Acrocephalus 25 (123): 207 – 212, 2004

Numbers and local movements of Pygmy Cormorants *Phalacrocorax pygmeus* wintering in Belgrade

Število in lokalni premiki prezimujočih pritlikavih kormoranov *Phalacrocorax pygmeus* v Beogradu

Dragan V. Simić[1] & Marko Tucakov[2]
[1] Ustanička 144, 11050 Beograd, Serbia and Montenegro, e-mail: ddsimic@eunet.yu
[2] Marka Oreškovića 9, 25275 Bački Breg, Serbia and Montenegro, e-mail: mtucakov@eunet.yu

Kongres ornitologov Slovenije ob 25. obletnici DOPPS
Slovene Ornithologists' Congress at the 25th anniversary of DOPPS – BirdLife Slovenia

1. Introduction

Pygmy Cormorants *Phalacrocorax pygmeus*, which breed on the Balkan Peninsula where the majority of the European breeding population is concentrated (Michev & Weber 1997), are partial migrants, spending the winter period partly inland and partly on or near the Adriatic, Aegean and northeastern Mediterranean coasts (Cramp 1998). The wintering flocks are often restricted to rivers, coastal lagoons and deltas, where foraging sites rich in food can be found, as well as to the riparian forests, which are utilized as roosting sites (Crivelli *et al.* 1996).

The species breeds regularly in Serbia, where 350 – 500 pairs have been counted in the last decade (Puzović *et al.* 2003). Post-breeding movements are recorded all over Serbia (Lukač & Lukač 1992, Dević 1995, Puzović *et al.* 1999, Gergelj *et al.* 2000, Stojnić 2000, Grubač & Grubač 2001, Lakatoš 2001, Tucakov 2003, M. Ružić *pers. comm.*). Observations during the winter period are more frequent along the rivers (BirdLife International 2004). In the years 1995 – 1998, the most important wintering grounds were situated along the Danube; in the immediate vicinity of Belgrade, in the Dubovac – Čibuklija zone in southern Banat, and in the Negotinska Krajina in eastern Serbia, near the Iron Gates (Puzović *et al.* 1999).

Recent information on Pygmy Cormorants from Serbia is scarce (Weber 1994), despite the fact that the confluence of the Sava and Danube rivers, within the city area of Belgrade, is known locally as a wintering site of the species (Paunović 1991 & 1993). There has been no regular monitoring for the winter population around Belgrade and recent information on wintering numbers, roosting sites, roosting behaviour (Cramp 1998) and foraging areas is lacking. Moreover, apart from the recent increase of the breeding population (Michev & Weber 1997), it is still unknown whether numbers on the wintering grounds also increased. The aim of this paper is to try to answer these questions.

2. Study area and methods

The study area lies within the city of Belgrade (UTM DQ56), northern Serbia. It comprises the confluence of the rivers Sava and Danube, from stream kilometer 1969 to 1973 along the Danube and the last 10 kilometers of the Sava river. Ada Ciganlija Island is located from stream kilometer 4 to 9 from the river mouth along the Sava, while Veliko Ratno Ostrvo Island stretches from kilometer 1970 to 1972 along the Danube. Close to Veliko Ratno Ostrvo's southern tip another 100 m long islet called Malo Ratno Ostrvo (a.k.a. Konjska Ada) is located (Figure 1). All islands are covered with alluvial forests, dominated by Willows *Salix* sp. and Poplars *Populus* sp. Veliko Ratno Ostrvo comprises two marshy depressions, scrub, ruderal plants, arable land and summer cottages on stilts with vegetable gardens. The lowest water level occurs in late summer and throughout the winter (Paunović 1991).

Point counts of wintering Pygmy Cormorants were carried out (1) from the Ušće (opposite to the Malo Ratno Ostrvo; observation point OP1), (2) from the 4th kilometer of the Sava river's left bank, overlooking the downriver end of the Ada Ciganlija Island and opposite the right bank roosting site (OP2), (3) from the 1st kilometer of the right bank of the Sava (OP3), and (4) in 2004, from the Belgrade district of Dorćol (Danube right bank, 1170 kilometer – OP4; Figure 1). The surveys were conducted in 1996 (20 field trips), 2001 (1 field trip), 2003 (2 field trips) and 2004 (3 field trips).

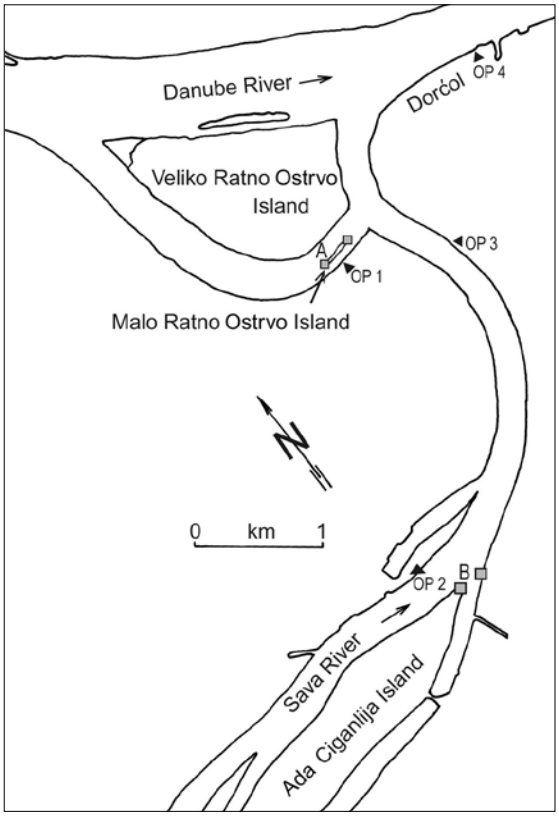

Figure 1: Map of the study area. Roosting sites A and B are marked with grey squares, while observation points (OP1 – 4) are marked with black triangles pointing towards observed area.

Slika 1: Zemljevid obravnavanega območja: počivališči A in B sta označeni s sivima kvadratoma, opazovalne točke (OP1 – 4) pa s črnimi trikotniki, ki kažejo v smer območja opazovanja

3. Results and discussion

Starting from the third decade of February until the first decade of April 1996, point counts at roost A were made from OP1, and movements towards roost B up the Sava River were noted. New roosting sites and the preferred way in which birds occupy it had been observed from OP2 and investigated from the water surface. In January 2001, a point count took place from OP3. In February to April 2003, the point counts made in 1996 were repeated using the same observation points (OP1, OP2) and nearly the same dates, while in 2004, the number of Pygmy Cormorants staying in the city in early spring (March to April) was recorded from OP2 and OP4.

3.1. Survey in 1996

On Malo Ratno Ostrvo Islet (roost A), birds primarily occupied partly submerged willow roots protruding from an eroded bank, and lower branches close above the water surface, while the rest of the birds were forced to settle down on the steep bare soil. Roosting in the tree canopies was not recorded.

At the Sava river (roost B), most of the birds roosted on a flooded mud bar by the right bank at the 4th river kilometer, overgrown with young White Willow *Salix alba* scrub, while part of the flock settled in willow scrub on Ada Ciganlija's downstream end (Figure 2). The first birds arriving occupied the lowest branches, immediately above the water surface, while later birds occupied higher positions in the scrub, until the top branches were filled.

Another, smaller site, used mostly as a day resting site, was discovered in a similar willow scrub at the southwest bank of the Veliko Ratno Ostrvo Island. Here 175 individuals were counted.

In order to estimate the size of Belgrade's wintering population of Pygmy Cormorants, a count was made on 24 Feb, when a total of 356 (33%) birds remained at the roost A, while an additional 724 (67%) birds occupied a new roosting site B. The total size of Belgrade's wintering population in 1996 was estimated at 1080 individuals.

3.2. Survey in 2001

On 12 Jan, from OP3 1200 individuals were counted leaving roost B.

3.3. Survey in 2003

Pygmy Cormorants utilised foraging areas upstream from roost B in the Sava river. Therefore on 23 Feb a survey was made from OP1, counting the birds foraging in the Danube (520 ind.); and on 27 Feb from OP2, counting the birds foraging in the Sava (300 ind.). The majority of birds (48%; 398 ind.) arrived flying down the Danube (from the NW) while only 5% (39 ind.) came flying up the Danube (from NE). 31% (254 ind.) arrived flying down the Sava (from the SW). 16% (129 ind.) of birds were flying very low over water, and were presumably feeding in the immediate vicinity of the islands. The total size of Belgrade's wintering population was estimated at 820 individuals.

In 2003 Pygmy Cormorants no longer used site A for roosting. Only 25 to 30 birds spend the day on this site, leaving the place before sunset to fly to roost B.

Figure 2: Roosting site B of Pygmy Cormorants *Phalacrocorax pygmeus*, section on the right bank of the river Sava in Belgrade, 27 Feb 1996 (photo: D. Simić)

Slika 2: Počivališče B pritlikavih kormoranov *Phalacrocorax pygmeus* ob desnem bregu reke Save v Beogradu, 27.2.1996 (foto: D. Simić)

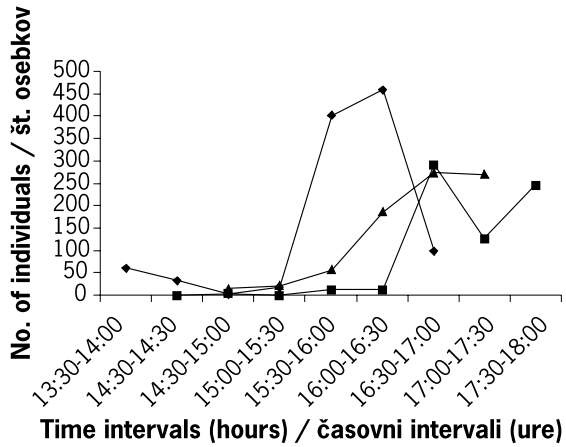

Figure 3: Intensity of local movements of Pygmy Cormorants *Phalacrocorax pygmeus* from foraging areas to roosting sites (diamond peaks: 24 Feb 1996 (sunset at 17:20); triangle peaks: 22 Mar 1996 (sunset at 17:50); square peaks: 25 Feb 2003 (sunset at 17:20)

Slika 3: Intenzivnost lokalnih premikov pritlikavih kormoranov *Phalacrocorax pygmeus* z njihov lovišč na počivališča (karo: 24.2.1996 (sončni zahod ob 17:20); trikotniki: 22.3.1996 (sončni zahod ob 17:50); kvadrati: 25.3.2003 (sončni zahod ob 17:20)

3.4. Survey in 2004

On 24 Mar, 710 individuals were counted from OP4, flying up the Danube towards the Sava river (from the NE). On 7 Apr 300 individuals were counted from OP4, and on 9 Apr an additional 300 birds were counted flying down the Sava River (from OP2), making an early April total of 600 birds.

The daily rhythm of Pygmy Cormorant activity was linked to the length of daylight. The first flights towards roosting sites were 120 minutes before sunset with peak numbers 120 to 60 minutes before sunset, while by 30 minutes prior to sunset almost all birds had entered the roost site (Figure 3). In late February (sunset at 17:20), the most intensive movements towards the roosting sites were recorded between 15.30 and 16.30.

3.5. Belgrade wintering population

The first survey of wintering Pygmy Cormorants in Belgrade was carried out in winter 1988/89, when only small flocks were recorded. From 3 Dec 1989 until 3 Mar 1990, 500 individuals wintered in the area on Malo Ratno Ostrvo Islet, while in 1990/91 only 300 individuals appeared. The Danube downstream from the roosting site was used mainly as a feeding area, but some birds fed upstream and in the Sava river (Paunović 1991). In the winter of 1991/92, Pygmy Cormorants had started to utilise roost B, but only as a day resting site (M. Paunović *pers. comm.*).

The largest midwinter number of individuals wintering in Belgrade was recorded on 16 Jan 2001, when 1200 individuals moved from the roosting site B towards foraging areas in the Danube. Therefore, the maximum wintering numbers are estimated at 1200 individuals throughout the late 90's and at the begining of this decade.

The Pygmy Cormorant makes fairly frequent diurnal feeding trips (Cramp 1998). The choice of foraging areas depends on the concentration of prey, the number of other fish-eating birds, and ice cover (Paunović 1991). Suitable waterbodies for foraging exist in our study area in the Danube flood zone, both upstream and downstream from roosting site A. The sites downstream were frozen in February 1996, in contrast to the 1989 – 1991 period (Paunović 1991). Presumably, this is the reason why, in February 1996, more than 90% of birds foraged upstream from Veliko Ratno Ostrvo. After the ice melted on the surrounding standing waterbodies in early March, about 40% of the birds chose feeding sites in the Danube flood zone and the Mika Alas fishpond, downstream from the roost site (Table 1). The exact location of feeding areas, however, remained unknown, but the presence of foraging individuals in winter had already been confirmed, primarily from upstream locations (Puzović & Grubač 2000, *own data*), and also roosting sites were described downstream (Dajović 1998, Anonymous 2000, *own data*). Only a small number of birds foraged in the immediate vicinity of the roosting sites. Also, in comparison to 1989/1991

Table 1: Proportion of Pygmy Cormorants *Phalacrocorax pygmeus* observed at Ušće (OP1) flying to the roosting sites A and B from two directions between 24 Feb and 4 Apr 1996 (in brackets the number of observed individuals is stated)

Tabela 1: Delež pritlikavih kormoranov *Phalacrocorax pygmeus*, opazovanih med letom z Ušća (OP1) proti počivališčema A in B iz dveh smeri med 24.2. in 4.4.1996, s številom opazovanih osebkov v oklepaju

Date / datum	NW direction / SZ smer	NE direction / SV smer	Total / skupaj
24 Feb	94% (1015 ind.)	6% (65 ind.)	1080 ind.
22 Mar	60% (413 ind.)	40% (276 ind.)	689 ind.
29 Mar	57% (410 ind.)	43% (310 ind.)	720 ind.
4 Apr	93% (481 ind.)	7% (36 ind.)	517 ind.

(Paunović 1991) and 1996, an increased number of birds foraged upstream the Sava river.

Pygmy Cormorants utilise reedbeds and trees as communal and nocturnal roosting sites (Cramp 1998). In both sites in the study area, birds roosted in young and relatively low White Willow scrub, up to 6 or 7 metres high, typical of communities of early stages of succession of alluvial soil bordering rivers or river islands. Roosting in trees with well developed canopies, which is characteristic of the Great Cormorant *Phalacrocorax carbo* (e.g. Geister 1997, Lekuona & Campos 1998) was recorded by Paunović (1991), but was not observed during this study. Only on 4 Feb 2004 were 11 Pygmy Cormorants found in the developed crown of a smaller tree, resting for a short period during the day on the urbanized right bank of the Danube.

Pygmy Cormorants often winter in large flocks (Cramp 1998). The number of individuals wintering in Belgrade appears to fluctuate from year to year, but has obviously increased from 500 birds at the beginning of the 90s (Paunović 1991), approximately 1000 in the mid 90s (Puzović 1999, Puzović *et al.* 1999, *this study*) to 1200 birds in 2001. This trend is in accordance with the recent increase of breeding pairs throughout the Balkan region (Michev & Weber 1997, Willems & de Vries 1998, Puzović *et al.* 2003) and the colonization of new or previously abandoned breeding sites (Danko 1994, Vogrin 1996, Mikuska *et al.* 2002, Schneider-Jacoby *et al.* 2002). Because Pygmy Cormorants normally winter upstream from breeding colonies (Novčić & Barjaktarov 2002), birds wintering in Belgrade may originate from downstream colonies located in Serbia, Bulgaria and Romania (Cramp 1998). Since it is reported that the population increase on the breeding areas can be a consequence of increased fish densities (Willems & de Vries 1998), this factor should be considered when discussing the recent increase of wintering numbers. However, there are no recent fish population data available which could support that assumption.

The impact of human disturbance on both roosting sites in the city of Belgrade is unknown. In general, it appears that the species is relatively indifferent to human presence (Cramp 1998). However, the roosting site on Malo Ratno Ostrvo Islet was completely abandoned and all birds roosted in the Sava at the beginning of the 2000's. During the same period, increased human activities were recorded close to Malo Ratno Ostrvo. In a study at a breeding site in Greece, however, a negative correlation between the density of feeding birds and human disturbance was recorded by Willems & de Vries (1998).

According to Delany & Scott (2002), the number of Pygmy Cormorants regularly observed during winter in our study area exceeds 1% of the population threshold (400 ind.), and, together with wintering numbers of other waterbirds (Paunović 1991, *own data*), qualifies the sector from Veliko Ratno Ostrvo to Ada Ciganlija for nomination as a Ramsar site. Currently, the study area supports 12.5% of the wintering population of Pygmy Cormorants in Serbia and Montenegro (compared to Burfield & van Bommel 2004)

Acknowledgements: We are cordially grateful to O. Vasić for help on willow species determination.

Summary

There is little recent information on Pygmy Cormorants *Phalacrocorax pygmeus* from Serbia. However, the confluence of the Sava and Danube rivers is known locally as a wintering site of the species. The study area lies within the city of Belgrade (UTM DQ56), northern Serbia. It comprises the confluence of the rivers Sava and Danube and the last 10 kilometers of the Sava river. Point counts were conducted in 1996, 2001, 2003 and 2004. In both sites in the study area, Malo Ratno Ostrvo Islet and at the bank of Sava river,

birds roosted in young and relatively low White Willow *Salix alba* scrub, up to 6 or 7 metres high, typical of communities of early stages of succession of alluvial soil bordering rivers or river islands. The number of individuals wintering in Belgrade probably fluctuates from year to year, but has obviously increased from 500 birds at the beginning of the 90s, 1080 individuals in February 1996 to 1200 birds in January 2001. The number of Pygmy Cormorants observed regularly during winter in our study area exceeds 1% of the population threshold (400 individuals), and, together with wintering numbers of other waterbirds, qualifies the sector from Veliko Ratno Ostrvo to Ada Ciganlija for nomination as a Ramsar site. Currently, the study area supports 12.5% of the wintering population of Pygmy Cormorants in Serbia and Montenegro.

Povzetek

O pritlikavem kormoranu *Phalacrocorax pygmeus*, pojavljajočem se v Srbiji, so bili v zadnjih letih na voljo le redki podatki, pa čeprav je sotočje Save in Donave v samem Beogradu (UTM DQ56) skupaj z zadnjimi 10 km toka reke Save lokalno znano kot prezimovališče teh ptic. Pritlikavi kormorani so bili po metodi štetja na površini v tem območju prešteti v letih 1996, 2001, 2003 in 2004. Na obeh lokalitetah raziskovanega območja, na otočku Malo ratno ostrvo in na bregu reke Save, so imeli počivališče v mladem in razmeroma nizkem vrbovju *Salix alba* (visokem do 7 m), v značilnih združbah (v zgodnji fazi sukcesije) na naplavinah ob reki in rečnih otočkih. Število osebkov, prezimujočih v Beogradu, najbrž iz leta v leto niha, čeprav je jasno, da se je število 500 os. z začetka devetdesetih let prejšnjega stoletja povečalo na 1080 v februarju 1996 in na 1200 v januarju 2001. Število pritlikavih kormoranov, ki se v našem raziskovanem območju redno pojavlja v zimskem času, presega 1% populacijskega praga (400 osebkov) in skupaj s prezimujočom številom drugih vodnih vrst izpolnjuje kriterije, na osnovi katerih se območje med Velikim ratnim ostrvom in Ado Ciganlijo lahko razglasi za ramsarsko območje. Danes se v raziskovanem območju zadržuje 12,5% v Srbiji in Črni gori prezimujoče populacije pritlikavega kormorana.

References

Anonymous (2000): Avis Marsilliana – Monitoring ptica na Dunavu, zima 1998/1999. – Ecolibri Bionet, Beograd.

BirdLife International (2004): Species factsheet: *Phalacrocorax pygmeus*. – http://www.birdlife.org; [Downloaded on 10 Oct 2004].

Burfield, I. & van Bommel, F. (2004): Birds in Europe: Population Estimates, Trends and Conservation Status. – BirdLife International, Cambridge.

Cramp, S. (1998): The Complete Birds of the Western Palearctic on the CD ROM. – Oxford University Press, Oxford.

Crivelli, A. J., Nazirides, T. & Jerrentrup, N. (1996): The Action Plan for the Pigmy Cormorant (*Phalacrocorax pygmeus*) in Europe. – BirdLife International & European Commission, Bruxelles.

Dajović, M. (1998). Results of bird monitoring in Belgrade area in 1990 – 1997 period. – Ciconia 7: 39–54.

Danko, S. (1994): Occurrence and nesting of Pigmy Cormorant (*Phalacrocorax pygmeus*) in the Slovak Republic and in neighbouring countries. – Aquila 101: 53–64.

Delany, S. & Scott, D. (2002): Waterbird Population Estimates – Third Edition. – Wetlands International, Wageningen.

Dević, M. (1995): The ornithofauna of the fishpond "Uzdin". – Ciconia 5: 32–44.

Geister, I. (1997): Survey of the wintering Grey Herons *Ardea cinerea*, Great Cormorants *Phalacrocorax carbo* and Mute Swans *Cygnus olor* in Slovenia between 1994 and 1997. – Acrocephalus 18 (80/81): 14–22.

Gergelj, J., Tot, L. & Frank, Z. (2000): Birds of Tisa area from Kanjiza to Novi Becej. – Ciconia 9: 121–158.

Grubač, B. & Grubač, S. (2001): Diversity richness of bird fauna of central Pomoravlje on example of lake and fishpond near Paraćin. – Ciconia 10: 77–92.

Lakatoš, J. (2001): Pygmy Cormorant and Great White Pelican – new records for vicinity of Apatin. – Ciconia 10: 142–144.

Lekuona, J. M. & Campos, F. (1998): Recent development of the wintering population of Great Cormorants *Phalacrocorax carbo* in northern Spain. – Cormorant Research Group Bulletin 3: 30–33.

Lukač, Š. & Lukač, A. (1992): Ornithofauna of fishpond "Bečej". – Ciconia 4: 4–27.

Michev, T. & Weber, P. (1997): Pygmy Cormorant *Phalacrocorax pygmeus*. pp. 38 In: Hagemeijer, W. & Blair, M. (eds.): The EBBC Atlas of European Breeding Birds. – T & A D Poyser, London.

Mikuska. J., Mikuska, T. & Romulić, M. (2002): Ptice – vodič kroz biološku raznolikost Kopačkog rita. – Matica hrvatska Osijek & Javna ustanova Park prirode Kopački rit, Osijek.

Novčić, I. & Barjaktarov, D. (2002): Report of Centre for Animal Marking. – Ciconia 11: 11–25.

Paunović, M. (1991): Struktura i sezonska dinamika faune ptica beogradskog ušća i njegovih ostrva. – Graduation Thesis, Faculty of Biology, Belgrade.

Paunović, M. (1993): Ratna ostrva kraj Beograda: U senci velegrada. – Trag 10: 30–31. (In Serbian)

Puzović, S. (1999): Usklađivanje intenzivnog gajenja riba i očuvanja raznovrsne faune ptica na šaranskim ribnjacima u Vojvodini. pp. 164 – 197 In: Šimić, S. & Ivanc, A. (eds.): Zaštita životne sredine pri intenzivnom gajenju riba. – Univerzitet u Novom Sadu, Prirodno – matematički fakultet, Institut za biologiju & Ekološki pokret grada Novog Sada, Novi Sad.

Puzović, S., Gergelj, J. & Lukač, Š. (1999): Heron and cormorant colonies in Serbia 1998. – Ciconia 8: 11–114.

Puzović, S. & Grubač, B. (2000): Federal Republic of Yugoslavia. pp. 725–745 In: Heath, M. F. & Evans, M.I. (eds.) Important Bird Areas in Europe: Priority sites for conservation 2: Southern Europe. – BirdLife International, Cambridge.

Puzović, S., Simić, D., Saveljić, D., Gergelj, J., Tucakov, M., Stojnić, N., Hulo, I., Ham, I., Vizi, O., Šćiban, M., Ružić, M., Vučanović, M. & Jovanović, T. (2003): Birds of Serbia and Montenegro – breeding populations estimates and trends: 1990 – 2002. – Ciconia 12: 33–115.

Schneider–Jacoby, M., Mikuska, T., Kovačić, D., Mikuska, J., Šetina, M. & Tadić, Z. (2002): Dispersal by accident – the Spoonbill *Platalea leucorodia* population in Croatia. – Acrocephalus 22 (109): 3–18.

Stojnić, N. (2000): Zimska posmatranja ptica vodenih staništa na Dunavu kod Čerevića. – Ciconia 9: 111–113.

Tucakov, M. (2003): Pygmy Cormorant *Phalacrocorax pygmeus*. – Acrocephalus 24 (117): 80–81.

Vogrin, M. (1998): Do Pygmy Cormorants *Phalacrocorax pygmeus* breed in Dalmatia (Croatia)? – Cormorant Research Group Bulletin 3: 28–29.

Weber, P. (1994): Pigmy Cormorant *Phalacrocorax pygmeus*. pp. 82–83 In: Tucker, G.M. & Heath, M.F (eds.): Birds in Europe – Their Conservation Status. – BirdLife Conservation Series No.3, BirdLife International, Cambridge.

Willems, F.J. & de Vries, E. (1998): Ecological aspects of Pygmy Cormorants *Phalacrocorax pygmeus* at Prespa, Greece, May – August 1996. – WIWO – reports published, WIWO home: Publication number 60.

Arrived / Prispelo: 15.12.2004
Accepted / Sprejeto: 9.5.2005