

Migration of Garganey *Anas querquedula* and Teal *Anas crecca* in north-eastern Slovenia

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Abstract

Migration patterns and occurrence of Teal *Anas crecca* and Garganey *Anas querquedula* were studied in the fishpond complex Racki ribniki (35 ha) in northeastern Slovenia between 1985 and 1996. Peak numbers of Teal in spring occurred in February and in autumn during November. Spring peak numbers of Garganey occurred in April, whereas in autumn the migration was less pronounced. During the spring migration the differences in numbers between months were highly significant. In spring, males

were significantly more common than females. Comparisons with other localities in Slovenia showed that the Racki ribniki ponds are important sites for both species during migration.

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Introduction

The Teal *Anas crecca* breeds mainly in the northern part of Europe, whereas the Garganey *Anas querquedula* is distributed through the whole of Europe (Cramp & Simmons 1977, Hustings & Poysa 1997, Farago & Zomerdijk 1997). The Teal winters mainly in the south-west and south-east of Europe, and the Garganey chiefly in sub-Saharan Africa (e.g. Cramp & Simmons 1977, Harrison 1982). During migration both species occur elsewhere but data of their occurrence and migration patterns are rather scarce. The aim of the present paper is to present migration patterns of both species in north-eastern Slovenia during 12 years of the study.

Study area

The study area was situated on Dravsko polje in lowland north-eastern Slovenia (approximately 46°25'N, 15°45'E). The main land-use was intensive arable farming, the principal crops being maize, sugar beat, wheat and potato. The density of the human population in the investigated rural districts is about 190 residents per km². The area belongs to the sub-Pannonic phytogeographical area (Marinček 1987). The climate is modified Continental: mean

annual precipitation is 1000 mm and average temperature +8 °C. See Furlan (1990) for more information.

The data for this study were gathered on Racki ribniki (fishpond complex, 35 ha). They comprise three large ponds (covering from 4.5 ha to 20 ha) which are managed for semi-intensive fish-farming. The fish ponds were regularly drained in early spring or in autumn for a few weeks for fish harvested with the use of a seine net over a few days. The ponds are reflooded with water from a neighbouring pond or channel. The belt of vegetation (mainly in the largest pond), up to 30 m wide, is composed mainly of *Typha angustifolia* and runs mostly along the northern shore. The other dominant plant species are *Nymphoides peltata* in the largest pond, *Polygonum amphibium* in the middle pond and *Trapa natans* in the smallest pond. The ponds are eutrophic. The surrounding landscape consists mainly of mixed forests and meadows with hedges. Racki ribniki and its vicinity are protected as a Landscape park (for further details see Vogrin 1997, Vogrin & Šorgo 1995).

Methods

Field data for the Teal and Garganey were gathered by direct counts of the whole fishponds complex

from 1985 through 1996 with up to 10 observation days (usually between 4–7) each month. In order to investigate sex-specific differences during migration the birds were divided into males and females. However, only for the Garganey was it possible to collect enough data for statistical analyses.

Statistical analyses were performed with non-parametric tests (Chi-square, Kruskal-Wallis 1-Way Anova and Mann-Whitney U-test), since data were not normally distributed (Sokal & Rohlf 1995). All statistical tests were performed with the SPSS 6.0 statistical package.

Results

The Garganey is one of the most common *Anas* species observed at Race ponds during migration. In spring the first migrants appear in early March, but a more massive migration starts from the end of March and continues to the end of April. In autumn, the Garganey migrates in smaller numbers throughout autumn (Figure 1). The difference in numbers between March and May is highly significant (Kruskal-Wallis 1-Way Anova test, Chi-square = 15.7, $df = 2$, $P < 0.0001$). In spring, from March to May, males dominate the passage (Table 1). In autumn too few specimens were sexed to allow calculation of sex ratio. At this time the eclipse male is hardly distinguishable from females and juveniles (see Harris et al. 1990).

The Teal was observed between September and April (Figure 2). The peak period occurred in February in spring and in November in autumn. I divided the Teal records into three categories: wintering (December–January), spring migration (February–April) and autumn migration (September–November).

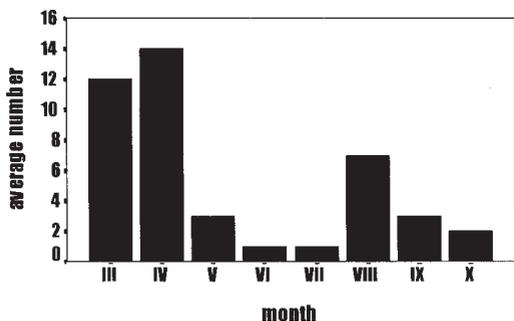


Figure 1. Average number of the Garganeys *Anas querquedula* during each month between 1985-1996.

Medeltalet årtor varje månad under perioden 1985-1996.

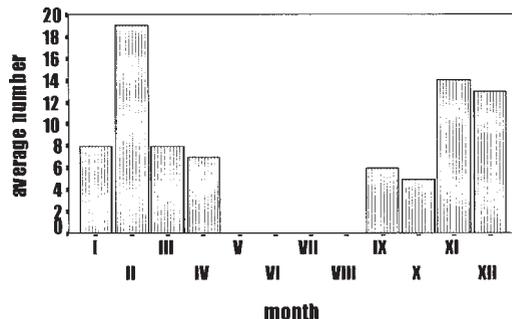


Figure 2. Average number of Teals *Anas crecca* each month between 1985-1996.

Medeltal krickor varje månad under perioden 1985-1996.

ber). The differences in numbers between December and January (Mann-Whitney U test, $U = 4.0$, $P > 0.05$) and between autumn months (Kruskal-Wallis 1-Way Anova test, Chi-square = 2.52, $df = 2$, $P > 0.05$) were not significant, whereas the differences between spring months were significant (Kruskal-Wallis 1-Way Anova test, Chi-square = 6.1, $df = 2$, $P < 0.05$). Only during three years (1984, 1988, 1991: December, January), the variation in numbers was large and highly significant (Chi-square test = 87.2, $df = 2$, $P < 0.0001$).

Discussion

From the results presented above it is clear that both species are regular and mostly abundant during migrating through Race ponds. There is little relevant previous work with which to compare the results of the present study. In most cases the studies comprise only one year of field work or the study areas are much more to the north (Zalakevicius et al. 1995) or to the west (Asensio & Carrascal 1992).

Nevertheless, if I compare my results with results from Bibic (1988), who studied waterbirds on large reservoirs in north-eastern Slovenia during winters between 1983 and 1988, we can see that both species are much more common and abundant on Race ponds. Data from spring and autumn migration in Slovenia are scarce or mainly based on qualitative data (see e.g. Sovinc 1990, Škornik et al. 1990, Trontelj 1992, Kmecl & Rizner 1993, Vogrin 1996). According to these data, we can conclude, however, that both species occurred in significant numbers on the Rače ponds in comparisons with other localities in Slovenia.

The peak period of the Teal in Poland and in

Table 1. Sex ratio of the Garganey *Anas querquedula* during spring migration on the Rače ponds in north-eastern Slovenia.

Könsvot för årtal under vårflyttningen i Rače fiskdammar i nordöstra Slovenien.

Month <i>Månad</i>	males : females <i>hanar : honor</i>	Chi-square test	P <
March	2.47 : 1	21.18	0.001
April	1.35 : 1	8.6	0.001
May	4.5 : 1	13.4	0.0001

Croatia occurs in March (Kot 1986, Kralj et al. 1998), as in the Czech Republic, whereas the autumn peak period in the Czech Republic occurs in September (Pecl 1992, Pykal & Janda 1994), as in Germany (Kuklik et al. 1982). The opposite results for spring migration was obtained by Pavelka et al. (1995) for fish ponds near Odra river (Czech Republic), and by Zalakevicius et al. (1995) for Lithuania, where the peak period was in April.

According to Ridgill & Fox (1990) the Teal is sensitive to severe winters. This holds true in my study area as well, although we must take into account that the ponds are usually frozen during winter.

The migration pattern of the Garganey in NE Slovenia was very similar to that in Poland and in Czech Republic (Kot 1986, Pavelka et al. 1995). In other parts of Poland and Czech Republic the Garganey is rare during migration (e.g. Kupczyk 1987, Pecl 1992). Results similar to mine were obtained also by Kralj et al. (1998) for a four year period in north-west Croatia.

The spring migration of Garganey was much more pronounced than autumn migration. The same pattern has also been observed in the Czech Republic (e.g. Pecl 1992), in Croatia (Kralj et al. 1998) and in Lithuania (Zalakevicius et al. 1995). These observations agree with the data in Cramp & Simmons (1977), who pointed out that in autumn the Garganey migrates from Europe to Africa through Iberia and Italy, whereas in spring it returns through the Balkans.

Among Garganeys in spring, there were significantly more males than females (Table 1). The same biased sex ratio was found by Christmas et al. (1990) analysing urban and rural populations of the Tufted Duck *Aythya fuligula* and the Pochard *Aythya ferina* in England. For Garganey I have found only one reference in the literature: Zalakevicius et al. (1995)

mentioned that during migration males were more common than females.

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Sammanfattning

Flyttningen hos årtan Anas querquedula och kricka A. crecca i nordöstra Slovenien

Krickan häckar huvudsakligen i norra Europa medan årtan är spridd över hela Europa. Krickan övervintrar främst i sydöstra och sydvästra Europa medan årtan flyttar till Afrika söder om Sahara. Under flyttningen uppträder båda arterna annorstädes. Denna artikel beskriver arternas förekomst på en lokal i nordöstra Slovenien under tolv år, 1985–1996. Lokalen utgörs av tre fiskdammar (Racki ribnike) i låglandet Dravsko polje. Landskapet utgörs av intensivt odlad jordbruksmark med majs, sockerbetor, vete och potatis. Närmast dammarna finns blandskogar och ängar med häckar. Dammarna är 20, 10,5 och 4,5 ha stora. Den största dammen har en del vegetation längs nordstranden, främst kaveldun.

Fältdata insamlades genom totalräkningar av hela området upp till tio gånger per månad (oftast 4–7 gånger). Jag separerade hanar och honor, vilket dock kunde göras i tillräcklig omfattning bara för årtan under våren, då könen är lätta att skilja åt.

Årtans rastningsmönster framgår av Figur 1. Det var en tydlig topp i mars–april, medan det inte fanns någon lika utpräglad hösttopp. För krickan visas förloppet i Figur 2. Det var en tydlig topp i feburari jämfört med närliggande månader, och i november och december. Krickan förekom genom hela vintern, även i januari, vilket däremot årtan inte gjorde.

Det fanns betydligt fler hanar än honor av årtan (Tabell 1). Skillnaden var signifikant alla tre vårmånaderna. Denna sneda könskvot är typisk för flera arter av änder.

Det finns ganska begränsat material från andra lokaler att jämföra flyttningsmönstret med. Men bilden verkar vara likartad på lokaler i Polen och Kroatien. För årtan verkar vårflyttningen vara mera markant än höstflyttningen och detta har noterats även på lokaler i Tjeckien och Litauen. Dessa observationer stämmer med tidigare slutsatser om att årtan under hösten flyttar från Europa till Afrika via Iberien och Italien medan den om våren återvänder via Balkan.

En granskning av de sparsamma observationer som finns från andra delar av Slovenien visar att fiskdammarna vid Racki är betydelsefulla för både kricka och årtan under flyttningen. Området ingår i en skyddad s.k. "landskapspark".