1984, 1987-1988 (GRISHCHENKO 1996b) and 1994-1995 (GRISHCHENKO 1999).

The 6th International White Stork Census was organised in Ukraine by the Ukrainian Society for the Protection of Birds (USPB, formerly UTOP), with assistance from NABU and financial support from *Ciconia-Stiftung* (2005) and I. Herzon (2004). In 2005, financial contributions enabled wider scientific and conservation action to be carried out. In addition, we have published a popular science book (GRISHCHENKO 2005), and created a video about the White Stork.

Material and methods

The census was carried out in both years. Most information was obtained by means of questionnaires. In total, about 15,000 questionnaires were distributed to schools, students, ornithologists, birdwatchers, hunters, village administrations, *etc*. The USPB website carried information about White Stork conservation and the 6th International Census, which was updated during the year. Announcements about the Census were also published in the USPB bulletin, newspapers, *etc*. A press release was distributed. In total, we obtained more than 2,000 completed forms, letters and e-mails containing Stork data. Professional and amateur ornithologists conducted Stork surveys over large areas: administrative districts, river valleys, *etc*. Additionally in 2005, thanks to financial support from *Ciconia-Stiftung*, several groups of volunteers investigated more than 600 settlements in different regions of Ukraine. In the Volynian region, a local campaign was organised to promote the study and protection of Storks, and this had good results.

The data obtained are not complete. Ukraine has a large land area and many Storks, but involvement of people in nature conservation and birdwatching are now very low. Data are sufficiently representative for only a few regions: Volynian, Donetsk, and the Crimea. Population estimates therefore require correction.

For some settlements, we have informations for both years. These data were used only for calculation of breeding success.

Results

Numbers and distribution

A total of 12,625 breeding pairs (HPa) were registered (Tab. 1). Numbers of Storks were lowest in the southern and south-eastern steppe regions. Most Storks breed in western and northern parts of Ukraine.

The overall population estimate requires a correction, which we carried out taking into account the following. According to monitoring of White Storks on study plots in Ukraine, numbers increased by a factor of approximately 1.5 between 1994 and 2003 (GRISHCHENKO 2004). In 2004, there was a further increase of 7.2%. Alternatively, a comparison of the results of the 5th and 6th International Censuses in the same settlements could be used. We have such data for 443 villages and towns across all 25 regions of Ukraine. Numbers in these localities have increased by an average of 58.1%. We estimated there to be 15,000-20,000 breeding pairs of White Storks in Ukraine in 1994-1995 (GRISHCHENKO 1999). Therefore, numbers in 2004 can be estimated to be around 30,000 (± 5,000) pairs (HPa). In 2005, numbers on monitoring plots in Ukraine decreased by 16.7%, but numbers recovered again over the following two years.

Because of incomplete survey coverage, breeding density cannot be quantified, but can instead be characterised on the basis of full counts from some areas (Table 2). It is highest in the north-western part of the country (Volynian and Lviv regions) and gradually decreases to the south and east. Densities for western and northern Ukraine are similar to those recorded in neighbouring areas of Poland (GUZIAK & JAKUBIEC 1999) and Belarus (SAMUSENKO 1999).

At present, the edge of the White Stork's breeding range runs through the Lugansk, Donetsk, Zaporizhzhya and Kherson regions, and the Crimea. The dividing line can be drawn roughly via the following towns: Bilovodsk - Stanichno-Luganske - Artemivsk - Maryinka - Pologi - Tokmak - Ivanivka. In the Crimea, storks breed in the north, and along the Sivash (Rozdolne - Dzhankoy - Nyzhnyohirskiy). In 2006, a pair appeared near Primorskiy (north-east of Feodosia). In 2007, storks also nested here (M.M. Beskaravayny, pers. com.). This is the southernmost nest of the White Stork in Ukraine. Since 1994-1995, there has been some expansion of breeding range in Ukraine to the east, accompanied by an increase in the number of storks breeding in eastern regions, but there have not been large-scale changes in distribution.

Nest location

Most nests in Ukraine are located on electricity transmission poles, or trees (Tab. 3). The proportion of nests on poles is constantly increasing, and was 23.2% higher than that recorded by the 5th Census (GRISHCHENKO 1999). This is a widespread trend, with similar increases in the proportion of Stork nests on poles being observed in many other countries (BOGUCKI & OŻGO 1999; JANAUS & STĪPNIECE 1999; PETROV *et al.* 1999; LOVÁSZI 2004, etc.). Gradually, this type of nest site is coming to predominate. In Ukraine, even in some northern forested regions, 40-50% of nests are on poles. The number of nests on buildings is decreased steadily, and has declined by 37.2% between the two international censuses. The number of nests on trees also decreased, by 16.9%. A characteristic location for Stork nests in Ukraine is on flat-topped water towers (known as Rozhnovski's towers Fig. 1). There was little change in the proportion of this type of nest site, which is most frequently found in the eastern part of the country.

Breeding success

There was a large difference in breeding performance between the two census years (Tab. 4). 2004 was a normal year, and reproductive parameters were close to long-term mean values (GRISHCHENKO 2005, 2006a). Most broods comprised 3 or 4 young (Tab. 5). 9 pairs raised 6 young and one even 7 (in Sumy region). 2005 saw a sharp drop in Stork numbers and breeding performance. Many nests remained empty. The proportion of failed breeding attempts was 1.5 times higher, and brood sizes were considerably lower. Almost half of nests fledged only 2 young. The largest recorded brood size was 5 young, and broods of this size were very infrequent (Tab. 6).

Discussion

Since the 5th International Census, the White Stork population in Ukraine has generally increased, but in a wave-like pattern, with the largest between-year increases in 1996 and 1998. Since 2001, population growth has stabilised (GRISHCHENKO 2004). The results of the 6th Census confirmed this overall change: the difference between the 5th and 6th censuses and for monitoring plots over the same period is an increase of 60%. Now Ukraine has the third-largest stork population in the world after Poland and Spain.

2005 was an interesting year, and deserves special analysis. It was a so-called "disturbance year" (*Störungsjahr*), with sharp declines in breeding numbers and breeding performance across the whole population. This was a consequence of bad conditions on the wintering grounds: birds returned late and in poor condition, and so raised fewer young (SCHULZ 1998). The previous disturbance year was 1997, when breeding success was the lowest recorded during 16 years of monitoring observations. In 2005, breeding parameters were not as bad, but the depression in breeding numbers was 1.5 times greater than in 1997. Although 1997 broke a previous steady trend of year-on-year population increases (GRISHCHENKO 2004), numbers recovered the following year, and the long-term upward trend continued. Following the 2005 crash, numbers did not recover until 2007. In both "disturbance years", there was a marked delay in stork arrival dates (GRISHCHENKO 2006b).

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Tab. 1. Results of the 6th White Stork Census in Ukraine.
Ergebnisse des 6. Internationalen Weißstorchzensus in der Ukraine.

Region	HPa	HPm	HPo	HPx	JZG
Vinnitsa	230	136	26	68	248
Volynia	3,844	3,267	408	169	4,570
Dnipropetrovsk	79	53	13	13	99
Donetsk	47	41	4	2	146
Zhitomir	789	603	73	113	965
Transcarpathians	85	49	9	27	107
Zaporizhzhya	17	15	2	0	27
Ivano-Frankivsk	144	105	11	28	137
Kyiv	458	252	42	164	681
Kirovograd	78	62	8	8	126
Crimea	10	7	1	2	10
Lugansk	9	8	1	0	17
Lviv	1,836	1,356	217	263	944
Mykolayiv	91	61	11	19	141
Odesa	69	52	2	15	55
Poltava	316	281	28	7	608
Rivne	515	397	87	31	567
Sumy	670	507	60	103	1,124
Ternopil	492	410	44	38	848
Kharkiv	169	130	31	8	145
Kherson	25	21	4	0	66
Khmelnitsky	844	545	56	243	1,194
Cherkasy	346	180	26	140	426
Chernivtsi	322	126	17	179	232
Chernigiv	1,140	869	163	108	1,822
Total:	**12,625**	**9,533**	**1,344**	**1,748**	**15,305**

Tab. 2. Population density of the White Stork in regions of Ukraine in 2004 and 2005.
Siedlungsdichte des Weißstorchs in einzelnen Regionen der Ukraine 2004 und 2005.

Name	Region	Area, km²	Density, HPa/100 km²
Turiysk district	Volynia, NW Ukraine	1,200	35.4
Ratne district	Volynia, NW Ukraine	1,400	26.1
Sambir district	Lviv, W Ukraine	900	60.0
Sokal district	Lviv, W Ukraine	1,600	32.8
Chortkiv district	Ternopil, W Ukraine	900	23.4
Slavuta district	Khmelnitsky, W Ukraine	1,300	24.3
Novoselitsa district	Chernivtsi, W Ukraine	700	21.9
Kozelets district	Chernigiv, NE Ukraine	2,700	15.9
Konotop - Krolevets area	Sumy, NE Ukraine	900	17.8
Kaniv area	Cherkasy, C Ukraine	700	5.4
Olexandriya district	Kirovograd, C Ukraine	1,900	4.1
Slovyansk district	Donetsk, SE Ukraine	1,300	1.2

Tab. 3. White Stork nest site selection in regions of Ukraine in 2004 and 2005.

Nistplatzwahl des Weißstorchs in verschiedenen Regionen der Ukraine 2004 und 2005.

Region	n	Tree	Pole	Building	Water tower	Other
Vinnitsa	220	59.1	20.9	4.1	10.5	5.5
Volynia	1,906	29.0	43.7	13.0	13.3	1.1
Dnipropetrovsk	63	9.5	50.8	1.6	36.5	1.6
Donetsk	37	5.4	54.1	2.7	29.7	8.1
Zhitomir	771	24.5	53.8	9.3	10.0	2.3
Transcarpathians	87	14.9	47.1	6.9	24.1	6.9
Zaporizhzhya	17	23.5	23.5	11.8	35.3	5.9
Ivano-Frankivsk	136	29.4	50.7	6.6	13.2	0.0
Kyiv	330	34.6	41.8	6.1	13.0	4.6
Kirovograd	78	16.7	60.3	5.1	18.0	0.0
Crimea	10	0.0	70.0	0.0	20.0	10.0
Lugansk	9	11.1	44.4	0.0	33.3	11.1
Lviv	1,273	35.1	44.5	6.8	9.5	4.1
Mykolayiv	94	13.8	60.6	5.3	20.2	0.0
Odesa	68	13.2	64.7	7.4	8.8	5.9
Poltava	204	28.9	31.4	4.9	34.3	0.5
Rivne	400	36.5	40.0	15.0	5.8	2.8
Sumy	665	42.7	31.1	3.5	19.4	3.3
Ternopil	429	56.9	22.1	11.4	6.5	3.0
Kharkiv	165	12.1	47.3	7.3	31.5	1.8
Kherson	25	16.0	48.0	4.0	28.0	4.0
Khmelnitsky	794	34.5	34.1	22.9	7.9	0.5
Cherkasy	312	28.9	53.2	5.5	10.3	2.2
Chernivtsi	190	23.2	54.7	6.3	12.1	3.9
Chernigiv	761	47.7	29.1	2.1	18.9	2.1
Total:	**9,044**	**33.8**	**40.9**	**9.4**	**13.4**	**2.4**

Tab. 4. Breeding performance of the White Stork in Ukraine in 2004 and 2005.

Bruterfolg des Weißstorchs in der Ukraine 2004 und 2005.

Region	2004				2005			
	JZG	JZa	JZm	%HPo	JZG	JZa	JZm	%HPo
Vinnitsa	192	2.34	2.74	14.6	132	2.32	2.69	14.0
Volynia	3,513	2.50	2.73	8.3	2,571	2.09	2.43	13.7
Dnipropetrovsk	115	2.95	3.29	10.3	61	2.44	3.05	20.0
Donetsk	135	3.46	3.65	5.1	11	2.20	2.75	20.0
Zhitomir	1,420	2.55	2.83	9.6	189	2.25	2.55	11.9
Transcarpathians	61	2.26	2.54	11.1	49	1.81	2.33	21.4
Zaporizhzhya	34	3.09	3.40	9.1	12	2.00	3.00	33.3
Ivano-Frankivsk	58	2.52	2.76	8.3	156	2.11	2.48	14.7
Kyiv	627	2.85	3.30	13.6	230	1.98	2.53	21.6
Kirovograd	95	2.50	2.71	7.5	36	2.25	2.77	18.8
Crimea	8	2.67	2.67	0.0	-	-	-	-
Lugansk	17	2.83	3.40	16.7	7	2.33	3.50	33.3
Lviv	600	2.27	2.53	10.2	2,137	1.93	2.27	14.7
Mykolayiv	110	2.24	2.62	14.3	56	2.15	2.43	11.5
Odesa	117	3.16	3.44	8.1	46	2.56	2.88	11.1
Poltava	719	3.06	3.34	8.5	163	2.36	2.67	11.6
Rivne	354	2.46	2.72	9.5	506	1.74	2.25	22.4
Sumy	1,082	2.55	2.85	10.3	292	2.50	2.86	12.8
Ternopil	776	2.87	3.09	6.9	207	2.05	2.30	10.8
Kharkiv	67	2.48	3.19	18.8	324	2.51	3.00	16.2
Kherson	54	3.00	3.18	5.6	37	1.95	2.47	21.1
Khmelnitsky	1,158	2.34	2.52	7.1	161	2.01	2.52	20.0
Cherkasy	287	2.79	3.12	10.7	176	2.23	2.63	14.8
Chernivtsi	126	2.38	2.63	9.4	171	2.16	2.48	12.4
Chernigiv	1,114	2.45	2.79	11.8	1,048	2.39	2.92	17.9
Total:	**12,839**	**2.56**	**2.83**	**9.4**	**8,778**	**2.09**	**2.48**	**15.4**

Tab. 5. Frequency distribution (%) of the number of fledging young per nest in 2004.

Häufigkeitsverteilung (%) der Anzahl flügger Jungstörche pro Nest 2004.

Region	n	1	2	3	4	5	6	7
Vinnitsa	69	7.3	40.6	33.3	11.6	7.3	0.0	0.0
Volynia	376	5.6	43.6	37.2	11.4	2.1	0.0	0.0
Dnipropet-rovsk	35	2.9	20.0	34.3	31.4	11.4	0.0	0.0
Donetsk	38	0.0	15.8	23.7	42.1	13.2	5.3	0.0
Zhitomir	464	6.9	32.5	41.8	17.0	1.5	0.2	0.0
Transcarpa-thians	24	4.2	50.0	37.5	8.3	0.0	0.0	0.0
Zaporizhzhya	10	0.0	10.0	60.0	10.0	20.0	0.0	0.0
Ivano-Fran-kivsk	21	0.0	38.1	47.6	14.3	0.0	0.0	0.0
Kyiv	106	2.8	20.8	34.0	32.1	6.6	3.8	0.0
Kirovograd	34	5.9	29.4	44.1	17.7	2.9	0.0	0.0
Crimea	2	0.0	50.0	50.0	0.0	0.0	0.0	0.0
Lugansk	5	0.0	0.0	60.0	40.0	0.0	0.0	0.0
Lviv	201	5.5	56.2	29.9	7.5	1.0	0.0	0.0
Mykolayiv	42	4.8	40.5	42.9	11.9	0.0	0.0	0.0
Odesa	35	2.9	14.3	37.1	37.1	8.6	0.0	0.0
Poltava	125	6.4	16.8	31.2	36.0	9.6	0.0	0.0
Rivne	125	2.4	39.2	42.4	16.0	0.0	0.0	0.0
Sumy	296	5.1	37.5	40.2	13.5	3.0	0.3	0.3
Ternopil	258	4.7	29.1	27.5	38.4	0.4	0.0	0.0
Kharkiv	21	9.5	9.5	42.9	28.6	9.5	0.0	0.0
Kherson	17	0.0	11.8	58.8	29.4	0.0	0.0	0.0
Khmelnitsky	459	3.3	49.7	41.0	5.7	0.4	0.0	0.0
Cherkasy	81	0.0	30.9	38.3	24.7	4.9	1.2	0.0
Chernivtsi	44	6.8	45.5	36.4	9.1	2.3	0.0	0.0
Chernigiv	160	2.5	23.8	41.9	30.0	1.9	0.0	0.0
Total:	**3,048**	**4.6**	**36.6**	**37.8**	**18.1**	**2.6**	**0.3**	**0.03**

Tab. 6. Frequency distribution (%) of the number of fledging young per nest in 2005 (%)

Häufigkeitsverteilung (%) der Anzahl flügger Jungstörche pro Nest 2005.

Region	n	1	2	3	4	5
Vinnitsa	40	2.5	50.0	32.5	15.0	0.0
Volynia	156	11.5	39.7	32.7	13.5	2.6
Dnipropetrovsk	20	0.0	25.0	50.0	20.0	5.0
Donetsk	4	0.0	25.0	75.0	0.0	0.0
Zhitomir	74	5.4	48.7	31.1	14.9	0.0
Transcarpathians	22	13.6	50.0	36.4	0.0	0.0
Zaporizhzhya	4	0.0	25.0	50.0	25.0	0.0
Ivano-Frankivsk	64	3.3	57.4	27.9	11.5	0.0
Kyiv	76	9.2	38.2	27.6	22.4	2.6
Kirovograd	13	0.0	46.2	38.5	7.7	7.7
Crimea	-	-	-	-	-	-
Lugansk	2	0.0	0.0	50.0	50.0	0.0
Lviv	816	16.4	48.0	31.3	4.3	0.0
Mykolayiv	21	4.8	42.9	52.4	0.0	0.0
Odesa	16	0.0	31.3	62.5	6.3	0.0
Poltava	61	3.3	41.0	41.0	14.8	0.0
Rivne	79	3.8	43.0	36.7	16.5	0.0
Sumy	82	3.7	30.5	41.5	17.1	7.3
Ternopil	90	10.0	58.9	23.3	6.7	1.1
Kharkiv	104	4.8	26.9	38.5	26.0	3.9
Kherson	15	0.0	60.0	33.3	6.7	0.0
Khmelnitsky	65	6.2	49.2	35.4	9.2	0.0
Cherkasy	67	4.5	38.8	46.3	10.5	0.0
Chernivtsi	69	5.8	49.3	36.2	8.7	0.0
Chernigiv	183	4.4	52.5	27.3	15.9	0.0
Total:	**2,143**	**9.9**	**45.5**	**33.3**	**10.4**	**0.9**

Fig. 1. Characteristic nesting sites for White Storks in the Ukraine are flat-topped water towers.

Wassertürme sind charakteristische Neststandorte des Weißstorchs in der Ukraine.

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