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THE WHITE STORK (CICONIA CICONIA) IN ESTONIA TILL YEAR 2008.

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Summary: The White Stork was registered breeding in Estonia for the first time in 1841 but a permanent population was not established here before the end of the 19th century. Abundance of White Stork in Estonia has constantly continued to grow, and it is estimated that 2003–2008 there was 4000–5000 pairs of White Storks breeding in Estonia. In 2003–2008 there was 1.62–2.39 fledglings per pair, compared to the successful breeders it was 2.07–2.83 fledglings. Increasing amount of stork nests has been built on electric pole, which is more than 70% occupied nests located in 2008.

Introduction

The White Stork (*Ciconia ciconia*) lives almost exclusively in close proximity to people and therefore all of its actions are very well monitored and the change in their population growth has been noted straight away. Thanks to the initiative of Rossitten's Ornithological Station (now Rõbats, Kaliningrad Oblast), international census to assess the status of the White Stork began in 1934 (Schüz 1936). The next international census took place in 1958 (Schüz & Szijj 1962) and since 1974 (Schüz 1979) there has been a census conducted in every 10 years.
Estonia did not participate in the first international census in 1934, but later on, led by Institution of Conservation and Tourism, Estonia conducted the first national census in 1939. In 1954 the ornithological section of Estonian Naturalists' Society began organizing the annual censuses and since 1991 that work has been continued by Estonian Ornithological Society (EOS). For many years the leader for the "stork project" was the legendary ornithologist Heinrich Veromann, whose

book about the White Stork (Veromann 1980) was published in 1980 among the literary series of "Pääsuke". After Heinrich Veromann's death in 1991 the author of the current article continued the coordination of the Estonian Ornithological Society's project about the White Storks.

In recent years, the collected data is not yet thoroughly analyzed, and this summary is intended to provide a more updated overview about the progress of the White Stork in Estonia.

Materials and methods

The population of the White Stork in Estonia is continuously monitored with the assistance of volunteer birdwatchers since 1954. The same year issued a worksheet used to count the nest sites, which has remained largely unchanged until today. The questionnaire asks for information on nest location, where is it situated, the age of the nest and breeding outcome. Questionnaires have been distributed to all interested parties, mainly members of the EOS and different ornithological associations, as well as school pupils and teachers. On the best years, the data has been obtained from more than 350 people. The basis of the questionnaire gives a good estimate of the White Stork's successful nesting rate and analyzes the choice for a nest location. Until the mid-1980s, when the abundance of the White Stork was still relatively low, sufficient data was obtained for the stork's population assessment. Lately the information obtained via questionnaires has been only a relatively small proportion about their nests and because of it in 1994 the precise censuses were started for the smaller areas all over Estonia. Selected sites were small municipalities because the accessible background information on land use and habitat distribution. Accurate censuses were carried out in Estonia in 1994–1998 and nests were counted in 21–35 municipalities per year. The final choices for the specific sites were based the previous information and the presence of observers in the regions. For example, Läänemaa Bird Club collected a relatively complete picture about practically all of the Läänemaa. What exactly set in motion the precise censuses for smaller areas in Estonia is the fact that the author of this article defended his thesis in 1997 in

department of animal ecology at the University of Tartu, about the White Stork's population dynamics and analysis on the methods of the census (Ots 1997) and to collect data necessary for the project was not possible in any other way.

The censuses for the White Stork were included in a national monitoring program in 1994 but as they were becoming a common species the overall yearly counting for nesting sites was no longer considered useful and so it was that in 1999 White Stork was left out of the list of species tracked by national monitoring program. For smaller areas the precise census is now intended to be carried out only once a decade. Organizing questionnaires, however, continued. During 1999–2003 questionnaires and summaries were sent to EOS members and other participants who had been involved with the project in previous years.

In 2004 the EOS chose the White Stork as the bird of the year. Since there was also another international census for the White Storks that year, it was planned to re-accurate census in the smaller areas. Unfortunately, the EOS bird of the year project failed to find funding and was limited to questionnaires. Even in the later years the data collected about the White Stork nests have been through questionnaires and only with the assistance of the EOS members. Although since 2007 there has been no more organized questionnaires distributed, quite a few birdwatchers previously involved in the project, sent a considerable amount of data about the White Storks' nesting for EOS. In the last decade, to estimate the general population of the White Stork in Estonia, the used information has only been data that has been gathered from a few small areas.

Results and discussion

Abundance and distribution of the White Stork

The White Stork is in Estonia so common bird today that it seems unbelievable, considering that it inhabited our regions only slightly more than a century and a half ago. The first registered pair of White Storks dates back to 1841, nesting in the ruins of the castle Vahtseliina

(Hueck 1845). Permanent population in Estonia was established at the end of the 19th century (Veromann 1975, 1990).

First national census (1939) showed that, with Petseri, 320 pairs of White Storks were breeding in Estonia (Kumari 1940). The results show that the number of storks has grown steadily (Figure 1), ranging up to 1400 pairs in 1984 (Veromann 1987, 1989) and in 1995 there was already 2600–3200 pairs (Ots 1997). Preliminary estimates were that in 1985 the abundance of White Storks decreased in Estonia.

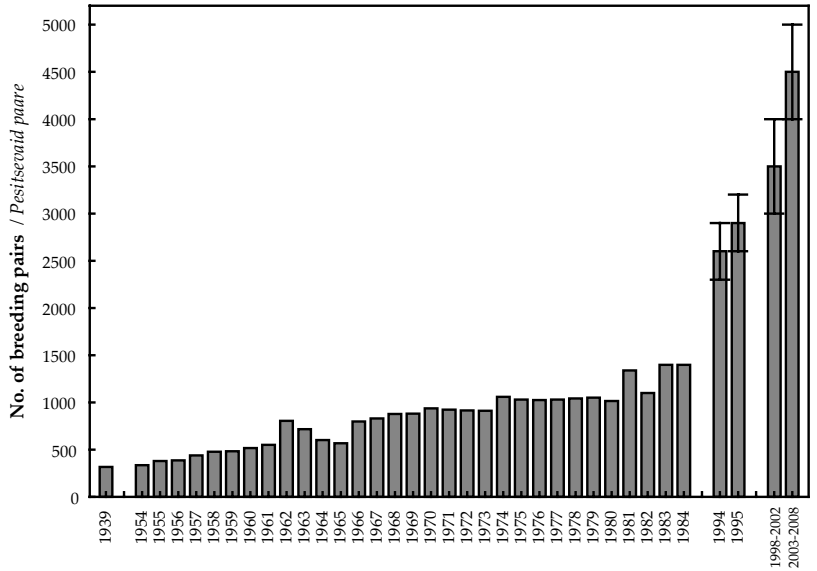

Figure 1. Numbers of White Stork in Estonia in 1939–2008. Numbers since 1994 are rough estimations and whiskers denote minimum and maximum number of breeding pairs.

Joonis 1. *Valge-toonekure arvukus Eestis 1939–2008. Alates 1994. aastast on tegu arvukushinnanguga ning "vurrud" tähistavad minimaalset ja maksimaalset pesitsevate paaride arvu.*

Actually, this was not the case, because in 1984 an international census was held and it provided a relatively good data about the progress of the White Storks. However, in the following years the census was not as comprehensive, less information was received and as

a result estimated numbers were a lot smaller than the actual numbers. In 1994–1996 census found a number of nests that existed already in 1985 but which at that time simply were not discovered. Presumably even the numbers done in 1985 are at least 5% underestimated, because later on, a relatively high number of old nests have been found that have not been registered previously. The significantly higher numbers done in 1994 and 1995 also refer to steady population growth of the White Stork during the mid-1980s. It is unlikely that their population size doubled in just a few years. It was rather a long-term and relatively steady process. The second half of 1990s and 2000s has seen continuous increase in the abundance of the White Stork. Over the period of 1998–2002 the size of the White Stork population in Estonia was 3000–4000 pairs and during the years of 2003–2008 was estimated at 4000–5000 pairs.

The rapid increase in the numbers of White Storks can be explained by the fact that Estonia is on the border range of their natural distribution and here are still many suitable habitats left. It is highly unlikely that the numbers have increased due to breeding success of Estonian White Storks.. It is likely that there's been immigration from the southern areas, even though the factual verification (ringing data) has not been found.

Recent data shows that the abundance of White Storks has grown not only in Estonia. International census in 1984 estimated population size to 135 000 pairs of White Storks throughout the entire area and then predicted their rapid decrease because compared to the census in 1974 the population had dropped by 20% (Boettcher, Streim & Schüz, 1989; Rheinwald 1989). But in 1994–1995 the population of White Storks was estimated up to 166 000 pairs (Schulz, 1999) and in 2004–2005 circa 231 000 pairs (Thomsen 2008). The results also indicate that the White Stork is expanding its distribution towards east and its numbers have increased in Russia, Belarus and Ukraine rapidly. Also have numbers started to rise in Western Europe (Spain, Portugal, and France) steadily.
The White Stork is not homogeneously dispersed in Estonia. Number of storks in southern Estonia is bigger than in northern Estonia. White

Stork population density in southern Estonia is in some cases more than 25 pairs per 100 km^2. Uneven distribution can be explained by the fact that the stork moved to our region relatively recently. Mere half a century ago a White Stork's nest in the northern coast of Estonia was a rare sight and the most remote areas in north-eastern Estonia were inhabited by storks only in the recent decades.

The White Stork rarely breeds on the islands of the western Estonia. Although it is common to see stork during the migration in Saaremaa, only two pairs breed there permanently at the end of the 1990s. Since 2003, however, already 6 nest sites were known and for 2008 the number of breeding pairs had increased to ten (Mati Martinson's personal data). For a couple of times in the last few decades, the White Storks have been trying to nest in Hiiumaa but so far with no success (Leho Aaslaidi and Ivar Ojaste data). There is one known attempt to nest in Vormsi in 1986 (Tiit Randla data). The White Stork is a relatively faithful to its breeding sites and the settlement of new areas is therefore quite slow.

Accordingly to solid and continuous growth of the White Storks, a question arises – what can be the maximum number of Estonian White Storks? The White Stork does not form breeding colonies in Estonia, so we can compare Estonian stork breeding density with Latvia, because already a bit more south from Latvia, this species also forms breeding colonies. In northern Latvia the population density for the White Storks is 10–15, but in southern regions even over 40 pairs per 100km^2 (Janaus & Stipniece 1989, Янаус и Стипниеце 1992). The average densities in southern Estonia and northern Latvia are approximately equal. Since the density of the White Stork has increased rapidly in recent decades in southern Estonia, it can be assumed that in most favourable areas (meadows) the population density may increase 30–40 pairs per 100 km^2 in Estonia. Considering this, the number of the White Storks could even be doubled in Estonia.

Breeding success

Number of fledged young in White Storks nest is most commonly 2 or 3, less rarely 1 or 4 and in good years sometimes even 5 (Table 1). During the recent decades there was found one nest with 6 fledglings. Breeding success was on the average 1.62–2.39 fledglings per pair and for the successful breeding pairs 2.07–2.83.

Table 1. White Stork's breeding success in 1985–2008.
Tabel 1. *Valge-toonekure pesitsusedukus 1985–2008.*

Aasta *Year*	**n**	**Lennuvõimestunud poegade arv** *No. of fledglings*							**JZa**	**JZm**
		0	1	2	3	4	5	6		
1985	653	96	30	177	240	101	9	-	2,38	2,79
1986	812	128	57	206	271	136	14	-	2,33	2,77
1987	640	107	33	172	197	118	12	1	2,35	2,83
1988	789	213	78	249	190	50	9	-	1,76	2,41
1989	737	106	41	205	257	113	15	-	2,37	2,77
1990	558	121	37	180	188	29	3	-	1,96	2,50
1991	519	109	42	179	148	40	1	-	1,94	2,46
1992	646	125	77	285	134	25	-	-	1,78	2,21
1993	657	73	77	331	164	12	-	-	1,95	2,19
1994	968	167	139	448	197	17	-	-	1,75	2,11
1995	897	121	93	391	246	43	3	-	2,01	2,32
1996	957	90	74	437	316	36	4	-	2,15	2,38
1997	880	212	90	407	160	11	-	-	1,62	2,14
1998	882	107	67	290	303	104	11	-	2,30	2,62
1999	243	31	14	101	71	26	-	-	2,19	2,51
2000	756	92	76	355	212	18	3	-	2,00	2,27
2001	795	103	49	311	246	81	5	-	2,21	2,54
2002	465	92	66	223	75	9	-	-	1,66	2,07
2003	408	65	44	174	111	14	-	-	1,91	2,28
2004	621	41	36	243	242	56	3	-	2,39	2,56
2005	142	17	13	55	48	8	1	-	2,14	2,43
2006	117	19	12	55	26	5	-	-	1,88	2,24
2007	236	33	26	93	75	8	1	-	2,01	2,33
2008	157	13	19	83	38	4	-	-	2,01	2,19

JZa – average number of young including unsuccessful nests / *keskmine lennuvõimestunud poegade arv kõigi paaride kohta.*
JZm – average number of young in successful nests / *keskmine lennuvõimestunud poegade arv edukate paaride kohta.*

1985–1996 breeding data shows some decline in the breeding success (the number of young per pair) (Ots 1997). Inclusion of subsequent years to longer-term comparison of data, however, does not show significant changes (Figure 2). To the relatively good years in the second half of 1980s, followed by a few bad years in the first half of 1990s formed the basis of the opinion that the overall breeding success has decreased. In fact, the White Stork's breeding success depends strongly from year. If the feeding period in June-July clashes with a bit longer draught period, there is not enough food for young and a many of them die. Extended cold snaps during the beginning of the breeding period in April and May can cause some pairs to skip breeding for the year. In the bad years, even a quarter of the storks may remain without progeny (*eg*. 1997).

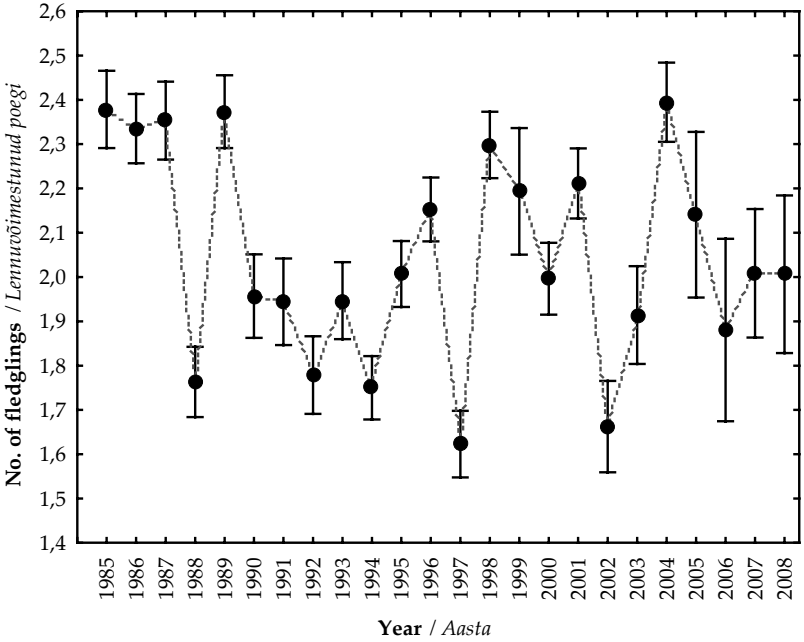

Figure 2. Number of fledglings of all breeding White Stork pairs in Estonia 1939–2008 (whiskers denote 95% confidence interval).

Joonis 2. *Valge-toonekure keskmine lennuvõimestunud poegade arv kõigi paaride kohta aastatel 1985–2008 ("vurrud" tähistavad 95% usalduspiire).*

Selection of nest site

Analysis showed that the White Storks have increasingly started to nest on electric poles (Figure 3). In 1939 93% of the White Stork nests were located on trees and the rest on various buildings (Kumari 1940). When in 1958 there was still 90% and in 1974 86% of the nests on trees (Veromann 1980), then in 1984 the situation was already changed: 68% on trees, 20% on the buildings and 12% of the nests on electric poles (Veromann 1987). In 1994 and 1995 there were already 41% of the nests on electric poles (Ots 1997). Ten years later, in 2004, more than half (53%) of the storks had made their nests on electric poles. Based on a relatively small sample size in 2008 (157 occupied nests), there were 72% of White Storks nests on electric poles (to 113 nests on electric poles are included also 10 specially made nest bases for storks).

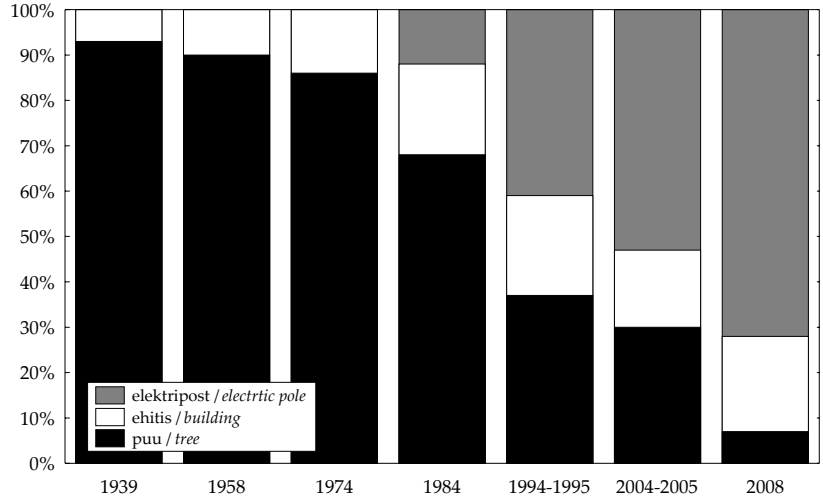

Figure 3. Nest locations of White Stork.
Joonis 3. *Valge-toonekure pesade paiknemine.*

Why do an increasing number of White Storks nest on electric poles? One obvious reason would be that with the increase of stork population there's a lack of suitable nesting sites. Other suitable nesting sites are already occupied and the electric poles offer a possibility of building a new nest. It is a very suitable and stable location for a nest. It should also be attributed to the fact that in recent decades there has been only very few artificial nest bases installed to trees (or anything else). When the nest has fallen down from tree, generally the new base will not be made and the birds move on electric poles, which is a firm and more suitable for nest.

The nests on electric poles are problem for humans because the nests may cause a short-circuits and line damages that are proven to be very costly to fix. In some places "Eesti Energia" has taken the old nests from the electric poles and put them on bases on new poles but do to high nest site fidelity, not all the new nests have been recognized straight away.

Acknowledgments. White Stork project has involved hundreds of birdwatchers for many years, a big thanks to everyone for their help and involvement.

Valge-toonekurg (C*iconia ciconia*) eestis Aastani 2008.

Kokkuvõte: Valge-toonekurg registreeriti Eestis esmakordselt pesitsemas 1841. aastal, püsiv asurkond tekkis siia alles 19. sajandi lõpuks. Valge-toonekure arvukus on Eestis pidevalt kasvanud, aastatel 2003–2008 pesitses Eestis hinnanguliselt juba 4000–5000 paari valge-toonekurgesid. Valge-toonekurgedel lennuvõimestus aastatel 1985–2008 keskmiselt 1,62–2,39 poega paari kohta, sama näitaja edukalt pesitsenud paaride lõikes oli 2,07–2,83. Järjest rohkem toonekurgesid pesitseb elektripostidel, 2008. aastal asus postidel juba rohkem kui 70% asustatud pesadest.

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