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A CONTRIBUTION TO THE MIGRATION OF THE WHITE STORK (*CICONIA CICONIA* (L.)) ALONG THE BULGARIAN BLACK SEA COAST

BOYAN MILCHEV, ANTON KOVACHEV

Department of Zoology, Faculty of Biology, University of Sofia, 8 Dragan Tsankov Blvd, 1421 Sofia

Data on the White Stork migration in the region between the Burgas lakes and the Bulgarian-Turkish border are presented. Spring passages from the beginning of March till the mid-May were observed. Flocks up to 250, most probably not breeding, birds were detected till the middle of June. A considerable bird flow passed over the town of Malko Tarnovo during the autumn.

Key words: White Stork, migration, Strandja mountain, Western Black Sea Route.

The White Stork is the most numerous soaring migrant on the West Black Sea passage (Мичев, 1984). The research on its migration in Bulgaria enables us to follow the changes in its numbers in the eastern part of Europe, to outline the basic migration routes and the sites where the birds rest and stay overnight. This information is used to work out programs for the preservation of the White Stork and for the needs of the aviation.

The main peculiarities of the autumn migration of this species in Bulgaria: numbers, period, routes of the flocks, etc., are noted by Мичев, Симеонов (1981), Мичев (1984) and Мичев и др. (1987). The information has been gathered by visual-radar methods. South of the Burgas Lakes only few visual observations have

been carried out and the slowly soaring flocks were usually near the radar station at the Ropotamo river. The data on the spring migration of the White Stork in the region are far more scarce (Простов, 1964; Roberts, 1979, etc.).

The purpose of this research is to complement the data about the autumn routes of the White Stork, the period of its spring routes and to follow to what extent the spring and the autumn routes in the region of the Burgas Lakes and the Bulgarian-Turkish border coincide.

MATERIAL AND METHODS

The research on the spring migration of the White Stork was carried out by weekly touring in the region of the three Burgas lakes (Atanassovo Lake, Vaia and Mandra) during March-June 1987 period (21 days). During these field researches the Bulgarian part of Strandja Mountain was toured too (1988-1992 — 232 days). The information about the autumn migration of the White Stork was gathered mainly by stationary observations: the town of Malko Tarnovo (17-25.08; 27-29.08; 01-05.09; 10,11.09.1988; 10-13.08.1989 — totally 23 days), the locality of Kovatch (03,06.09.1988; 09,27.08.1989 — 4 days totally), the locality of Katchul (23,30,31.08; 03,12-14.09.1988 — 7 days totally), the locality of the Thracian camp (07-09.09.1988; 21-24.08.1989 — 7 days totally) and the dam of Malko Sharkovo (15-18.08; 28,29.08.1989 — 6 days totally). The first four sites were attended because in this region the route divides into two to beset the highest hill of the Strandja Mountain — the Mount Machiada (1031 m). The radar observations of Мичев (1984) show no concentration of flocks at these localities. We ascertained a spring migration of the White Stork at the dam of Malko Sharkovo and that is why we chose it to be one of our observation points during the autumn migration in 1989.

The method we used is fully described by Мичев, Симеонов (1989), Мичев (1984) that is why we shall not dwell on it in this paper. We used it during five autumn migration periods at the Atanassovo Lake and cape Emine. During the observations we used binoculars 8 x 40 and 8 x 30 and an optical monocular x 20.

RESULTS AND DISCUSSION

Spring passage. During the observations we ascertained 41 flocks in flight and 18 flocks landed for sleeping, resting or feeding due to adverse migration weather (Fig. 1). Table 1 shows the summarized data on the flocks divided into three groups according to the information about the periods of migration known so far. Простов (1964), Roberts (1979), Дончев (1980) report a migration period from March to mid-April. Thiollay (1968) and Roberts (1979) report a second spring passage till mid-May, which was supposed by Симеонов и др. (1990) to be a separate phenomenon. Our observations actually proved the duration of the spring passage from March till mid-May.

In the regions with lower altitude Симеонов и др. (1990) report wandering flocks numbering to about 100 and even more birds. The flocks observed in

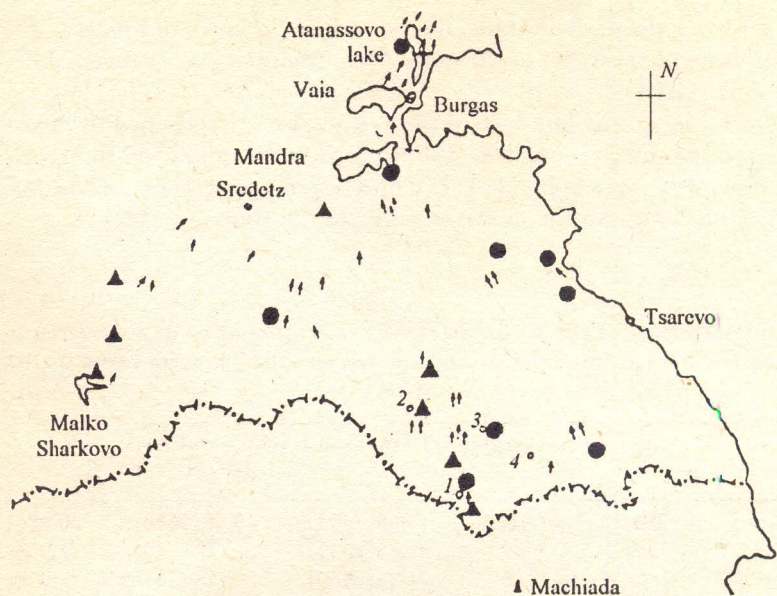


Fig. 1. Spring migration of the White Stork: (↑) — a flock in flight; (▲) — a sleeping flock up to 99 birds; (●) — a sleeping flock of 100 to 500 birds; (+) observation point at Atanassovo Lake

1 — observation point, Malko Tarnovo; 2 — observation point, Kovach; 3 — observation point, Thracian camp; 4 — observation point, Katchul

Table 1

Number of birds and flocks of the White Stork (*Ciconia ciconia*) during the spring passage between the Burgas Lakes and the Bulgarian-Turkish border (1987–1992)

Counts of birds and flocks	From March to mid-April	From mid-April to mid-May	From mid-May to mid-June	Total
Counts of birds	3922	2037	614	6573
Counts of flocks	29	21	9	59

May should be included into this group. We recorded their presence in Strandja Mountain, which is not a suitable place for wandering of the White Stork. Storks behaved as migrants on the main passage in Bulgaria. Three of the flocks contained between 100 and 250 birds. After the end of the spring migration — since mid-May till mid-June (18.06.1991), on the main migration route in Bulgaria, flocks of most probably not breeding birds were seen on their way northwards.

The flocks flew in a wide front, as during the autumn passage, and narrowed in the region of the Burgas Lakes (Fig. 1). There were some differences in the width of the passage which in spring expands to the west. These were flocks we

registered between the dam of Malko Sharkovo and the town of Sredetz. They flew over the lowering of the relief of Strandja Mountain and the Derevent hills to the north and northeast.

Autumn passage. The numbers of the White Stork determined in the first four observation points are presented in Table 2. Autumn migration in the region of Malko Sharkovo Dam was not recorded. This confirms the records of Мичев (1984) for the width of the migration passages south of the Burgas Lakes.

Table 2

The autumn migration of the White Stork (*Ciconia ciconia*) by days over the town of Malko Tarnovo, the localities of Kovach, Katchul and the Thracian camp in 1988 and 1989

Observation point	Year (total count)	Date, month (counts of birds)		
Malko Tarnovo	1988 (32 816)	18.08(2393), 21.08(3532), 24.08(6430), 28.08(26), 03.09(238)	19.08(1650), 22.08(743), 25.08(1219), 29.08(3085), 04.09(8), 10.09(51), 11.09(80).	20.08(7316), 23.08(550), 27.08(15), 01.09(5480)
	1989 (3162)	10.08(210), 11.08(356), 13.08(2576)		
Kovach	1988 (214)	03.09(214)		
Katchul	1988 (412)	23.09(412)		
Thracian camp	1989 (2356)	22.08(1970), 23.08(386)		

There was no conformity in the site of the flocks and White Stork number in our records with those taken at the Atanassovo Lake (Мичев, 1984). During our observations in 1988 at the town of Malko Tarnovo we recorded 32 816 birds in 87 flocks, which is only 77% of the total number of birds registered at the Atanassovo Lake for the same period of time.

The graphics of the number of the White Stork in hours at the town of Malko Tarnovo (Fig. 2) shows that the sleeping flocks in the region of the Burgas Lakes are not the major part of those passing over the town. A peak in the number of the passing birds between 12 and 1 p.m. was noticed (it includes 32.4 % of their total number). Having in mind the average speed and time of departure (Мичев, 1984), these were flocks which stay overnight about 150 km north of the observation point. These sites are located around a semibow that passes through the towns of Pliska-Valchi dol-Varna. The flocks reached the Burgas bay when minimum flow was recorded over the Atanassovo Lake (10–11 a.m.) The breeze was slight and they passed through the bay instead of detouring it. Мичев (1984) registered flocks, most probably of the White Stork, by radar on their way across the bay. A part of them prepared to beset the mount of Machiada from west and these are probably the flocks that we observed at the town of Malko Tarnovo.

The main direction of the passage over the town of Malko Tarnovo is southeast — 87.7 % of the flocks ($n = 100$). This is the direction that the radar-traced flock

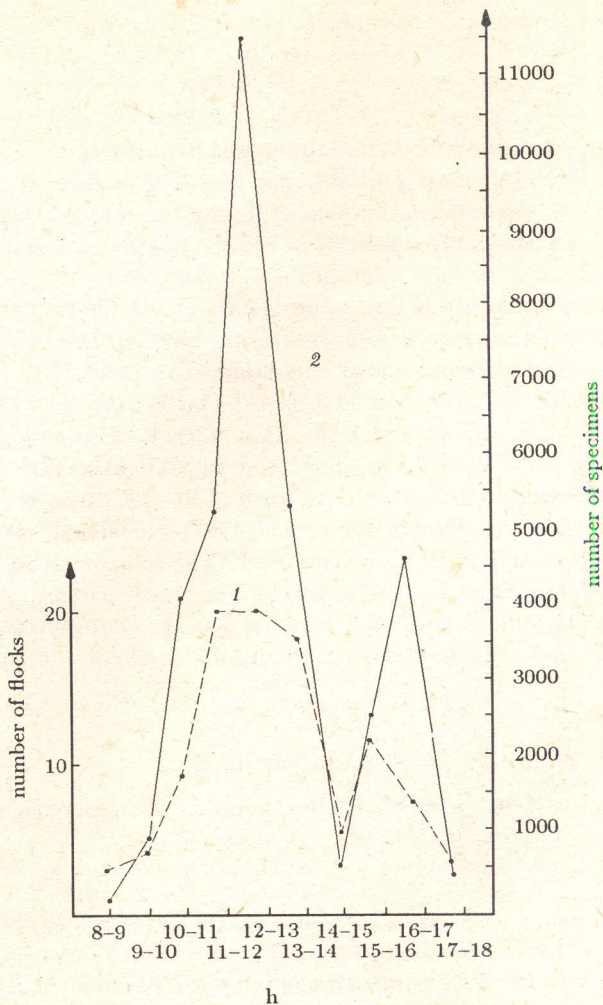


Fig. 2. Total number of birds and flocks of the White Stork at different hours of the day during the autumn migration over the town of Malko Tarnovo (1988-1989)
 1 — number of flocks; 2 — number of birds

follows (Мишев, 1984). To south a move of 8.7 % of the flocks was recorded and to southwest — 3.8 %. All of the flocks observed over the localities of Katchul and the Thracian camp flew south-southeast and the ones observed over Kovach — southward.

The height of the flight of 58.8 % of the flocks over the town of Malko Tarnovo ($n = 97$) is 500-999 m, of 27.3 % of the flocks — 0-499 m, and 13.4 % — 1000-1500 m. The dominant part of the flocks fly higher than they do in the region of the Atanassovo Lake (Мишев, 1984). We presume that this is determined by the

relief of the region the birds pass over.

CONCLUSION

The spring passage of the White Stork was noted from the beginning of March till mid-May. Flocks of most probably not breeding birds continued their way to the north along the main migration route till mid-June (18.06.1991). The migration passage over the Standja Mountain extended westwards and as during the autumn migration it narrowed in the region of the Burgas Lakes.

In autumn a considerable flow of birds passes over the town of Malko Tarnovo. It consists of flocks that pass across the Burgas bay and that is why they were not recorded at the observation point at the Atanassovo Lake. The rush hour appears to be between 12 and 1 p.m. when 32.4 % of the birds pass. The prevailing direction of the migration is southeast (87.7 % of the flocks). The height of the flight for 58.8 % of the flocks is 500–999 m. The most suitable observation point for future stationary researches appears to be the town of Malko Tarnovo.

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