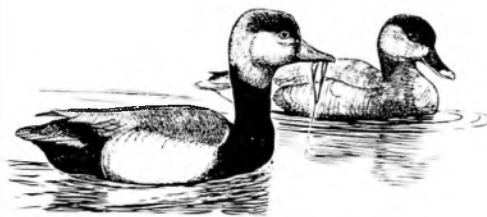


The Red-crested Pochard *Netta rufina* breeding and wintering in Yugoslavia



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The breeding of Red-crested Pochard was proved in the Posavina (Croatia) in 1987, the birds probably originating in Central Europe where the population is healthy with flocks of non-breeding birds at, for instance, Lake Constance and Lake Neusiedl. The large numbers of Red-crested Pochard found in January 1987, 1988 and 1989 on Lake Ohrid (Macedonia), which is a good wintering site because of the occurrence of Chara, are likely to be part of the Eastern European population.

The Red-crested Pochard *Netta rufina* occurs in only a few localities in Europe, and the wetlands that they use for breeding, moulting and wintering are often widely separated. Szijj (1975) used this distribution to compare fluctuations in the Southwest and Central European populations and to discuss the phenomenon of duck migration. New records show that the situation is not so clear as it seemed 15 years ago

when Western and Eastern European populations appeared to be separate. Large numbers of Red-crested Pochards have been counted in Spain, which can hardly belong to the breeding population of Southwest and Central Europe (Rüger *et al.* 1987). Yugoslavia lies between the Western and Eastern European populations and, until now, little was known about the occurrence of Red-crested Pochards there.

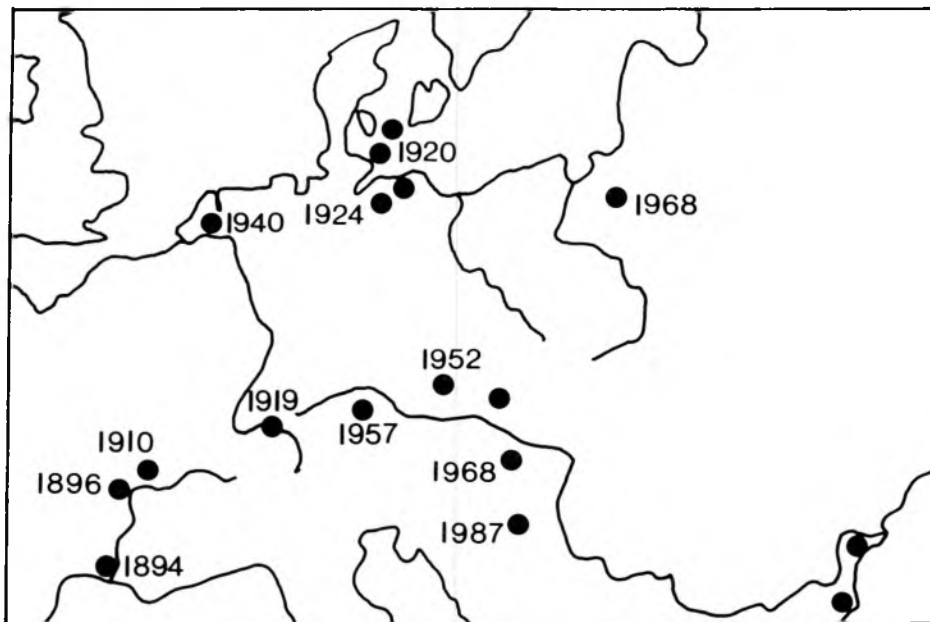


Figure 1. Immigration of the Red-crested Pochard in Central Europe during the 20th century, with the year of first proven breeding indicated (from Bauer & Glutz 1969, Bezzel 1985, Tomialojć 1972 and own obs').

Breeding

According to the *Catalogus faunae*, the Red-crested Pochard is not found as a breeding bird in Yugoslavia (Matvejev & Vasić 1973). One old nesting record in the Baldamus collection was determined by Szijj as *Anas querquedula* (Antal *et al.* 1971). Although breeding was not proven during the last century, it is not impossible since the Red-crested Pochard was at that time still widespread in Central Europe, nesting at Lake Neusiedl (Bauer & Glutz 1969), and it is likely that its breeding range reached the north of Yugoslavia. Baldamus (1851) counted the Red-crested Pochard as a breeding species, but without mentioning further details. Observations at the end of the last century in Northern Bosnia could indicate a breeding population (Obratil 1983).

After the decrease at the end of the last century, the Red-crested Pochard immigrated again into Central Europe (Bauer & Glutz 1969, Bezzel 1985, Fig. 1). Since the increase at Lake Constance (Jacoby, Knötzsch & Schuster 1970, Schuster *et al.* 1983) and together with the establishment of new breeding populations in Bavaria (Wüst 1981), Czechoslovakia (Hudec & Cerny 1972, Hudec 1987), GDR (Neubauer 1971) and Austria (Bezzel 1985, Dvorak, Grill & Kohler 1987), single birds and pairs were observed more often in Hungary (e.g. Vasvari 1939–42) and later also in Yugoslavia (Table 1, Fig. 2). Only the observation on Lake Skadar (Vasić 1980) does not refer to that part of Yugoslavia which borders Central Europe.

In April 1986 a three-year study was initiated to determine the importance of the

alluvial wetlands of the Sava River (Schneider 1986, and 1988). In addition to the alluvial wetlands, two fish pond areas were regularly – at least every fortnight – checked during the breeding season. In 1986 a male was recorded twice (29 April Lonjsko Polje (no. 11 in Fig. 2) and 15 May fish ponds of Lipovljani (no. 12)). On 15 April 1987 two pairs were seen by H. Ern and birdwatchers from the DBV group Radolfzell in the fish pond near Okučani (no. 13). On 17 July, breeding of the Red-crested Pochard was established by the observation of a female with four three-week-old ducklings in one of these fish ponds. In 1988 one pair was again observed. In the Posavina, no Red-crested Pochard has been seen during the breeding season since the end of the last century (Obratil 1983). Geister (1988) counts the Red-crested Pochard as a very rare breeding bird in Slovenia (cf. Table 1).

Wintering

Wintering of large flocks of Red-crested Pochards in Yugoslavia was not known until recently, although the bird was found in great numbers in Rumania and Greece (Johnson & Hafner 1970, Rüger *et al.* 1987). Few authors mentioned this species during the winter season and then only in small numbers – Rucner (1952–53) for Neretva valley, Antal *et al.* (1971) for Vojvodina, Obratil (1983) for North Bosnia, Vasić (1980) for Skadarsko jezero. Most of the data are from the end of last century. For the new evaluations only a few IWRB waterfowl counts from Yugoslavia

Table 1. Observations of the Red-crested Pochard in Yugoslavia during the breeding season (April–July). The locations are shown in Fig. 2.

1.	6.4.1889	?	Sava Bos. Brod (Obratil 1983)
2.	2.7.1892	?	D. Svilaj (Obratil 1983)
3.	16.5.1893	?	D. Svilaj (Obratil 1983)
4.	2.7.1899	?	Bos. Brod (Obratil 1983)
5.	28.+29.4.1963 und 1.5.1963	1 male 1	Ludaško jezero (Mikuska 1968) Ludaško j. (Antal <i>et al.</i> 1971)
6.	2.5.1968	1	Skadarsko jezero (Vasić 1980)
7.	18.5.1972	1 male	Draganići (Zbirke Hrv. Pri. Muzeja Zagreb)
8.	5.6.1979	5	Cerknisko jezero (Geister 1980)
9.	23.5.1984	1	Ptujskego jezero (Janzeković 1985)
10.	7.4.1986	1 pair	Ormoz (Kazmiercak 1987)
11.	4.4.1987	2 male	Hotinja Vas (Vogrim 1987)
12.	7.4.1987	1 pair	Cerknisko jezero (Kazmiercak 1987)



Figure 2. Observations of the Red-crested Pochard during the breeding season (April-July) in Yugoslavia (cf Table 1 and text) and the lakes of Macedonia.

were available (Rüger *et al.* 1987). In the North of Yugoslavia the Red-crested Pochard is still rare in winter (Geister, Ham & Mikuska in litt.).

Since 1987 the Macedonian lakes have been counted by V.F. Vasić (Table 2) and there he found the Red-crested Pochard. Lake Ohrid ("Chara-Lake") is the preferred lake and an ideal wintering site. Although it is situated between high mountains 695 m above sea level, its water remains at 5.6°C–6.6°C at the surface because of its great depth of 286 m (Stanković 1960). The main reason for the occurrence of Red-crested Pochards is the rich vegetation of *Chara* which is the preferred food resource for this diving duck (cf. Allouche & Tamisier 1984, Cramp & Simmons 1977, Hauri 1989). *Chara* is less abundant in Lake Prespa and is not found in the Yugoslavian part of Lake Dojran, which explains the lower number of Pochard on these lakes (Table 2). On Lake Constance only those parts of the lake where *Chara* grows are used by large flocks, and the loss of these plants caused a severe decline after 1961 (Schuster *et al.* 1983).

Discussion

Reviewing the old data, it seems possible that the Red-crested Pochard bred in the North of Yugoslavia during the last century; at that time, it was also widespread in Central Europe (Bauer & Glutz 1969). After a decrease it has, since the beginning of the 20th century, immigrated again from

Table 2. Numbers of Red-crested Pochard on the Macedonian lakes in January.

	1987	1988	1989
Ohrid Lake	1300	3000	3400 *
Lake Prespa	150	100	46
Lake Dojran	—	10	—

* 5000 estimated for the whole lake including Albania

South France into its former breeding area (Fig. 1). Ringing records show that the populations from South Germany and Czechoslovakia move in the opposite direction to the immigration route (Hückler 1966, Hudec & Cerny 1972, Schlenker 1979, Schuster & Hölzinger in Hölzinger 1987). The recent occurrence of the Red-crested Pochard in the North of Yugoslavia (Table 1) indicates a continuing spread to the east. This can be interpreted as a prolongation of spring migration, which reaches its maximum at the end of March in Bavaria (Wüst 1981).

A few ringing results also indicate that the moulting and resting ducks on Lake Constance originate from the Southwest European population as proposed by Mayaud (1966) and Szijj (1975). Until recently there was no evidence that these birds are migrants from eastern breeding places (Balkan, S. Russia, SW Siberia) as supposed by Salomonsen (1968, Cramp & Simmons 1977). The largest Central European population (Lake Constance) increased again during the 1980s and, in autumn, there are 2000 to 6000 birds (Schuster *et al.* 1983, Ornithologische Arbeitsgemeinschaft Bodensee, unpublished). In the Ismaninger Teichgebiet (Bavaria) an average of 1500 ducks moults in August (Krosigk 1987).

In 1987 breeding was established in Yugoslavia in the Posavina. The nearest known breeding site is Lake Neusiedl 275 km to the north, which was colonized in 1968 (Bezzel 1985) and has now five to six successful females, and held up to 294 non-breeders in May 1988 (Dvorak *et al.* 1987, Grüll *et al.* 1988). The fish ponds in the North of Yugoslavia offer good breeding habitat to the Red-crested Pochard with shallow open water (1–2 m deep) and large reed beds (cf. Cramp & Simmons 1977). Currently these ponds cover about 24,000 ha (Bertić 1987) and are used for the

production of carp. The older ponds have an especially rich birdlife (e.g. Šetina 1966, Obrátil 1974–75). There is some danger to successful females, which moult in their breeding places (Amat *et al.* 1987), and to their young, because the hunting season starts in the middle of August. Ferruginous Duck *Aythya nyroca* also breed very late in the fish ponds, and families have been observed up to the beginning of September (cf. Lampio 1982). Late nesting females and their young are especially vulnerable to hunting (Clark *et al.* 1988) and the beginning of the season should be set one month later.

On the other hand, Yugoslavia's wintering flocks are likely to be part of the Black Sea population, which also winters in Greece and Rumania (Johnson & Hafner 1970, Rüger *et al.* 1987). The number of birds on Lake Ohrid reaches the 1% criteria for international importance for this species, and a regular monitoring of these lakes is necessary to complete the European census.

The Red-crested Pochard has an ability to cross large areas and to occur both as a breeding bird and as a migrant in small, limited sites that offer suitable conditions. Newly colonized areas are often more than 100 km apart, calculated by Reichholf (1984) as the critical distance for breeding sites for water birds. The Red-crested Pochard has often returned to exactly the same areas after an absence of many years, and re-established stable breeding populations.

Population growth and the spread to the east is supported by protection. Most of the important breeding sites in the south of Central Europe are protected (e.g. Lake Constance, Ismaninger Teichgebiet, Lake Neusiedl); some show a steady increase since colonization (e.g. Grüll *et al.* 1988, Hudec & Cerny 1972, Schuster *et al.* 1983, Wüst 1981) which is supported at Lake Constance by two specially managed reserves (Wollmatinger Ried & Mettnau,

Schuster *et al.* 1983). At this lake few pairs occur outside the reserves and they can adapt well to disturbance by men (although the larger flocks of moulting ducks cannot). They sometimes even breed in harbours (Constance), near heavily frequented tourist places (Insel Mainau) and in small regularly frequented pools. On the other hand, the Red-crested Pochard vanished from the nature reserve "Unterer Inn", which is intensively used by anglers (Reichholf 1988).

Although the population of the Red-crested Pochard is increasing in Central Europe, it must still be considered potentially endangered. Its future depends on only a few sites which should be better protected. Problems arise through increasing tourism and watersports, e.g. at Lake Constance (Schuster & Hölzinger in Hölzinger 1987) and the large moulting site at Pantano del Ebro in Spain (Van Impe 1985). At Lake Constance, boating now occurs throughout the year (Frenzel & Schneider 1987, Schneider 1987). A second serious problem is water quality, since eutrophication can destroy suitable habitats (e.g. Schuster *et al.* 1983, Van Impe 1985, Neubauer 1988); at Lake Ohrid, a canal is under construction that will collect waste water and save its oligotrophic character.

The Red-crested Pochards, both breeding and wintering, of Yugoslavia fill the gap between the Western and Eastern European populations (cf. Szijj 1975). Until now it has not been clear whether the large fluctuations in Spain are caused by birds coming from the Eastern Mediterranean (Rüger *et al.* 1987). It still seems that there are two populations in Europe, but the lack of any large concentrations in Italy could be caused by severe hunting pressure. It would be interesting to have more information on breeding distribution between the Delta of the Danube and the Central European population, and about the movements of Eastern European birds.

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