

THE CENSUS OF THE WHITE STORK (*Ciconia ciconia* Linnaeus, 1758) IN THE ROSPA0073 MĂCIN-NICULIȚEL AND ADJACENT AREA, IN 2013

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Abstract. In this paper, the authors show the situation of the white stork (*Ciconia ciconia* Linnaeus, 1758) breeding in the ROSPA0073 Măcin-Niculițel and adjacent area from Tulcea County in 2013. Assessments are made on several indicators that characterise the breeding (uH, HPo, HPm, Hpa, H, JZG, JZa, JZm, and StD) and on other aspects that regard the feeding territories during the breeding, the altitude from the sea level of the places of breeding and the type of support where the nests were placed. It is stated that, through the medium of the trophic supplies they need to breed the young, the density of the hydrographical network from different parts of the area influence the spreading of the birds, the drier areas from the South and South-East, which are far from the water bodies, being, practically, uninhabited. The density of the pairs/km² (StD = 2.75), a value less than the one registered at national level, reflects the general dry nature of the area, too. The values of JZa and JZm (2.95, each) attest that the population is stable.

Keywords: white stork, breeding, Măcin-Niculițel.

Rezumat. Recensământul berzelor albe (*Ciconia ciconia* Linnaeus, 1758) în ROSPA0073 Măcin-Niculițel și zona adiacentă, în 2013. În această lucrare, autorii prezintă situația cuibăritului berzei albe (*Ciconia ciconia* Linnaeus, 1758) din anul 2013 în aria protejată ROSPA0073 Măcin-Niculițel și zona adiacentă din județul Tulcea. Sunt făcute aprecieri asupra mai multor indicatori care caracterizează cuibăritul (uH, HPo, HPm, Hpa, H, JZG, JZa, JZm, StD), dar și a altor aspecte care țin de teritoriile de hrănire din timpul cuibăritului, altitudinea locurilor de cuibărit și tipul suportului pe care cuiburile au fost amplasate. S-a constatat că, prin intermediul resurselor trofice de care berzele au nevoie pentru a-și crește puii, densitatea rețelei hidrografice din diferitele părți ale zonei influențează răspândirea păsărilor, zonele mai aride din sud și sud-est, depărtate de trupurile de apă, fiind, practic, nelocuite. Densitatea perechilor pe km² (StD = 2,75), o valoare sub cea de la nivel național, reflectă, de asemenea, caracterul general arid al zonei. Valorile lui JZa și JZm (de 2,95, fiecare) atestă că populația este stabilă.

Cuvinte cheie: barza albă, cuibărire, Măcin-Niculițel.

INTRODUCTION

The breeding of the white stork (*Ciconia ciconia* Linnaeus, 1758) in Romania was studied quite frequently.

At the moment, a complete enumeration of the research-studies on this subject is impossible, but they were performed preponderantly in Transylvania, Banat, Crișana and Maramureș. So, the populations from the south-eastern part of Transylvania (KOVÁCS, 1968), the West of Romania (KISS, 1998), the Criș Rivers Basin (BECZY, 1970), the Crișul Repede Basin (IONCIO, 2004), the Târnava Rivers Basin (KÓSA & PAPP, 2005), the Hârtibaciu River Basin (KÓSA & PAPP, 2007), the Upper and Middle Olt River Basin (KÓSA et al., 2002a), the Someș River Basin (KÓSA et al., 2002b), the Burzenland, Hârtibaciu Valley and Târnavale Land (KLEMM, 1975a), the neighbourhoods of the Harghita Mountains (WEBER & ANTAL, 1978), Satu Mare – Șieu – Măgheruș range (CRISTEA, 1993), Sibiu vicinity (KLEMM, 1975b), the Cluj County (BELDI, 1959; KÓSA et al., 1998a; KÓSA et al., 1998b), Sibiu County (PHILIPPI & POPA, 1990), Brașov County (LUTSCH, 1990; LUTSCH et al., 1990), Covasna County (DAMÓ, 1984; DAMÓ, 1985; KOVÁCS, 1976; MOLNÁR, 1990), Timiș County (KISS, 1979; KISS, 1989; KISS, 1992; KISS, 2000), Mureș County (SÁRKÁNY-KISS & KÓNYA, 1991; PAPP, 1995; PAPP & SZABO, 1996), Harghita County (SZABO & PAP, 1996), Maramureș County (BÁCSA, 1998; BÉRES & NÁDIȘAN, 1974; CHIȘ, 2005; KOVATS, 1977) etc. have been studied.

The situation of the white storks breeding and distribution from Moldavia and Bukovina remained less known (BALTAG et al., 2009).

Excepting a single study from Argeș County (MESTECĂNEANU et al., 2012), we do not know other detailed works from Oltenia, Muntenia and Dobroudja.

At the national level, there are few papers on this theme, even if the southern and south-eastern part of the country is poorly represented (KLEMM, 1982; KÓSA, 2005; SÁRKÁNY-KISS, 1990; SÁRKÁNY-KISS, 1991; WEBER, 1996).

The most important purposes of this study were to establish the distribution of the white storks in the ROSPA0073 Măcin-Niculițel and adjacent area and to assess their breeding population.

The white stork is a bird from Ciconiiformes Order. It is black on remiges and tectrices and white in rest, with red bill and red legs. The young have the same plumage colour, but the bill is darker and the colour of the legs is unclear (SVENSSON et al., 2009). In Romania, the 3-5 eggs of the pair are laid in the beginning of April. The incubation is 31 – 34 days and the fledgling is placed after 33 – 35 days (RADU, 1984).

It is a common species in the continental Europe (excepting its northern part) and prefers the open areas as territories of feeding (crops, grasslands, strands, etc.), where it catches various frogs, snakes, lizards, fish, small

terrestrial mammals, insects, etc. Often, the nests are installed on the top of the buildings and, in Romania, frequently on the top of the concrete electric power poles, more rarely in trees (BRUUN et al., 1999).

There are 105,000 – 120,000 breeding pairs in Europe (ARAUJO & BIBER, 1997) and 4,000 – 6,000 pairs in Romania, where it is widely spread in villages and in the outskirts of some towns (CIOCHIA, 1992; MUNTEANU et al., 2002). The overall decline in Europe (manifested mainly in the western and Central Europe) is complex. The modern agricultural practices, often associated with the loss of favourable habitats, are the major cause of this situation; the long-term rainfall decrease in the western Sahel can be taken into account, too. Instead, in eastern and southern Europe, generally, the number of storks is relatively constant or slightly increasing (ARAUJO & BIBER, 1997).

For these reasons, the white stork is protected. The laws of protection in Romania are: Law 13/1993, Law 13/1998, Law 462/2001, and Law of hunting (MUNTEANU, 2005). The installation of the artificial platform for nesting and the isolation of the electrical wires from the power lines can considerably reduce the mortality of the species.

MATERIALS AND METHODS

The ROSPA0073 Măcin-Niculițel is placed in the north-western part of Dobrogea, in Tulcea County. It is 67,361 ha and contains the Măcin Mountains that are the oldest geological formations in Romania. They have two main parallel crests heavily eroded (Pricopan-Megina, in North-West, and Măcin, in the middle part and in South-East, the two of them being isolated by Greci Depression). Țuțuianu Peak (467 m) is the maximum height. The minimum one is 0 m and the mean is 154 m. The varied relief is favourable for the vertical currents of air development, which are used by numerous species of birds that transit the area in passage on Via Pontica route of migration. The Danube surrounds the area at a small distance from West to North-East (Fig. 1).

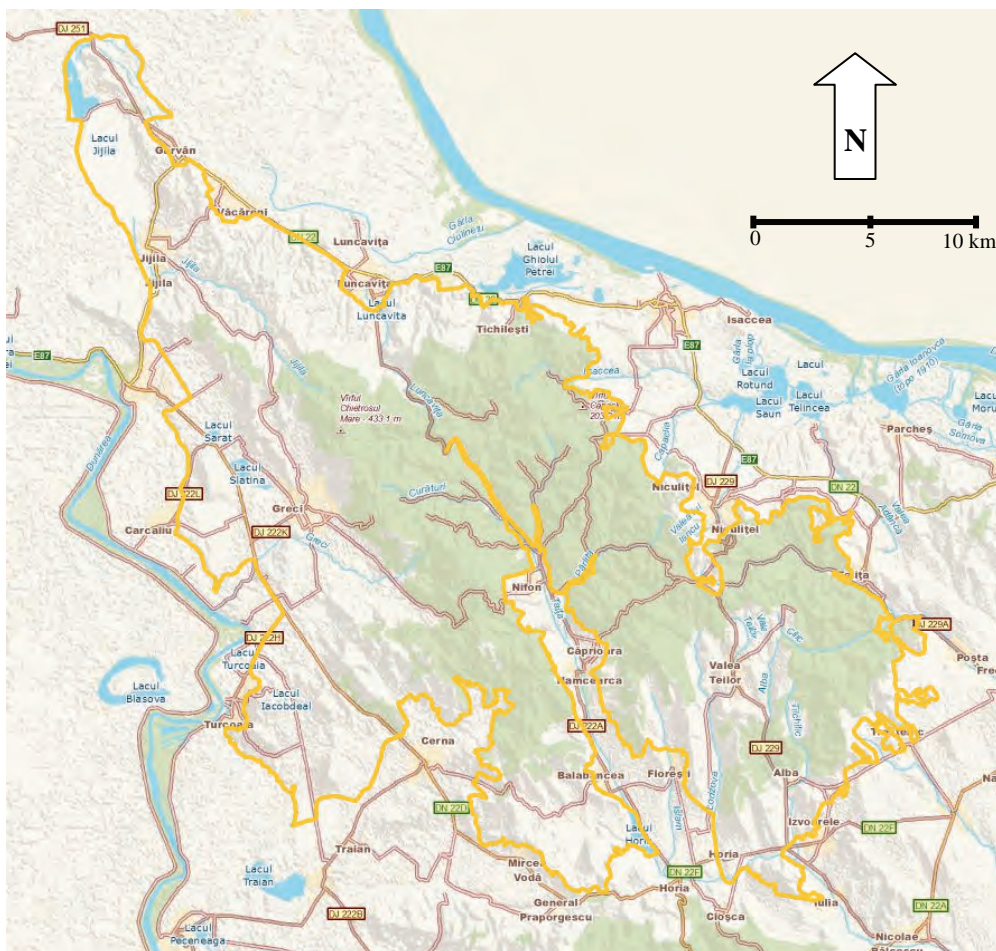


Figure 1. The map of ROSPA0073 Măcin-Niculițel (bordered by orange line, cf. infonatura 2000).

The climate of the zone is excessive temperate-continentl with very dry summers and very cold winters, without humidity. The temperatures vary between -15°C in January and 35°C in July, the annual average being $10-11^{\circ}\text{C}$. The precipitations do not exceed 400 mm/year. The winds are relatively constant and intense and they predominantly blow from North and North-East.

The vegetation is specific of steppe and silvo-steppe. The silvo-steppe is composed by woods of: *Quercus pedunculiflora*, *Q. pubescens*, *Fagus sylvatica* (in Valea Fagilor Reserve), and bushes of: *Cotinus coggygria*, *Crataegus monogyna*, *Prunus spinosa*. The herbaceous plants characteristic to steppe are: *Agropyron repens*, *Stipa pennata*, *Chrysopogon gryllus*, *Festuca* sp., *Andropogon* sp., *Thymus* sp., *Artemisia* sp., *Potentilla* sp., *Verbascum*, *Ononis spinosa*, etc. *Agrimonia pilosa*, *Moehringia jankae*, *Campanula romanica*, *Himantoglossum caprinum*, *Echium russicum* are only few protected plants.

The animals are very well represented and between the protected species *Lycaena dispar*, *Callimorpha quadripunctaria*, *Lucanus cervus*, *Osmoderma eremita*, *Cerambyx cerdo*, *Morimus funereus*, *Euphydryas maturna*, *Bombina bombina*, *Bufo bufo*, *Rana dalmatina*, *Testudo graeca*, *Elaphe quatuorlineata*, *Rhinolophus ferrumequinum*, *Spermophilus citellus*, *Mesocricetus newtoni*, *Mustela eversmannii*, *Vormela peregusna*, *Felis silvestris*, etc. can be enumerated. Also, over 187 species of birds were observed in area, including 56 species of communitarian interest: *C. ciconia*, *Accipiter brevipes*, *Aquila pomarina*, *Buteo rufinus*, *Circus pygargus*, *Falco peregrinus*, *F. cherrug*, *Burhinus oedicephalus*, *Coracias garrulus*, *Dendrocopos leucotos*, *Picus canus*, *Lullula arborea*, *Anthus campestris*, *Sylvia nisoria*, *Oenanthe pleschanka*, *Ficedula albicollis*, *Lanius minor*, *Emberiza hortulana*, etc. (cf. infonatura 2000).

The census of the white storks was performed during 1 – 4 July 2013, when the young were old enough for an adequate counting but not before fledging. All localities from the special protected area (Jijila, Greci, Alba, and Valea Teilor) and the limitrophe area (Măcin, Carcaliu, Turcoaia, Cerna, Mircea Vodă, General Praporgescu, Horia, Cloșca, Florești, Hamcearca, Căprioara, Nifon, Balabancea, Iulia, Izvoarele, Trestenic, Poșta, Telița, Niculițel, Isaccea, Revărsarea, Tichilești, Rachelu, Luncavița, Văcăreni and Garvăn) were visited (Fig. 1). More 10*50 binoculars were used.

Each locality, the geographic coordinates of the nests, the status of occupancy of the nest (pair with chicks, pair without chicks, solitary bird, unoccupied nest), the number of chicks, the placement of the nest (electric pole, chimney, stabling or barn, comb, tree), and the date of the observation were noted (cf. <http://www.ciconia.ro>).

The following parameters were used in the paper: uH – the number of unoccupied nests; HPo – the number of nests not bearing chicks; HPm – the number of nests bearing chicks; HPa – the number of pairs (nests with pair); H – the number of nests; JZG – the number of chicks; JZa – the average of the number of fledged young per pair related to all number of pair (nests with pair) of a defined area (JZG/HPa); JZm – the average of the number of fledged young per pair related to all number of nests bearing chicks of a defined area (JZG/HPm); StD – the number of pairs (HPa) per 100 km² of a defined area.

The study was performed in the project **Studii pentru elaborarea planului de management integrat al PNMM prin revizuirea și integrarea prescripțiilor de management pentru siturile Natura 2000 (SPA-ul Măcin - Niculițel și SCI-ul Munții Măcinului) ce includ PNMM** (Contract no. 286/POS/August 29, 2011) between RNP Romsilva Administrația Parcului Național Munții Măcinului RA and S.C. Multidimension Research and Development S.R.L. and S.C. Geosystems Romania S.R.L.

In this work, we will discuss the results according to the most recent data from Romania, at the national level – 2004 (KÓSA, 2005) and from adjacent studied areas: Moldova, respectively Galați County, 2004 - 2007 (BALTAG et al., 2009) and Muntenia, respectively, Argeș County, 2004 (MESTECĂNEANU et al., 2012). Also, the results obtained in the bordering counties of Tulcea (Brăila, Galați and Constanța) and in Tulcea County, by the last census at the national level (KÓSA, 2005) were used, too.

RESULTS AND DISCUSSIONS

From the 18 visited localities, nests of white storks were found in: Cerna, Turcoaia, Carcaliu, Gărvan, Văcăreni, Luncavița, Rachelu, Revărsarea, Hamcearca, and Isaccea (that means 55.55% of them), (Table 1, Fig. 2). 23 nests (H) were counted, Turcoaia being the locality with the biggest number (7, 30.43% of all). It is interesting that the population was absent from the South and South-East parts of the area (including proximities). The distance until the feeding wetlands, that assure preponderantly the food for the chicks when they stay in the nests, constitutes the main factor of this situation. Other authors also observed that the availability of trophic resources is more important than the breeding opportunity in the distribution of the storks (MUNTEANU, 2012). The dry plains from the area are used for feeding mainly in migration and, also, by the immature birds or by the ones that do not breed from various reasons (i. e.: almost 70 individuals near the Cerna-Greci route, tracking an agrimotor during the ploughing, on July 7, 2013). In Moldova, the most white stork pairs were found in Vicovu de Jos, Suceava County (9 pairs) and in Argeș County, Bârla had the biggest number of occupied nests (9). At the national level, the largest stork colonies were found in Cristian – 28 HPa – and Sânsimion – 26 HPa (KÓSA, 2005).

The altitude above the sea level where the nests were placed varied between 7 and 105 m. The mean was 19.43 m (Table 2). In majority, the nests were situated between 10 and 19 m a.s.l. (12, 52.17%) and the fewest of them were installed under 10 m a.s.l. (2, 8.70%), (Fig. 3). In Moldova, most of the nests (83.66%) were located under 400 m altitude, prevalingly between 100 and 200 m (BALTAG et al., 2009) and in Argeș County they were installed under 500 m, prevalingly between 200 and 299 m and between 300 and 399 m, in equal percentage – 25.35% (MESTECĂNEANU et al., 2012). In Romania, the majority of the pairs (61.66%) brood below 200 m altitude, predominantly less than 100 m (KÓSA, 2005) but the distributions reflect both the predilection of the white storks to nest at some altitudes and the relief of each area.

Table 1. The distribution of the nests on localities.

No.	Locality	Number of nests
1.	Carcaliu	1
2.	Cerna	1
3.	Gârvan	1
4.	Turcoaia	7
5.	Hamcearca	1
6.	Isaccea	5
7.	Luncavița	2
8.	Rachelu	1
9.	Revărsarea	2
10.	Văcăreni	2

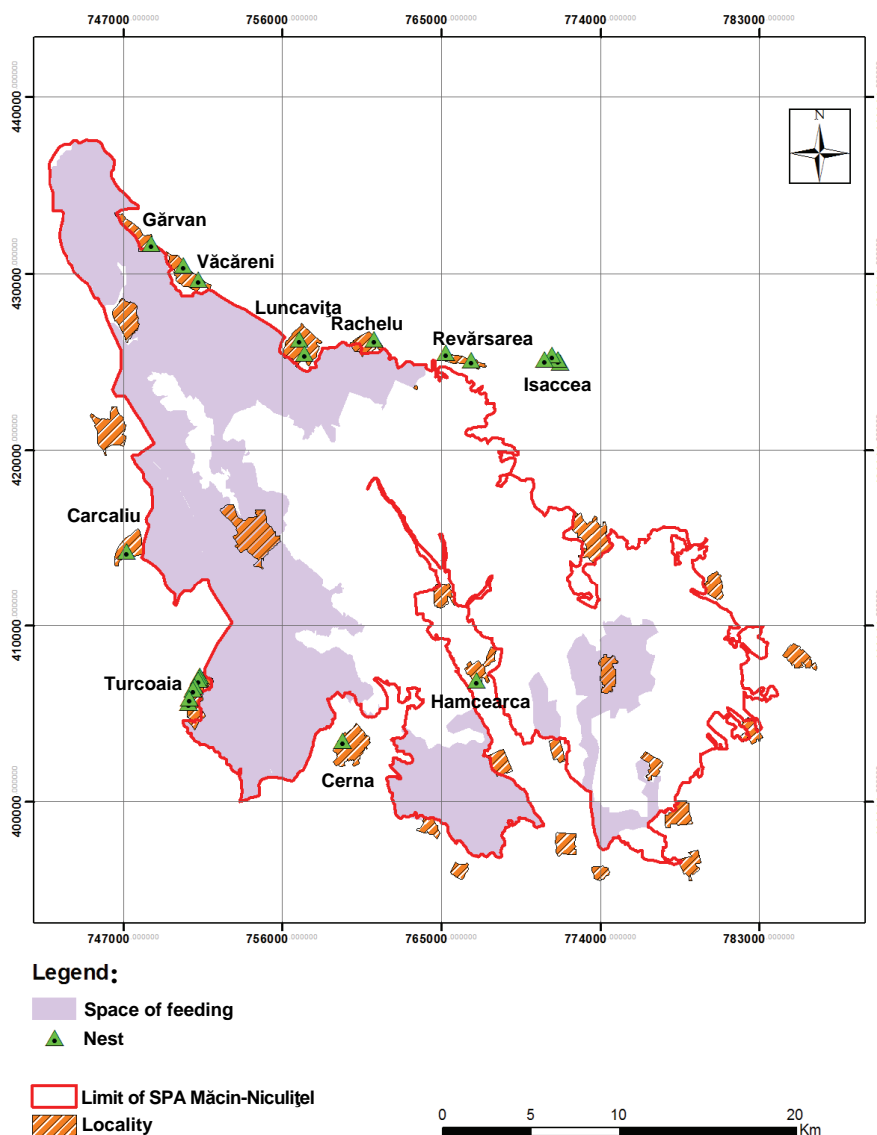


Figure 2. The map with the nests distribution and the potential feeding places of the white stork within the ROSPA0073 Măcin-Niculitel. (original)

It is noticeable that the mean of juvenile number on pair (JZm) was 2.95 and JZa was equally with JZm because all pairs had chicks (Table 3, Table 4). The values are much closed to the others, i.e.: in Moldova (for 2007 year), JZa was 2.25 and JZm was 2.73 (BALTAG et al., 2009), in Argeș County, JZa was 2.13 and JZm was 2.20 (MESTECĂNEANU et al., 2012) and at the national level, JZa was 2.72 and JZm, 2.99. Other values: JZa – 2.80 and JZm – 2.80, in Brăila County, JZa – 1.81 and JZm – 2.53, in Constanța County, JZa – 2.59 and JZm – 2.59, in Galați County, and JZa – 3.13 and JZm – 3.16, in Tulcea County County (KÓSA, 2005). Because the minimum values necessary for a stable population are 2 for JZa and 2.5 for JZm (BURNHAUSER, 1983; LAKEBERG, 1995), it means

that the population in the area of Măcin Mountains is stable, but the assertion must be taken reticently (KÓSA & PAPP, 2007; MORITZI et al., 2001).

Table 2. The main statistical parameters of the altitude above the sea level of the nests of *C. ciconia*.

Parameter	Value
Mean	19.43
Variance	504.62
Standard Deviation	22.46
Standard Error	4.68
Sum	447
Number of Sample	23
Minimum	7
Maximum	105
Confidence Level for Mean (95.00%)	206.23

The pairs had between 1 and 5 juveniles but most of them (31.8%) had 3 juveniles (Fig. 4). A relatively similarly situation was registered in Moldova, in 2007 but, nests with 6 young were encountered here, too (BALTAG et al., 2009). In Argeș County, most pairs (73.01%) had 2 young and pairs with 4 and over 4 juveniles were not found (MESTECĂNEANU et al., 2012). Over the whole Romanian territory almost 40% of pairs had 3 young, HPm varying between 1 and 6 (KÓSA, 2005).

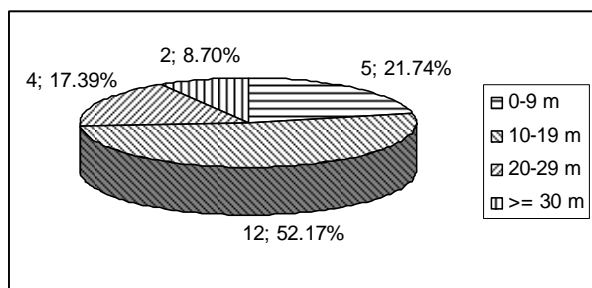


Figure 3. The repartition of the nests of *C. ciconia* by altitude.

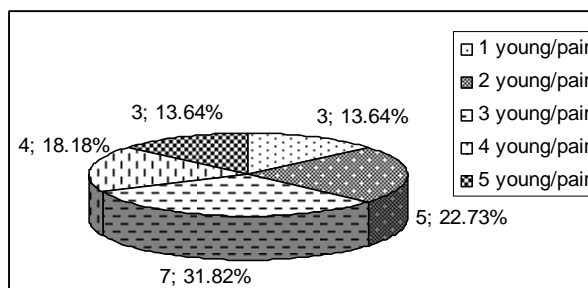


Figure 4. The diagram of distribution according to the number of young/pair (HPm 1-5).

Of the 23 identified nests (H), 22 (95.7%) were used (HPa) and 1 (4.3%) was unoccupied (uH), in Hamcearca (Table 4). In Moldova, uH mains 3.93% (BALTAG et al., 2009) and in Argeș, 8.45% (MESTECĂNEANU et al., 2012).

The number of pairs/100 km² (StD) was nearly 2.75 (Table 4), a middle value but below the one registered at national level. This fact reflects both the impress of steppe of the area, with mountain influence, and the presence of the wetland from vicinity. In Moldova, the density of the population was 0.89 HPa/100 km², but some areas were not well covered with observers: so, in the Suceava hydrographic basin, StD was 4.36 and in the Siret hydrographic basin, StD was 0.72 (BALTAG et al., 2009). In Argeș County, StD was 0.95 HPa/100 km² (MESTECĂNEANU et al., 2012). The density calculated for Romania in 2004 was 4.17 HPa/100 km² (KÓSA, 2005).

Table 3. The main statistical parameters of the number of juveniles from the nests of *C. ciconia*.

Parameter	Value
Mean	2.95
Variance	1.56
Standard Deviation	1.25
Standard Error	0.26
Sum	65
Number of Sample	22
Minimum	1
Maximum	5
Confidence Level for Mean (95.00%)	0.65

All nests were placed on low voltage power poles. That shows the adaptability of the birds to use the most common and beneficial human buildings in the places where the propitious trees for the nests lack. It is noticeable that 86.95% of the nests were placed on metallic supports specially installed on the pole tops, a very important fact because, together with a better isolation of the electric wires, it reduces the risk of electrocution of the juveniles. Of course, on the other hand, the electric wires are better protected and the maintenance costs of the power lines are lower. The general situation is very different of that from other quarters. By comparison, in Moldova (2004 - 2007) the nests were installed: 89.10% on electric poles, 2.73% on

electric poles with support, 1.75% on chimneys, 0.19% on roof tops, 0.19% on barns, and 6.04% on trees; in Galați County, 75% were installed on electric poles (without special support) and 25% on trees (BALTAG et al., 2009). In Argeș County, 70.42% of the nests were made on electric poles (without support), 28.16% on trees and 1.40% on chimneys (MESTECĂNEANU et al., 2012). In 2004, in Brăila County, all identified nests were located on electric poles, in Constanța County, 96% on electric poles and 4% on other supports, in Galați county, 82.35% on electric poles, and 17.65 on trees, and in Tulcea County, 98.43% on electric poles and 1.58% on trees; in Romania, in 2004, the percentages are: 69.96% - electric poles, 3.49% - trees and 6.55% - chimneys; the rest were built on other supports: electric poles with support, roof tops, barns etc. (KÓSA, 2005). The percentage of nests placed on the special supports from the electric poles will increase wherever as the supports will be put on them. The variable percentages of nests placed on the special supports from different areas reflect the supports availability and not the modification of the stork preference for them.

Table 4. The characteristic parameters of the *C. ciconia* population from the ROSPA0073 Măcin-Nicilițel and its proximity.

Parameter	Value
uH	1
HPo	0
HPm	22
HPa	22
H	23
JZG	65
JZa	2.95
JZm	2.95
StD	~ 2.75

Legend:

uH – the number of unoccupied nests;

HPo – the number of nests not bearing chicks;

HPm – the number of nests bearing chicks;

HPa – the number of pairs (nests with pair);

H – the number of nests;

JZG – the number of chicks;

JZa – the average of the number of fledged young per pair related to all number of pairs (nests with pair) of a defined area (JZG/HPa);

JZm – the average of the number of fledged young per pair related to all number of nests bearing chicks of a defined area (JZG/HPm);

StD – the number of pairs (HPa) per 100 km² of a defined area.

A special study of the cohabitants has not been taken into account, but in the nests of *C. ciconia*, there were observed breeding both *Passer domesticus* and *P. hispaniolensis*. 3 nests (13.04%, in Carcaliu, Garvan and Văcăreni, in the north-western part of the area) were used by the latter. The first species is widely spread in Romania, breeding in the house tops, chinks, etc., rarely in trees, and the second is a species that recently entered in the southern parts of Romania, breeding in trees, rarely in stork nests (BRUUN et al., 1999; MUNTEANU et al., 2002). Other species – *Passer montanus* and *Sturnus vulgaris* – can also breed in the nests of white storks (INDYKIEWICZ, 1998). These birds use the nests of stork because they need to be secure. Firstly, because the nests of storks installed on poles are hardly reached by terrestrial predators and, secondly because the adult storks defend the place of the nest against most terrestrial and aerial predators. These things were stated by others authors, too (BOCHEŃSKI, 2005).

CONCLUSIONS

During the census of the white storks performed on 1 – 4 July, 2013, nests of white stork were found in 10 localities (55.55% of whole). The locality with the highest number of nests (7, 30.43% of all) was Turcoaia.

The nests were placed between 7 and 105 m a.s.l. The mean was 19.43 m and most of the nests were situated between 10 and 19 m a.s.l. (12, 52.17%).

The values of JZa and JZm (2.95, each) attest that the population in the area of Măcin Mountains is stable.

Most of the pairs (31.8%) had 3 juveniles, the pairs having between 1 and 5.

Of the 23 identified nests (H), 22 (95.7%) were used (HPa) and 1 (4.3%) was unoccupied (uH).

The density of the pairs/km² (StD = 2.75), a value less than the one registered at national level, reflects the general dry nature of the area.

All the nests were placed on metallic support specially installed on low voltage power poles.

Taking into account the conditions of breeding and feeding, we can say that the species has a good status of conservation in the area.

The census of the white stork is necessary in the future for monitoring the dynamics of the population in the area under the action of both the climate changes manifested at present and the direct human activities (positive or negative).

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