

Occurrence and passage of Wood Sandpiper *Tringa glareola* and Green Sandpiper *Tringa chloropus* on the Dravsko polje, north-eastern Slovenia

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This paper describes the occurrence of the Wood Sandpiper and the Green Sandpiper in north-eastern Slovenia in 1984-1997. The Wood Sandpiper is a regular migrant between March and September, whereas the Green Sandpiper is present throughout the season. The differences between years in both species is significant whereas between months it is not (Kruskal-Wallis test). Both species are dependent during migration on drained ponds and reservoirs (66% of *T. ochropus* and 85% of *T. glareola* respectively).

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INTRODUCTION

The Wood Sandpiper *Tringa glareola* and the Green Sandpiper *Tringa ochropus* have been studied extensively on the breeding grounds in northern Europe (e.g. Glutz Von Blotzheim *et al.* 1977, Cramp & Simmons 1983 and references therein). On the other hand, little quantitative information is available from migration in Central Europe, although breeding biology in this region has received more attention (e.g. Kraatz & Beyer 1982, Kraatz & Beyer 1984, Zdarek 1994, Zavdil 1995). Therefore, the aim of the present article is to describe the occurrence and migration pattern of both species in north-eastern Slovenia.

STUDY AREA

Dravsko polje (about 210 km²) is located in north-eastern Slovenia (approximately 46°25'N, 15°45'E; Figure 1) and is one of the largest agricultural areas in the lowland part of Slovenia. Throughout the country there are also numerous man-made water bodies (i.e. fish ponds, reservoirs, gravel pits) small towns and villages. The most important standing water bodies in this area for waterbirds are fishponds (Race), reservoirs (Pozeg and Medvedce), and some gravel pits. Most flowing waters are canals and regulated streams.

The area belongs to the sub-Pannonic phytogeographical area (Marinèk 1987) and the climate is moderately Continental (Furlan 1990). A detail description of the study area and habitats has been given elsewhere (Vogrin & Orgo 1995, Vogrin 1996, Vogrin 1997a, Vogrin 1997b).

METHODS

Data were collected between 1984 and 1997 during all months. Field data for the Wood Sandpiper and the Green

Sandpiper were gathered during censuses at different localities and habitats throughout the study area. Censuses and visits to localities were randomly chosen throughout the study. In general, it was possible to avoid disturbing birds during censuses. However, occasionally sandpipers were flushed during counts. Usually, complete counts were obtained before the birds flew and often it was possible to see where they went (e.g. in complex of Race ponds), thus avoiding double-counting. Data from the river Drava (on the border with the study area) are not taken into account in this study.

All statistical tests were performed with the SPSS 6.0 statistical package, and a nonparametric Kruskal-Wallis one-way ANOVA test was carried out (Sokal & Rohlf 1995) to compare numbers recorded in different months and years.

RESULTS

Wood Sandpiper *Tringa glareola* and Green Sandpiper *Tringa ochropus* are two of the most abundant species of nonbreeding shorebird on the Dravsko polje during migration (pers. obs.). Over the whole study period both species used drained ponds and reservoirs more often than other habitats for feeding and resting (Table 1).

Table 1. The usage of habitat types (in %) by *Tringa ochropus* and *Tringa glareola* within the study area during 1984 -1997.

	drained ponds and reservoirs	other water bodies	arable lands
<i>Tringa ochropus</i>	66	27	7
<i>Tringa glareola</i>	75	21	4



Green Sandpiper *Tringa ochropus*

Green Sandpipers are regularly observed throughout all seasons, however during late autumn and winter they become much more rare. Only occasional migrants are observed in June. The first migrants usually appear in the first week in March. Peak numbers in spring occur in May, whereas the autumn migration is less pronounced (Figure 1). Nevertheless the differences between months in average numbers of observed individuals was not significant (Kruskal-Wallis test, Chi-square = 8.90, df = 5, $P > 0.05$). The difference was not significant even between spring months (Kruskal-Wallis test, Chi-square = 5.63, df = 2, $P > 0.05$). The largest number counted in one day was 79 in May 1986.

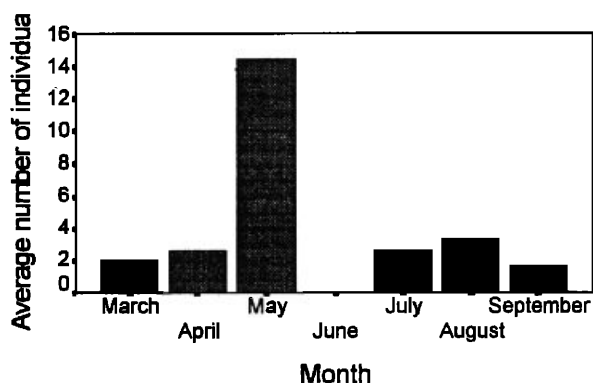


Figure 1 Migration pattern of the Green Sandpiper *Tringa ochropus* on the Dravsko polje in the northeastern Slovenia in different months.

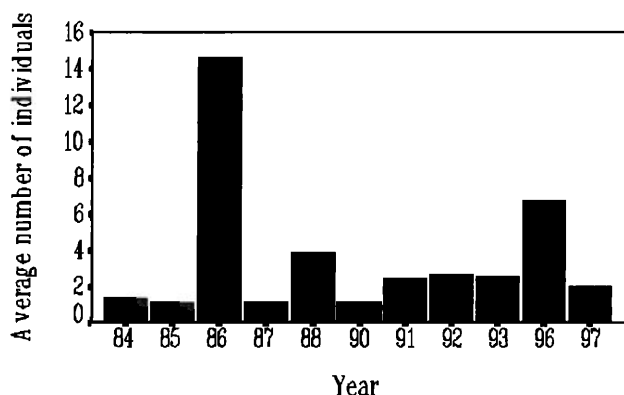


Figure 2 Migration pattern of the Green Sandpiper *Tringa ochropus* on the Dravsko polje in different years.

The average numbers of migrants in different years is present in Figure 2. The largest average number of Green Sandpipers was observed in 1986. The differences between years in average numbers of observed individuals was highly significant (Kruskal-Wallis test, Chi-square = 25.92, df = 10, $P < 0.005$).

Wood Sandpiper *Tringa glareola*

Wood Sandpipers on the Dravsko polje are recorded between March and September. The first migrants in spring appear in March, but a larger-scale migration starts in April (Figure 3). During the autumn, the Wood Sandpiper is a regular migrant in smaller numbers. In spite of this difference, there was no difference in numbers between months (Kruskal-Wallis test,

Chi-square) = 6.17, df = 5, $P > 0.05$). The highest daily count was 54 in April 1993.

More pronounced migration took place in 1984, 1993 and 1996 (Figure 4), but the exact reasons for this are unknown. The differences between years was significant (Kruskal-Wallis test, Chi-square = 19.95, df = 10, $P < 0.05$).

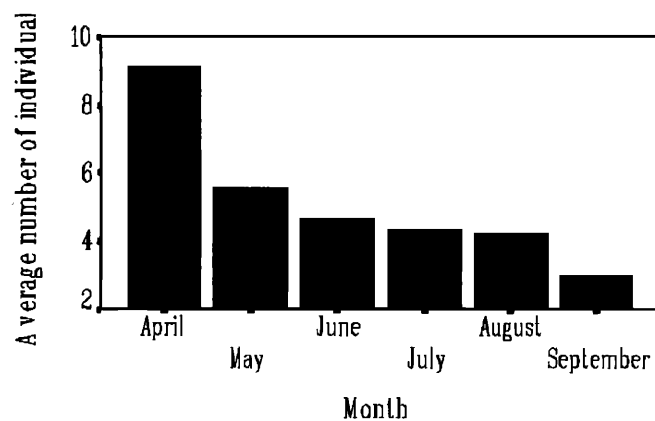


Figure 3 Migration pattern of the Wood Sandpiper *Tringa glareola* on the Dravsko polje in the northeastern Slovenia in different months.

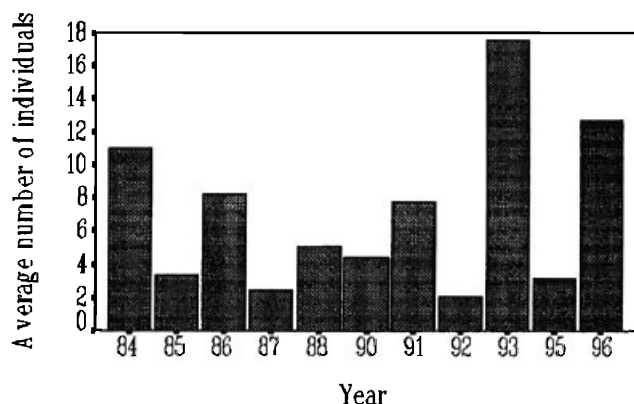


Figure 4 Migration pattern of the Wood Sandpiper *Tringa glareola* on the Dravsko polje in different years.

DISCUSSION

For both species it is well known that birds migrate on a broad front across Europe (e.g. Cramp & Simmons 1983, Colston & Burton 1988). We must also take into account that both species also migrate during the night (Zalakevičius *et al.* 1995) and thus the numbers of both species are surely underestimated. There is little relevant previous work with which to compare the results of the present study, although where comparisons are possible, the articles present data from only one or two seasons. According to Cramp & Simmons (1983) and Colston & Burton (1988), spring passage of the Green Sandpiper begins in March and is completed in May. In my study area this is only partly true; on the Dravsko polje, peak spring passage of Green Sandpipers occurred in May. In autumn, the main passage period is in July and August (Cramp & Simmons 1983), and this is true of my study area as well.

The number of individuals of both species occurring on the Dravsko polje was similar to the results obtained by Musil



(1995) on fishponds in the Trebon basin, Czech Republic between 1988 - 1995. In Vojvodina (northern part of Serbia), the Green Sandpiper was also a regular migrant between 1966-1974 (Dimitrijević 1977). Spring migration in Vojvodina is less pronounced than on the Dravsko polje. On the other hand, in Vojvodina autumn migration is in two waves: the main one during August, and the second one during October (Dimitrijević 1977). Nevertheless the average number of individuals per month is similar or even a little lower than that on the Dravsko polje.

The Wood Sandpiper in Vojvodina and in Seewinkel (Austria) reached peak numbers in spring, during late April or early May respectively (Dimitrijević 1977, Winkler & Herzig-Straschil 1981), similar to my results. During autumn migration, in Vojvodina, peak numbers occurred during July or in mid August. However in north-eastern Slovenia this species migrates throughout the autumn without any noticeable peak (see Figure 4). The highest daily count in Vojvodina was up to 600 individuals in July (Dimitrijević 1977), however the average number of individuals throughout the season is similar on Dravsko polje. Kmecl & Rifiner (1993) present data for Wood Sandpiper passage through Lake Cerknica (south-west Slovenia) for 1991 and 1992. However, the authors present maximum Wood Sandpiper numbers per pentad, so a direct comparison is not possible.

The key factors which influence habitat selection by migrant waterbirds during the nonbreeding season are availability of food, safe roosting sites and the extent of disturbance (e.g. Myers 1984, Ens *et al.* 1990, Ens *et al.* 1994). On the Dravsko polje there are numerous water bodies, especially fish ponds, which serve as feeding and roosting sites for many waterbirds (Vogrin pers. obs.).

Water level fluctuations are a dominant feature in wetlands and can determine wetland use by waterbirds through effects on food availability (e.g. Kushlan 1989, Ntiamoa-Baidu *et al.* 1998). When the water level falls, aquatic prey become more concentrated and thus more available, especially for those species which prefer shallow water, e.g. for Green and Wood Sandpipers (Cramp & Simmons 1983, Ntiamoa-Baidu *et al.* 1998). Habitats where water levels fluctuate periodically on the Dravsko polje are fishponds and other water bodies which serve as extensive fish farms (e.g. reservoirs). Every year (usually from March - May and/or between September - November), some ponds are drained and the fish are harvested with the use of a seine net over a number of days. The ponds are reflooded with water from the neighbouring pond or canals. The partial spring and/or autumn drying of fishponds therefore positively influences the numbers of migrating waders (see also Bukacinska *et al.* 1996). In my study area this was the case for Green and Wood Sandpipers, which are highly dependent on drained ponds and reservoirs. On the other hand, the fact that, during these seasons, flowing water sites are fully vegetated, with little exposed mud or open

shallow water, and as such are of little interest for sandpipers (Smith *et al.* 1992) should be taken into account.

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