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White Stork (*Ciconia ciconia*) at the North-Eastern Ukraine: trends in population dynamics at the edge of range

Abstract

The paper presents results of the population monitoring of the White Stork in the Kharkov region (Eastern Ukraine). Since 1974 total censuses were carried out periodically in the Kharkov region by means of questionnaires and follow-up then checks. Since 2005 the population is investigated on specific monitoring plots.

The monitoring data showed a constant decline of the number of White Storks in the south-western part of the studied region. In the north-western and eastern parts the population has recovered. Breeding success ranges from 2.2 ± 0.38 (in the eastern part) to 3.33 ± 0.19 (in the region's centre). There is a tendency for an increase in the number of nests constructed on poles (electric, telegraph, and others). Spring droughts in 2010 and 2011 severely affected the breeding success even in an area with a very dense river network.

Key words: White Stork, Eastern Ukraine, population dynamics, breeding success.

Introduction

At present the White Stork is considered as rather common breeding and migratory species in the north-eastern part of the Ukraine.

Somov (1897) considered the White Stork an uncommon breeding and migratory bird in all districts of the Kharkov province, west of Kharkov, especially in areas bordering the province of Poltava (Dnieper basin). To the east of the river Oskol, the White Stork is only a migrant. However, in the late 19th century the species' range expanded and White Storks appeared in the southern parts of the Kharkov province. The distribution boundary, formerly the center of the province, shifted gradually to the southeast (Averin 1910) as well as to the east. In 1998 White Stork nests were registered on the right bank of Oskol River and the floodplains of Severskiy Donets, Aidar, and Derkul rivers in the Lugansk region (Vetrov 1999; Atemasova & Atemasov 2003).

Kharkov ornithologists investigate the distribution, numbers and breeding biology of the White Stork population at the edge of the species range since the 1970s

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(Krivitsky et al. 1979; Ziomenko et al. 1984; Krivitsky & Shaparenko 1990; Atemasova & Atemasov 2003).

Methods and materials

Total censuses of the White Stork in the Kharkov region were carried out in 1974-78, 1987-88, and 1994-98. The first stage of each of the censuses was to get information by means of a questionnaire, covered by different groups and institutions. The results were checked and, if necessary, corrected during special control visits.

Since 2005 the ongoing monitoring is carried out on four sample plots differing in the number of White Stork breeding pairs in previous years (Fig. 1).

The selection of the monitoring plots was based on data of earlier years. In addition, variables included the density of the river network (Demchenko 1970), which clearly defines food capacity of White Stork habitat. The first plot (south-western part of the region) is characterized by the maximum number of breeding pairs over the last

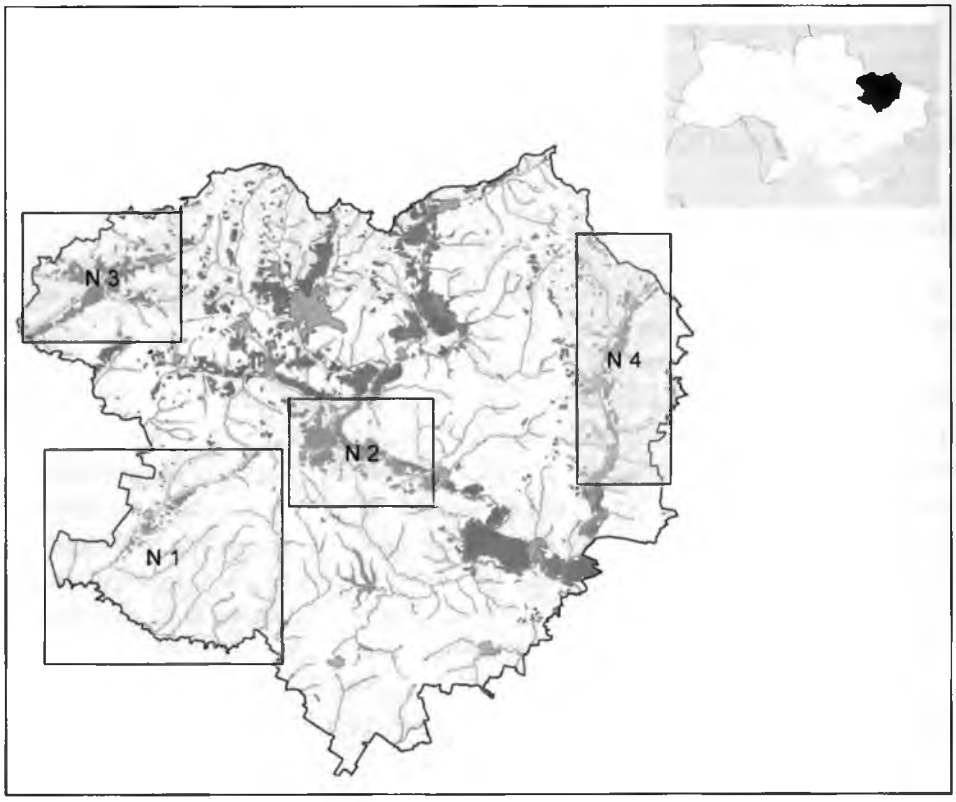

Figure 1. Location of the four monitoring plots

30 years: in only one village in the Staromazharovo Zachepylivka district 22 White Stork pairs nested in 1994 (Atemasova & Atemasov 2003). The river network density for this plot is the highest in the entire region with 0.28 to 0.39 km/km^2.

The second plot (central part of the region) is located east of plot no. 1, in the same direction, now resettled by the Stork and, therefore, represents a boundary shift (Atemasova & Atemasov 2007). The river network density varies from 0.15 to 0.17 km/km^2.

The third plot is located near the north-western border region (river network density 0.21-0.23 km/km^2); and the fourth in the eastern part where Storks started to breed relatively recently, i.e. in 1994. Plot no. 4 has the lowest density of river network in the area with 0.14-0.16 km/km^2 (Demchenko 1970).

For convenience of calculation, each of the monitoring plots include two or three administrative districts. Records were made on the total number of occupied nests as well as of successful nests, i.e. with fledglings. The following abbreviations, proposed by E. Schüz (1952) are traditionally used in White Stork investigations: JZa – average number of fledglings per breeding pair; JZm – average number of fledglings per successful pair;% HPo – proportion of unsuccessful pairs. Since 2005 a total of about 60-100 nests were permanently controlled.

Results and discussion

Population number and dynamics

A rapid growth in the total number of nests was observed in the Kharkov region from 1987 to 1996, with 162 nests in 1974, 218 in 1987, and 310 in 1994. In contrast, nest numbers declined in 1997, 2005, and 2009.

A decline in the number of nests from 103 to 62, i.e. by about 60%), was registered in the south-western plot (no. 1) (Fig. 2).

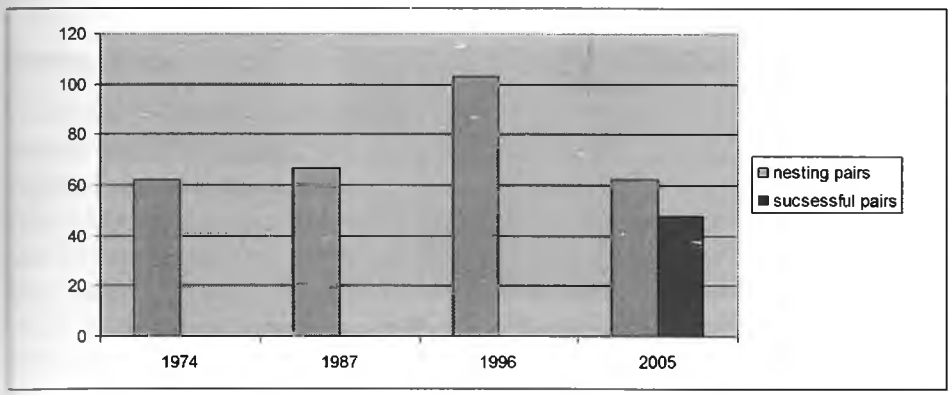

Figure 2. Dynamics of the number of breeding pairs of the White Stork on monitoring plot no. 1

In these areas, nests were located mainly on rooftops. Replacement of thatched roofs on the slate was accompanied by a destruction of nests. It was also noted that storks stopped nesting on abandoned houses. While the area of foraging habitat in these areas has remained constant, dry spring conditions in recent years (2010-2014) had a negative impact on food resources for the storks and, consequently, on the growth of the population. Here a change of traditional nesting habits by storks can be expected. For example, one of the newly built nests was placed on the slate roof ridge (which is not typical for storks).

Sample plot no. 2, located in the center of the Kharkov region (Fig. 1), is characterized by a stable number of nests, even during the total reduction of the population, in 1997, 2005, and 2009.

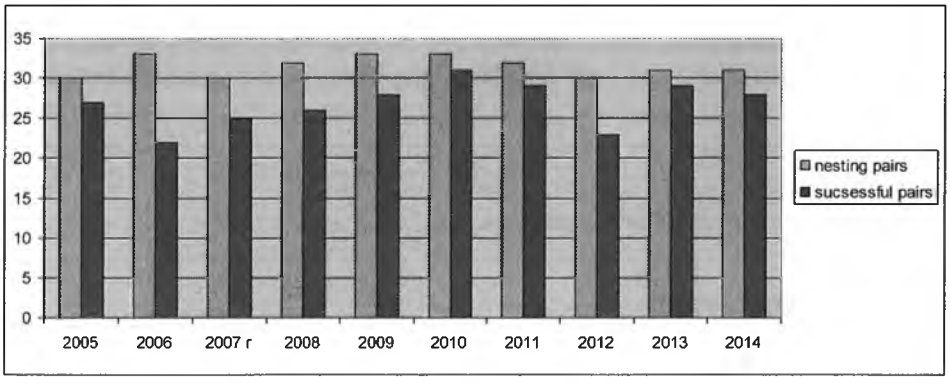

Figure 3. Dynamics of the number of breeding pairs of the White Stork on monitoring plot no. 2

On the north-western plot (no. 3) a decline in the number of White Stork nests was also registered, from 39 in 1994 to 12 in 2007 (about 70%). Currently, the total number of nests is increasing (Fig. 1).

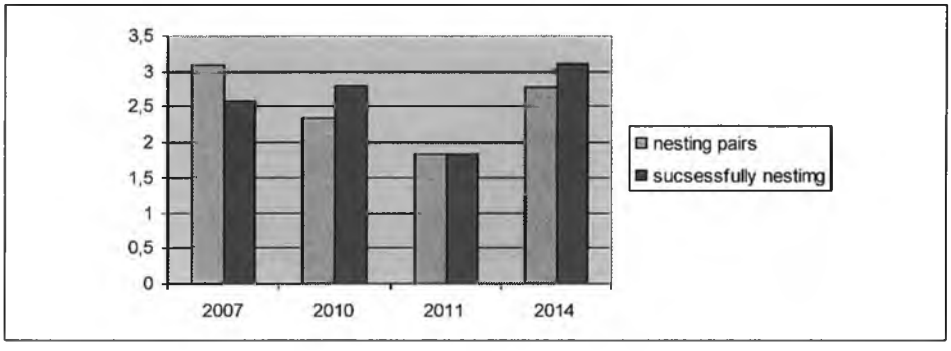

Figure 4. Dynamics of the number of breeding pairs of the White Stork on monitoring plot no. 3

In previous years, the majority of nests were placed on a short-lived support such as trees. In addition, some nests were destroyed during the liquidation of agricultural practices and individual settlements (nests were located on pump houses). In 2013and 2014, 17 nests were recorded, mainly on power lines and poles specially designed for nest support.

In the eastern part of region (plot no. 4) nest numbers declined from 17 in 1994 to 10 in 2014, i.e. by 41% (Fig. 5).

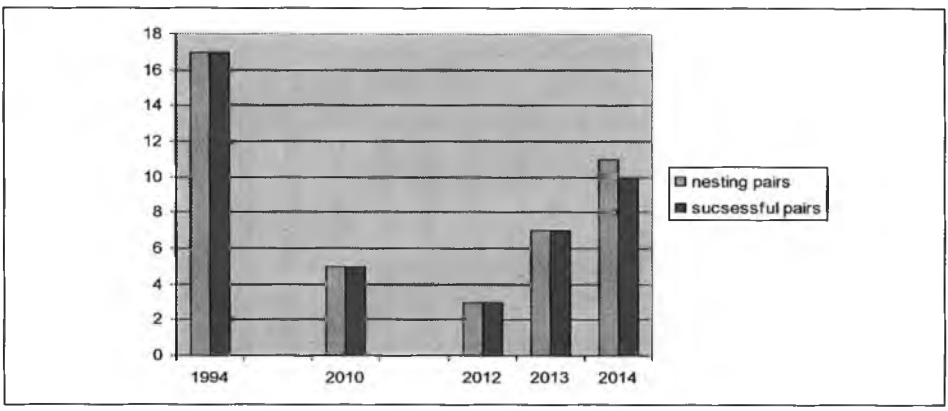

Figure 5. Dynamics of the number of breeding pairs of the White Stork on monitoring plot no. 4

On this plot, the first White Stork nests were registered relatively recently, from 1994 to 1998 when the species breeding range expanded eastward. Here White Storks nested on the highest available points, the top of pump houses. Over time, these buildings fell into disrepair and nests were destroyed. Currently, the number of nests on plot no. 4 is increasing (Fig. 5). Most stork nests are situated on poles of power lines. However, successful breeding is significantly affected by spring droughts, as the district is located in the arid part of the region.

Nesting success

According to the results of the Ukrainian population monitoring of the White Stork, nesting success in the region of the Eastern Ukraine (Kharkov, Lugansk, and Donetsk regions) was among the highest in the entire country in 1998, with JZa = 3.26 and JZm = 3.74 (Grishchenko 2001). In 2011, the respective values were 2.50 ± 0.20 (1.00-3.16) and 2.89 ± 0.26 (1.00-3.60), with mostly three and four nestlings per nest (Grishchenko 2011). In 2012 JZa was 2.75 ± 0.18 (1.5-3.5) and JZm 3.13 ± 0.14 (2.25-4.00) (Grishchenko 2012). These values include data from the Donetsk and Lugansk regions, where the White Stork population faces the most difficult climatic conditions which has affected the minimum and maximum values for JZa and JZm. According to the same author,

the mean number of White Storks on monitoring plots in 2012 for the Eastern Ukraine shows a negative trend, with -0.8 ± 4.4 (-16.7-22.2) (Grishchenko 2012). Data obtained from different plots within the Kharkov region are somewhat different.

Plot no. 1

For plot no.1 breeding success in 1998 was JZa = 3.13 and JZam = 3.36 (Grishchenko 1998). Most often four, three, and two nestlings per nest were recorded. In 2006, JZa was 2.38 ± 0.20 and JZm 3.09 ± 0.14 fledglings, with mostly three nestlings per nest. In 2010 and 2011 a negative trend in breeding success was recorded, probably due to spring droughts: JZa = 3.17 and JZm = 3.00 in 2010, and 2.38 and 2.33, respectively, in 2011, which is the lowest rate for all study years on this site (V.N.Grischenko pers. comm.).

Plot no. 2

This sample plot, located in the center of the Kharkov region (Fig. 1), is characterized by a stable number of White Stork nests, even during the total reduction of population in 1997, 2005, and 2009. Nesting success was JZa = 3.21 ± 0.21 and JZm = 3.33 ± 0.19 (in 2014). This is the highest rate in the Eastern Ukraine.

Plot no. 3

Currently, there is a tendency for an increase in the number of nests as well as breeding pairs in the north-west of the region (Fig. 1).

But even during a sharp decrease in the total number of breeding pairs in the area in 2007, nesting success was at a level typical for the area, with JZa = 2.58 ± 0.43 and JZm = 3.1 ± 0.31. In 2010 and 2011, success rates were very low: JZa = 2.33 and JZm = 2.8, and JZa = 1.83 and JZm = 1.83, respectively (V.N. Grischenko pers. comm.). Spring drought conditions in 2010 and 2011 strongly affected the breeding success even in an area with a high density of the river network.

In 2014, nesting success rates were significantly higher in the area, with JZa =2.78 ± 0.27 and JZm= 3.12 ± 0.15. This part of the population is now recovering, although numbers are still below 50% of previous ones (1994: 39 nests).

Monitoring on plot no. 4 started relatively recently, in 2010, and the area under investigation has a difficult climate. Currently the number of nests increases slightly, with already 10 nests registered in 2014 (Fig. 5). However, nesting success remains low in comparison with the other monitoring plots (JZa = 2 ± 0.38 in 2014).

Location of nests

The proportion of nests located on buildings has decreased over the last 25 years, from 30.5% to 6.8%. In the entire Kharkov region, the number of tree nests remained

almost unchanged until 1998 (69 nests). In 1974 74 nests were recorded on trees, and in 1987 51. Nevertheless, this type of nest site is very rare and frequently destroyed, e.g. by storms, squalls, lightnings, or avalanches. The total number of this type of nest site has decreased slightly, from 38% to 21%.

Poles of power lines, telegraph poles and those specifically erected for White Stork nests are used more frequently. On all monitoring plots there is a tendency for an increase of this type of nest location (Fig. 6).

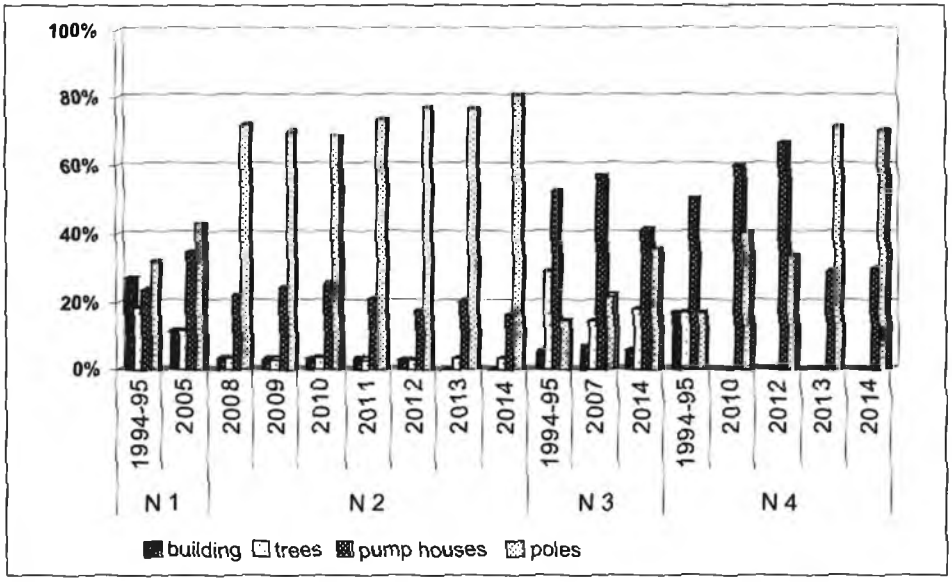

Figure 6. Changes in the type of nest site of White Storks on the four monitoring plots

In our opinion, this development is caused by two factors. First, with the spread into the steppe zone, whith limited support for nests, the White Stork increasingly began to use power line pylons as nesting sites. Second, in the last 20 years local people erected poles specifically for stork nests, accounting now for almost 50% of the increasing number of nests.

There was a significant increase over the past 25 years in the proportion of nests built by White Storks on pump houses, especially in the north-west and east of the region (plots 3 and 4). In the steppe zone, the majority of nests are situated on pump houses.

However, nest on pump houses are often destroyed by people, when replacing these buildings. Furthermore, in hot summers nestlings in this nest type are often killed by high temperature. Currently, water towers are used less frequently as nest site (Fig. 6).

Nests on trees and buildings were recorded less frequently (Fig. 6). Some stork nests were placed on pipes, haystacks, agricultural equipment, and even on monuments.

Data from previous censuses allow a conclusion about changes in White Stork nesting sites. In 1987 nests were situated, in decreasing order, on pump houses (27.53%), poles (16.97%), trees (14.68%), and buildings (9.17%). However, in 1974 the majority of nests was located on trees (37.03%) and the proportion of nests on buildings was 35.80%, on poles 18.51%, and on pump houses 6, 17%.

In recent years, the number of nests on rooftops has declined while that on power lines increased. Numbers of nests on water towers decreased also, due to the dismantling of unused towers. The proportion of nests built by people has increased. The figure for this nest type in 1998 is approximately 22% (1974 13%, 1987 15%).

Conclusion

Beginning in 1994, the White Stork has been expanding its breeding range in the Ukraine successfully for several years. Then there was a decrease in the number of breeding pairs in climatically difficult areas in the border region. Currently, numbers are slightly increasing again, although nesting success is low. In the north-west of the region the number of breeding pairs recovered, accompanied by a change in nest type use. In the south-west of the Kharkov region, despite the most favorable high density of the river network and, theoretically, high quality foraging habitat, the population shows the lowest reproductive success, probably due to a direct impact of spring weather conditions. Spring droughts do not allow for large broods, i.e. four or five nestlings.

Since 1987, a change in using certain nest sites is observes. Currently, nests are mainly located on poles (power lines, telegraphs, and specially installed columns) and on pump houses.

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