

**DISTRIBUTION, POPULATION SIZE AND DYNAMICS
OF THE WHITE STORK (*CICONIA CICONIA* LINNAEUS, 1758)
IN THE TÂRNAVA RIVERS BASIN (TRANSYLVANIA, ROMANIA)**

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KEYWORDS: white stork, Târnave rivers basin, distribution, population size, breeding success, nest site selection, population trends.

ABSTRACT

Based on the results of the censuses carried out in 2003 and 2004, the total White stork population of the Târnave Rivers Basin is 105 HPa distributed in 94 localities. The total population of the region can be estimated to approx. 130 HPa. The mean population density (StD) for the whole area was only 1.68 HPa/100 km². Most common nest sites are electric pylons (60.16 %), chimneys (20.33 %) and churches (8.47 %). The mean JZa and JZm values for the region were above 2.0 and 2.5, values which are higher than the estimated Jza and JZm values needed to keep the population stable. In comparison to the last survey in 1974, the 2003-2004 surveys shows a 58.83 % HPa decrease in the Târnave River Basin.

ZUSAMMENFASSUNG: Verbreitung, Populationsgröße und Populationsdynamik des Weißstorches (*Ciconia ciconia* L.) im Flusstal der Târnava (Rumänien).

Basierend auf Vogelzählungen, die in den Jahren 2003 und 2004 durchgeführt wurden, lag der Bestand an Weißstörchen im Flusstal der Târnava bei 105 HPa an 94 Fundorten. Die Gesamtpopulation der Region kann auf 130 HPa geschätzt werden. Die mittlere Dichte (StD) für das gesamte Gebiet betrug nur 1,68 HPa/100 km². Die bevorzugten Nistplätze waren Strommasten (60,16 %), Schornsteine (20,33 %) und Kirchen (8,47 %). Die Durchschnittswerte von JZa und JZm lagen in dieser Region über 2,0 und 2,5, Werte die höher sind als die geschätzten Werte JZa und JZm, die für den Erhalt einer stabilen Population notwendig sind. Im Vergleich zu Beobachtungen aus dem Jahr 1974 zeigen die Daten aus 2003-2004 eine Abnahme von 58,83 % HPa im Flussgebiet der Târnave.

REZUMAT: Distribuția, mărimea populației și dinamica berzei albe în bazinul râurilor Târnave.

În urma recensămintelor din 2003 și 2004 am identificat 105 perechi de berze albe în 94 de localități din bazinul Târnavelor. Populația totală a teritoriului poate fi estimată la aproximativ 130 de perechi de berze albe. Densitatea medie a perechilor (StD) a fost de numai 1,68 HPa/100 km². Valoriile medii ai parametrilor JZa și JZm au fost mai mari decât 2,0 și 2,5 (valori minime considerate ca necesare pentru menținerea unei populații stabile). Între 1974-2004, în bazinul Târnavelor, numărul perechilor clocitoare a scăzut cu 58.83 %.

INTRODUCTION

With the exception of high mountainous regions and the forested areas, the white stork is distributed over the entire territory of Romania, and the total number of breeding pairs was estimated by the last national census (realized in 1999) to ~ 4500 breeding pairs (Kósa, 2001).

The first regional white stork census in the Târnave rivers geographical area, was conducted in 1974 by Mr. Peter Weber (Klemm, 1975). Some scattered data on the numbers of the white stork in the Târnave rivers basin were published by the following authors: Klemm (1983), Klemm and Salmen (1988), Pap (1995), Pap and Szabó (1996), Philippi (2001), Philippi and Popa (1990), Salmen (1980), Sárkány-Kiss (1991), Szabó and Pap (1996) and Weber and Antal (1978).

In 2004, the white stork population from the Târnave River Basin was censused again after 30 years. The main goal of this study was to evaluate the population size, breeding parameters and population dynamics of the white stork in the Târnave rivers basin. The second aim was to locate and characterize the nest sites used by White storks in this region.

Definition of the study area

The Târnave rivers basin occupies the middle part of Romania and is situated within four counties (Alba, Harghita, Mureş and Sibiu), along about 200 river kilometers. The total size of the Târnave rivers basin is 6245.85 km² (Ujvári, 1972). The geographical range of the area is from 23°40'E to 25°36'E and from 45°51'N to 46°42'N.

METHODS

Between June 11th and July 10th 2004, 175 villages from the Târnave rivers basin were surveyed for white stork nests by the members of the "Milvus Group" - Association for Bird and Nature Protection.

The data from another 19 localities were obtained in 2003.

The population size and breeding success were established by standard methods used during the International Census of white stork (Schulz, 1999 a, b). The following parameters were registered and calculated:

HPa - number of pairs occupying a nest, nesting pairs ($Hpa = HPm + Hpo + HPx$);

HPm - number of pairs with fledglings;

HPo - number of pairs occupying a nest but without fledgling;

HPx - number of pairs with unknown breeding success;

JZG - total number of fledglings in a defined area per year;

JZa - breeding success, average number of fledged young per pair related to all HPa of a defined area (JZG/HPa);

JZm - breeding success, average number of fledged young per pair related to all HPm of a defined area (JZG/HPm);

Std - "Stork density": number of pairs (HPa) per 100 sq km of a defined area.

Brood sizes were estimated from the ground and the number of successful nests used in the analyses was strictly the number of nests with young about to fledge. It was not always clear whether young from these nests did actually fledge.

The nests were photographed with a Canon PowerShot A60 and the geographical location of the stork nests were determined with a Garmin 12CX.

Data analysis was made with the FileMaker Pro software and the distribution map was produced with the fGIS software.

RESULTS AND DISCUSSION

Distribution, population size and density

The distribution of the 118 white stork identified nests in the study area is presented in Fig. 1. The species was identified in 102 localities (Tab. 1). The distribution of the white stork throughout the area is uneven, nesting birds are confined mainly to the upper Târnava Mare River and the lower Târnava rivers basins. About 47.4 % of the surveyed villages had no storks. No white stork nests were identified in the following 92 localities (Fig. 1): Abuş, Aluniş, Andreeni, Apold, Aţel, Atid, Avrămeşti, Bălăuşeri, Bălcaciu, Bazna, Benţid, Bernadea, Biertan, Biserican, Boiu, Brateiu, Bulgăreni, Cădaci Mare, Cădaci Mic, Călimăneşti, Căpâlna de Jos, Ceheţel, Chibed, Cireşeni, Cistei, Cobăteşti, Copşa Mare, Crăciunel, Crişeni, Cund, Curciu, Deaj, Dejuţiu, Dobeni, Dupuş, Ernea, Făget, Feisa, Filitelnic, Forţeni, Găneşti, Glogoveţ, Goagiu, Gogan, Hoghia, Iclod, Idiciu, Inlăceni, Izvoarele, Jidvei, Laslău Mare, Lepindea, Lodroman, Lunca, Lunca Târnavei, Lupeni, Lupu, Medişoru, Mihai Viteazu, Morăreni, Mureni, Nadeş, Ocna de Jos, Ocişoara, Odrihei, Ormeniş, Păltiniş, Petrisat, Poloniţa, Presaca, Săcel, Sântămărie, Şaroş pe Târnavă, Satu Mare, Satu Mic, Senereuş, Şmig, Şoimuşu Mic, Şona, Spăţac, Tăietura, Tărceşti, Târnoviţa, Tăuni, Ungurei, Valchid, Valea Lungă, Văleni (HR), Velt, Veza, Vişoara, and Zagăr.

Based on the results of the censuses carried out in 2003 and 2004, the total population of the Târnavă Rivers Basin is 105 HPa (Tab. 1.). As about ~20 % of the region was not covered by the censuses (mainly the small settlements from the mountainous area), the total population is estimated to approx. 130 breeding pairs.

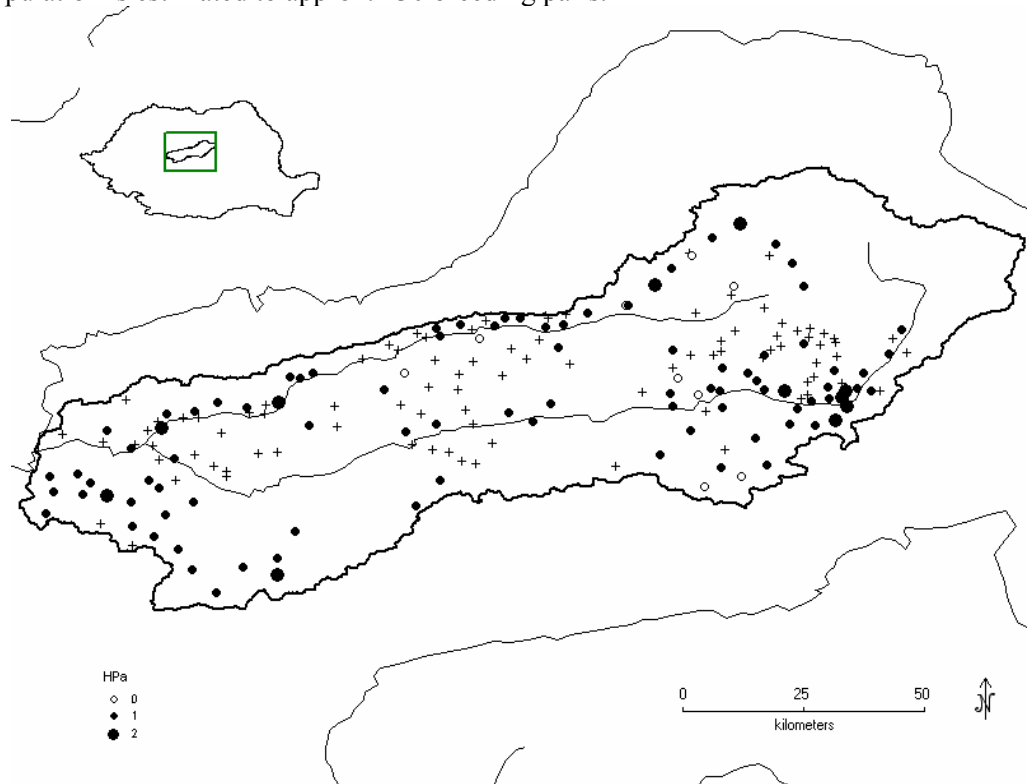


Fig. 1: Distribution and number of white stork breeding pairs (HPa) in the Târnavă basin (Upper left corner: position of the study area in Romania; + surveyed localities without white stork nests).

In the Târnave Basin no white stork colonies were recorded. The mean number of nests/localities is 1.03 and the maximal number of nest/localities doesn't exceed 2 nests/locality.

About 4.28 % of the Transylvanian population, and about 2.18 % of Romanian population breeds in the study area.

The mean population density (StD) for the whole area was 1.68 HPa/100 km². It is much lower than the average value for Romania (4.18 HPa/100 km² in 2004 - Kósa, unpublished data). In the neighbouring region (Olt River basin), we calculated an even higher average value of 5.47 HPa/100 km² (Kósa et al. 2002).

Table 1: List of localities with white stork nests in the Târnava Rivers Basin in 2003-2004 (Abbreviations: counties: AB - Alba, HR - Harghita, MS - Mureş, SB - Sibiu; Nest support: E - electric pylon, ES - electric pylon with nest support, C - chimney, R - roof, B - barn, T - tree, CR - church or ruin; Latitude and longitude are expressed in decimal degrees).

Locality	County	Latitude	Longitude	H	HPa	HPm	HPo	HPx	HE	uH	JZG	Nest support	Census year
Adămuş	MS	46.3040	24.2359	1	1	1	0	0	0	0	3	B	2004
Agrişteu	MS	46.3922	24.6833	1	1	1	0	0	0	0	3	E	2004
Alămor	SB	45.9275	24.0027	1	1	1	0	0	0	0	2	E	2004
Alma	SB	46.2066	24.4714	1	1	0	1	0	0	0	0	E	2004
Alma Vii	SB	46.0500	24.4333	1	1	1	0	0	0	0	4	C	2004
Archita	MS	46.1801	25.0841	1	1	1	0	0	0	0	2	R	2004
Armeni	SB	45.9660	23.9766	1	1	1	0	0	0	0	3	E	2004
Arvăţeni	HR	46.2702	25.3065	1	1	1	0	0	0	0	3	E	2003
Băgaciu	MS	46.2706	24.3724	1	1	1	0	0	0	0	3	C	2004
Bahnea	MS	46.3737	24.4791	2	1	1	0	0	1	0	4	2E	2004
Berghin	AB	46.0772	23.7361	1	1	1	0	0	0	0	5	E	2004
Beta	HR	46.2771	25.2240	1	1	1	0	0	0	0	3	R	2003
Beteşti	HR	46.2888	25.0867	2	1	1	0	0	0	1	3	2E	2003
Biia	AB	46.2314	24.0089	1	1	1	0	0	0	0	4	E	2004
Boarţa	SB	46.0000	24.2000	1	1	1	0	0	0	0	4	C	2004
Bodo-gaia	HR	46.2746	24.9986	1	1	1	0	0	0	0	3	C	2003
Bogatu Român	SB	45.9907	23.9308	1	1	1	0	0	0	0	4	E	2004
Boian	SB	46.2036	24.2281	1	1	1	0	0	0	0	3	C	2004
Brădeşti	HR	46.3404	25.3419	1	1	1	0	0	0	0	5	E	2003
Broşteni	SB	46.0318	23.9525	1	1	1	0	0	0	0	5	E	2004
Bucerdea Grânoasa	AB	46.1927	23.8387	1	1	1	0	0	0	0	3	T	2004
Buneşti	BV	46.1069	25.0589	1	0	0	0	0	1	0	0	CR	2004
Căpâlna de Jos	AB	46.2382	24.1076	1	1	1	0	0	0	0	3	E	2004
Cecheşti	HR	46.3143	25.0206	1	1	1	0	0	0	0	5	CR	2003

Locality	County	Latitude	Longitude	H	HPa	HPm	HPo	HPx	HE	uH	JZG	Nest support	Census year
Cenade	AB	46.0574	24.0055	1	1	0	0	1	0	0	0	E	2004
Cergău Mare	AB	46.0987	23.9212	2	1	1	0	0	0	1	4	2E	2004
Cergău Mic	AB	46.0826	23.9398	1	1	0	0	1	0	0	0	E	2004
Cetatea de Baltă	AB	46.2472	24.1705	2	2	2	0	0	0	0	9	2E	2004
Chendu	MS	46.3952	24.7175	1	1	1	0	0	0	0	4	C	2004
Chibed	MS	46.5292	24.9632	1	0	0	0	0	0	1	0	ES	2003
Colibi	AB	46.1112	23.7840	1	1	1	0	0	0	0	4	E	2004
Cornești	MS	46.2937	24.2117	1	1	1	0	0	0	0	4	ES	2004
Coroi	MS	46.4088	24.6342	2	1	0	1	0	0	1	0	E, ES	2004
Coroi-sânmartin	MS	46.4076	24.6047	1	1	1	0	0	0	0	4	ES	2004
Corund	HR	46.4690	25.1782	1	1	1	0	0	0	0	3	E	2004
Crăiești	MS	46.2964	24.1915	1	1	1	0	0	0	0	4	B	2004
Criț	BV	46.1230	25.0180	1	1	1	0	0	0	0	3	CR	2004
Cușmed	HR	46.4702	25.0432	1	0	0	0	0	0	1	0	E	2003
Daia	MS	46.1464	24.9024	1	1	1	0	0	0	0	4	C	2004
Dârjiu	HR	46.2024	25.1990	1	1	1	0	0	0	0	4	CR	2004
Dârlos	SB	46.1903	24.4129	1	1	1	0	0	0	0	5	CR	2004
Eliseni	HR	46.2938	24.9357	1	0	0	0	0	0	1	0	ES	2003
Fântânele	MS	46.4193	24.7626	1	1	1	0	0	0	0	5	C	2004
Feleag	MS	46.2379	25.0204	1	1	1	0	0	0	0	3	E	2004
Feliceeni	HR	46.2746	25.2794	1	1	0	0	1	0	0	0	C	2003
Filiaș	HR	46.2696	25.0168	1	1	1	0	0	0	0	4	CR	2004
Forțeni	HR	46.3082	25.2361	1	1	1	0	0	0	0	2	C	2004
Ghindari	MS	46.5045	24.9229	1	1	1	0	0	0	0	3	ES	2004
Ghirbom	AB	46.0342	23.7218	1	1	1	0	0	0	0	4	E	2004
Haranglab	MS	46.3045	24.4116	1	0	0	0	0	1	0	0	E	2004
Henig	AB	46.1055	23.7288	1	1	0	1	0	0	0	0	E	2004
Hoghilag	SB	46.2289	24.6106	1	1	0	0	1	0	0	0	C	2004
Idrifaia	MS	46.3888	24.4719	2	1	0	0	1	0	1	0	E,B	2004
Laslău Mic	MS	46.3685	24.5560	1	0	0	0	0	0	1	0	E	2004
Laslea	SB	46.2099	24.6569	1	1	1	0	0	0	0	4	CR	2004
Loamneș	SB	45.9333	24.1000	1	1	1	0	0	0	0	3	E	2004
Lutița	HR	46.2502	25.1917	1	1	1	0	0	0	0	4	CR	2004

Locality	County	Latitude	Longitude	H	HPa	HPm	HPo	HPx	HE	uH	JZG	Nest support	Census year
Mănărade	AB	46.1411	23.9679	1	1	1	0	0	0	0	4	E	2004
Mătișeni	HR	46.2352	25.1664	1	1	1	0	0	0	0	4	E	2004
Meșendorf	BV	46.0867	24.9884	1	0	0	0	0	1	0	0	E	2004
Mihăileni	HR	46.3604	25.1773	1	1	1	0	0	0	0	4	E	2004
Mugeni	HR	46.2555	25.2271	1	1	1	0	0	0	0	4	CR	2004
Mujna	HR	46.2061	25.1506	1	1	1	0	0	0	0	4	E	2004
Nicolești	HR	46.2412	25.2599	2	2	2	0	0	0	0	6	2E	2004
Ocna de Sus	HR	46.5142	25.1566	1	1	1	0	0	0	0	4	E	2003
Ocna Sibiului	SB	45.8833	24.0500	1	1	0	1	0	0	0	0	C	2004
Odorheiu Secuiesc	HR	46.3034	25.2937	1	1	1	0	0	0	0	2	C	2003
Ohaba	AB	46.0710	23.7937	1	1	1	0	0	0	0	5	R	2004
Oțeni	HR	46.2578	25.2522	2	2	2	0	0	0	0	6	E, ES	2004
Pănade	AB	46.2245	23.9548	1	1	1	0	0	0	0	4	E	2004
Păuca	SB	46.0097	23.8882	1	1	1	0	0	0	0	5	B	2004
Porumbenii Mari	HR	46.2701	25.1414	2	2	1	0	1	0	0	3	E,C	2003
Porumbenii Mici	HR	46.2730	25.1030	1	1	1	0	0	0	0	3	CR	2004
Praid	HR	46.5512	25.1253	1	1	1	0	0	0	0	3	C	2003
Richiș	SB	46.0991	24.4790	1	1	0	0	1	0	0	0	C	2004
Rodeș	BV	46.1283	25.1076	1	1	0	0	1	0	0	0	C	2004
Roșia de Secaș	AB	46.0568	23.8872	1	1	1	0	0	0	0	4	E	2004
Rugănești	HR	46.3045	25.0712	1	1	1	0	0	0	0	1	ES	2003
Ruși	SB	45.9500	24.1667	1	1	1	0	0	0	0	4	C	2004
Sâncel	AB	46.1998	23.9442	2	2	2	0	0	0	0	5	2E	2004
Sângeorgiu de Pădure	MS	46.4325	24.8406	1	1	1	0	0	0	0	3	C	2004
Sânmiclăuș	AB	46.2473	24.0529	1	1	1	0	0	0	0	4	B	2004
Sărățeni	MS	46.5632	25.0031	1	1	1	0	0	0	0	4	E	2004
Saschiz	MS	46.1943	24.9602	1	1	1	0	0	0	0	3	R	2004
Secășel	AB	46.0947	23.8079	1	1	1	0	0	0	0	5	E	2004
Secuieni	HR	46.2621	24.9747	1	0	0	0	0	0	1	0	C	2003

Locality	County	Latitude	Longitude	H	HPa	HPm	HPo	HPx	HE	uH	JZG	Nest support	Census year
Seleuş	MS	46.2455	24.6920	1	1	1	0	0	0	0	2	C	2004
Simoneşti	HR	46.3385	25.1016	1	1	1	0	0	0	0	3	ES	2003
Slimnic	SB	45.9167	24.1667	2	2	2	0	0	0	0	8	2E	2004
Şoard	MS	46.2640	24.9223	1	1	1	0	0	0	0	5	C	2004
Şoimuş	MS	46.3946	24.5846	1	1	0	1	0	0	0	0	E	2004
Şoimuşu Mare	HR	46.3481	24.9261	1	1	0	1	0	0	0	0	C	2003
Sovata	MS	46.5881	25.0566	2	2	2	0	0	0	0	2	ES, R	2004
Suplac	MS	46.3969	24.5195	1	1	1	0	0	0	0	5	ES	2004
Tău	AB	46.0701	23.8407	2	2	2	0	0	0	0	7	E, B	2004
Tăureni	HR	46.2693	25.2595	2	2	2	0	0	0	0	8	2E	2004
Țigmandru	MS	46.3525	24.7077	1	1	1	0	0	0	0	5	C	2004
Tiur	AB	46.1596	23.8869	1	1	1	0	0	0	0	4	T	2004
Trei Sate	MS	46.4711	24.8922	2	2	2	0	0	0	0	7	ES, ES	2004
Ulieş	HR	46.2134	25.2399	2	2	2	0	0	0	0	7	2E	2004
Vânători	MS	46.2396	24.9274	1	1	1	0	0	0	0	4	E	2004
Zetea	HR	46.3874	25.3660	1	1	1	0	0	0	0	3	E	2003
Total				1 1 8	1 0 5	9 1	6	8	4	9	3 2 5		

Breeding success

The JZa and JZm values, which characterize the breeding success, were calculated only for the second census year (2004). In this year 89 HPa (78 HPm + 6 HPx + 5 HPo) and 284 JZG were recorded, distributed in 83 localities. The mean JZa and JZm values for the Târnava Rivers Basin were 3.19 and 3.64. Thus the mean JZa and JZm values for the region were above 2.0 and 2.5, values which are higher than the estimated JZa and JZm values needed to keep the population stable (Burnhauser 1983, Lakeberg 1995).

The frequency distribution of brood size for the study area in 2004 was the following (Fig. 2): the percentage of nests with 1 young (HPm1) was 2.56 %, HPm2 - 7.69 %, HPm3 - 28.2 %, HPm4 - 46.15 %, HPm5 - 15.38 % (n = 78 HPm).

In 2004 the percentage of breeding failure (% HPo) was low, only 5.61 %.

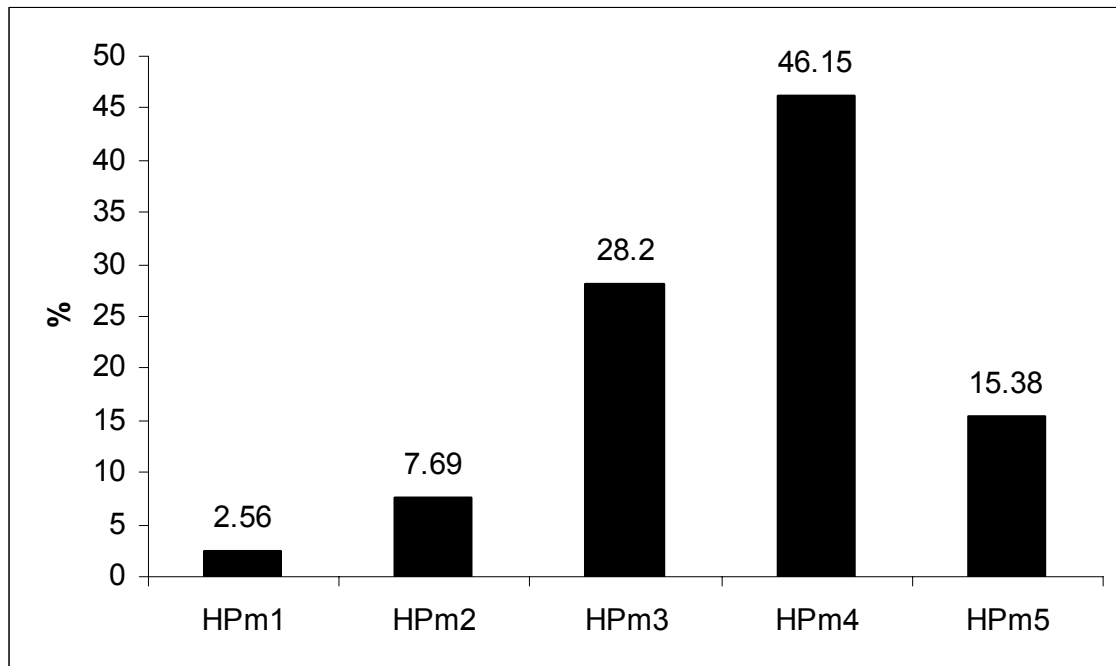


Fig. 2: The frequency distribution of brood size in the Târnava Rivers Basin in 2004 (n = 78 HPm).

Nest site selection

The most common nest sites in the Târnave rivers basin are electric pylons (60.16 %), chimneys (20.33 %) and churches, ruins (8.47 %) (Tab. 1 and Fig. 3). The frequency distribution of nest sites for Romania (2004) is the following: 83.5 % of nests are constructed on electric pylons and only 12.57 % on buildings (chimneys + barns + roofs) (Kósa 2005, *unpublished data*). Thus the study area remains behind other regions in Romania, as far as the proportion of nests constructed on electric pylons is concerned.

There are regional differences in nest site preferences. The proportion of nests constructed on churches is the highest in the Odorheiu Secuiesc Basins and chimneys are preferred as nesting sites in the lower section of the Târnava Mare River valley.

During the last decades massive changes have been observed in Romania in nest site preferences, birds were moving from buildings to electricity pylons (Kósa 2001, Kósa et al. 2002, Weber 1999). This process differed significantly in various parts of the country (Kósa et al. 2002). Unfortunately, due to the lack of data we don't know when and where this process started in the Târnava Rivers Basin.

In the middle of the 1990s, in cooperation with the national electricity company, the installation of artificial nest platforms on electricity poles begun in Romania and until 2004 about 1100 poles were equipped with such platforms. Unfortunately only 13 platforms were installed in the Târnava Rivers Basin. Consequently, there are still 58 nests in direct contact with electric wires.

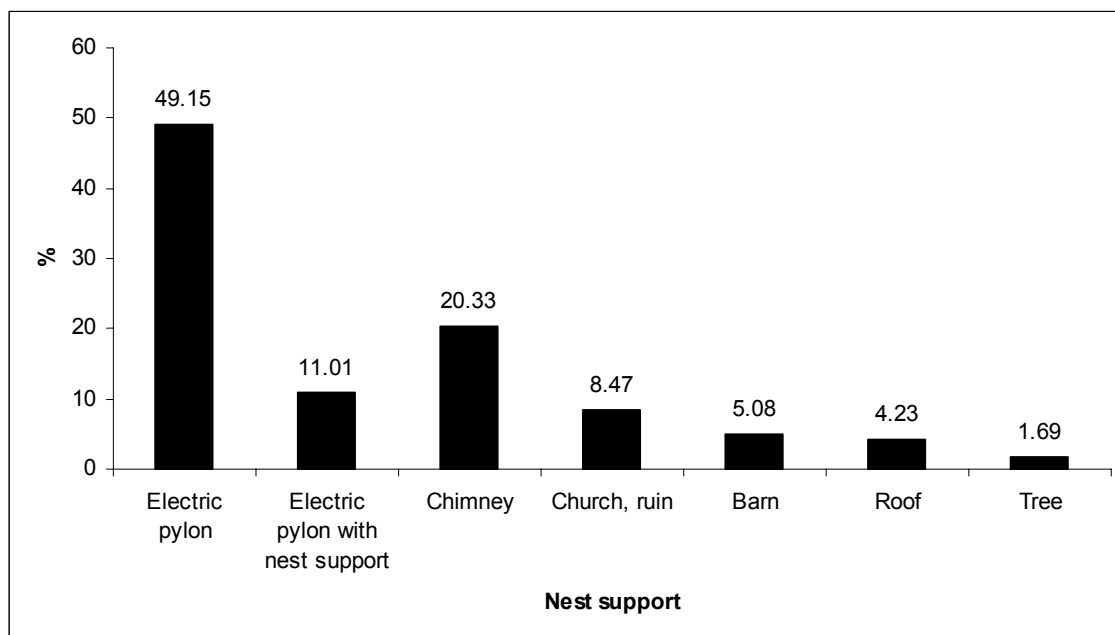


Fig. 3: The frequency distribution of different nest sites of the white stork in the Târnava Rivers Basin (n = 118).

Population trends

The Târnava rivers basin, considering the available amount of white stork population data, is one of the less studied area in Romania. The only census covering the whole area was organised thirty years ago, in 1974 (Klemm, 1975). For the 1974-2002 period we have only scattered data from some localities.

As we can see in Tab. 2, in comparison to the last survey in 1974, the 2003-2004 surveys shows a 58.83 % HPa decrease in the Târnave Rivers Basin. The white stork disappeared from 40 % of the compared localities. Today, nesting birds became increasingly confined to the main river valleys (Târnava Mare, Târnava Mică, Secaş).

The Romanian breeding white stork population underwent a large decline between 1958 and 1978 (Klemm 1983). In the 1973/1974-1988/1989 period the decline of Stork populations continued also in the neighbouring region (Olt River basin) (Kósa et al., 2002). Among the causes of the decline Klemm (1983) listed the disappearance of wetlands due to drainage and river regulation following a systematic government plan and structural changes of the human settlements and attitudes with transition to urban building and behaviour.

Although in the period 1990-2002 the species experienced moderate increase in many regions, the population has recovered to the level preceded its decline in only some regions (Kósa et al., 2002). Unfortunately white stork breeding data are lacking between 1990 and 2003, so we do not know in what manner the breeding population in the Târnave Rivers Basin was affected in the last 13 years, when increases were registered for some of the neighbouring regions (Sibiu Basin, Ciuc Basin).

Table 2: Population changes of the white stork in the Târnave rivers' basin from 1974 to 2004 (HPa values from 1974 are based on data published by Klemm (1975) and Weber and Antal (1978)). (Data marked with * were obtained in 2003).

Locality	HPa 1974	HPa 2004
Adămuș	3	1
Alma Vii	1	1
Atid	1	0*
Bahnea	3	1
Bălăușeri	1	0
Biertan	1	0
Blăjel	1	0
Boian	2	1
Boiu	3	0
Călimănești	1	0
Căpâlna de Jos	2	1
Cetatea de Baltă	2	2
Chendu	5	1
Copșa Mare	1	0
Cornești	1	1
Corund	1	1
Daneș	1	0
Fântânele	1	1
Gănești	1	0
Ghindari	2	1
Hoghilag	1	1
Idrifaia	1	1
Jidvei	2	0
Laslea	1	1
Moșna	1	0*
Porumbenii Mari	1	2*
Praid	4	1*
Săcel	1	0*
Sâncel	5	2
Sângeorgiu de Pădure	2	1
Sărățeni	1	1
Saschiz	2	1
Șoard	1	1
Șoimușu Mare	1	1*
Șona	2	0
Trei Sate	2	2
Vânători	1	1
Velț	3	0
Viforoasa	1	0*
Zagăr	1	0
Total	68	28

CONCLUSIONS

Based on the results of the censuses carried out in 2003 and in 2004, the total white stork population of the Târnave Rivers Basin is 105 HPa distributed in a total of 94 localities. The total population of the region can be estimated to approx. 130 HPa. The mean population density (StD) for the whole area was only 1.68 HPa/100 km². Most common nest sites are electric pylons (60.16 %), chimneys (20.33 %) and churches (8.47 %). The mean JZa and JZm values for the studied region were above 2.0 and 2.5, values which are higher than the estimated JZa and JZm values needed to keep the population stable. In comparison to the last survey in 1974, the 2003 - 2004 survey shows a 58.83 % HPa decrease in the Târnave River Basin.

From a conservational point of view it is necessary to continue the monitoring of the white stork populations in key sites. As the foreseeable introduction of the EU agricultural policy in Romania will damage the white stork feeding habitats, increasing efforts are needed to protect these regions. The installation of nestplatforms on electric poles must be continued in the Târnava Rivers Basin

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