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Breeding of Little Grebe *Tachybaptus ruficollis* and Great Crested Grebe *Podiceps Cristatus* on Race Ponds in Northeastern Slovenia (Central Europe) - A 13-years Study

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Abstract: Between 1986 to 1998 data about breeding of Little grebe *Tachybaptus ruficollis* and Great Crested Grebe *Podiceps cristatus* were gathered on Rački ribniki fishpond complex (33 ha) in north-eastern Slovenia. Up to 16 pairs of Great Crested Grebe and 19 pairs of Little Grebe were breeding in the study area. In the total data set number of breeding pairs of both species were stable, however in first part of the study, we found a significant decrease of Great Crested Grebe. Inter-specific competition between both species does not exist. Moreover, relationship between both grebes were positive and significant ($r = 0.65$, $P < 0.05$, $n = 10$).

Key words: *Podiceps cristatus*, *Tachybaptus ruficollis*, breeding, ponds

Introduction

Little Grebe *Tachybaptus ruficollis* and Great Crested Grebe *Podiceps cristatus* are distributed throughout Europe (Cramp and Simmons, 1977; Gorban, 1997; Fjeldsa and Lammi, 1997). Studies about breeding ecology of both species are extensive, though not exhaustive. Data are available mostly for Western and Northern Europe (e.g. Cramp and Simmons, 1977, Fuchs, 1982; Lawniczak 1982; Glutz Von blotzheim, 1989; Renevey, 1989; Ulfvins, 1989; Walravens *et al.*, 1990; Keller, 1992; Stanevičius, 1994 and references therein) however data from other regions are scarce or missing. This is specially true for long-term studies.

The purpose of this study were to present breeding dynamics of Little Grebe and Great Crested Grebe on fishpond complex over 13 years and their inter-specific competition.

Study area: The data was gathered in north-eastern Slovenia (Dravsko polje) on Rački ribniki fishpond complex. Veliki ribnik (20 ha) is the biggest pond in the complex. Pond is surrounded mainly with *Typha* spp. In the growing season, *Nymphoides peltata* usually cover a considerable proportion of the pond surface. The smallest pond, Mali ribnik, measured 4.5 ha and is covered mainly with *Trapa natans* and *Lemna* spp. The middle pond, Gajič (8.5 ha), is usually without vegetation, however in some years *Polygonum amphibium* almost completely cover the pond surface. All three ponds are eutrophic. The culturing of carp has always been carried out there, and has lately been done with supplementary feeding and manuring. The surrounding landscape consists mainly of mixed forests and meadows with hedges. Fishpond complex is protected as nature reserve and belong to the Landscape Park Rački ribniki - Požeg. For description of the study area and ponds see also Vogrin and Šorgo (1995), Vogrin and Vogrin (1999).

Materials and Methods

The censuses of breeding grebes have been done between 1986 and 1998. The investigations were conducted separately for each pond. Numbers of pairs were estimated only on the base of found nests and additionally on the base of observed females with fledglings. Only the nest with eggs, egg shells or young were treated as nests (Goc, 1986). Searching for nests were carried out 2 to 5 times in

a breeding season (May-July). Attempts were made to find all nests, by making a systematic search of the vegetation throughout the ponds. Additional censuses were carried out at least 20 times during each breeding season. All nests were marked on maps to avoiding double count. Statistical analyses were carried out using the SPSS statistical package 6.0.. Since data were not normally distributed, data were log-transformed for parametric testing.

Results

Numbers of breeding pairs of both species are presented in Fig. 1. On all three ponds up to 16 pairs of Great Crested Grebe and up to 19 pairs of Little Grebe were breed.

The highest densities reached by both grebes on particular ponds are presented in Table 1.

Table 1: The highest density (no. of pairs/10 ha) of Little Grebe *Tachybaptus ruficollis* and Great Crested Grebe *Podiceps cristatus* on Rače fishponds separately for each pond

Pond (ha)	<i>Podiceps cristatus</i>	<i>Tachybaptus ruficollis</i>
Veliki ribnik (20 ha)	7.5	4.0
Gajič (8.5 ha)	2.4	9.4
Mali ribnik (4.5 ha)	2.2	17.8

From these data it is obvious that Great Crested Grebe prefer the biggest pond, whereas Little Grebe prefer the smallest pond. Since both grebes are feeding at least partly with fishes and breed in similar habitats, we can assume, that between both grebes inter-specific competition occurs. Surprisingly, we found that correlation on the Veliki ribnik (only for this pond have enough data for both grebes) is even positive, and statistically significant (Pearson, $r = 0.65$, $P < 0.05$, $n = 10$, Fig. 2).

In the total data set number of breeding pairs in both species on the Veliki ribnik were stable (Little Grebe: Pearson, $r = -0.10$, $n = 10$; and Great Crested Grebe: $r = 0.02$, $n = 13$; in both cases: $P > 0.05$). For both species trends were curvilinear. In years between 1986 and 1992 however, I found significant negative relationship for Great Crested Grebe (Pearson, $r = -0.90$, $n = 7$, $P < 0.001$).

Discussion

According to data from Geister (1995) on Rački ribniki fishpond complex breed about 2% Slovenian population of Little Grebe and about 5% of Great Crested Grebe (Vogrin 2000). Concerning proposal of Vogrin (1996a) Rački ribniki

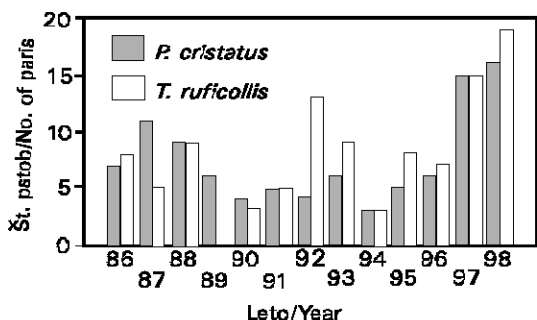


Fig. 1: Numbers of breeding pairs of the Great Crested Grebe *Podiceps cristatus* and Little Grebe *Tachybaptus ruficollis* on Rački ribniki on Dravsko polje in northeastern Slovenia between 1986-1998

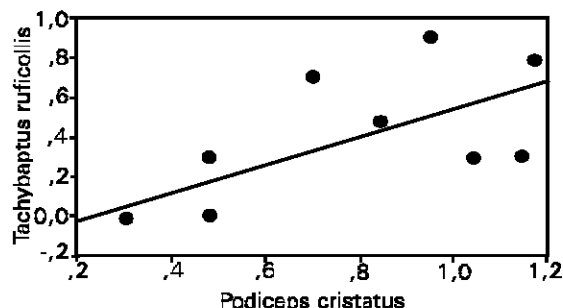


Fig. 2: Relationship (log-transformed) between Little Grebe *Tachybaptus ruficollis* and Great Crested Grebe *Podiceps cristatus* on the Veliki ribnik (Rački ribniki fishpond complex) in north eastern Slovenia

are important breeding locality for both species in Slovenia. About great importance of fishponds for some water species elsewhere see also e.g. Bukacinska *et al.* (1996) and for Rački ribniki fishpond complex see Vogrin (1997; 1998a; 1998b; 1999; 2000).

Food supply is among habitats one of the main factors influencing the ecology of many avian groups (Newton, 1998). Population densities of grebes are often limited by food supply and shortage of vegetation cover, which also influences breeding success (Moskal and Marszalek 1986; Salonen and Penttinen, 1988). This is specially true for Great Crested Grebe which is feeding mainly with fishes (Cramp and Simmons, 1977; Glutz Von Blotzheim *et al.*, 1987; Renevey, 1989). Since fishponds are reach with fishes, food could not be the factor which influence on the population densities of grebes, what is specially true for Great Crested Grebe. It could be, that fishponds, specially those covered with dense vegetation are very attractive for Great Crested Grebes. Such habitats are also Rački ribniki fishponds complex (Vogrin, 1989) if we compare densities obtained on this fishponds with data from elsewhere (Lawniczak, 1982; Cempulik, 1985; Kot 1986, Dvorak *et al.*, 1993; Mackowicz and Krajewski 1993; Trnka 1995, Witkowski *et al.*, 1995; Vogrin, 1996b). On the other hand, unfavourable environmental conditions, e.g. the

absence of water during April and May in some ponds (pers. obs.) could influence not only on the number of pairs but also on the delayed breeding and on the breeding success.

The decrease of both species, especially of Great Crested Grebe between 1990 to 1994 were hardly to explained. However the main reasons for low numbers in 1992 were probably scarce vegetation in Veliki ribnik and water fluctuations (pers. obs.).

According to my data inter-specific competition between Little Grebe and Great Crested Grebe which live syntopic does not exist. Newton (1998) pointed out that pairs of similar species e.g. Great Tit/Blue Tit, Blackbird/Song Thrush could positively correlated, it could be, that similar species responded in similar fashion to the same environmental factors (Tomialojč and Wesolowski, 1990). Concerning our data, such pair is also Little Grebe and Great Crested Grebe.

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Milan Vogrin: Breeding of little grebe and great crested grebe on ponds

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