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Glossy Ibis *Plegadis falcinellus* in Serbia and Neighbouring Balkan Countries

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ABSTRACT

This paper discusses the distribution and population of Glossy Ibis in Serbia and neighbouring countries in the Balkan Peninsula: Bosnia and Herzegovina, Montenegro and North Macedonia. Literature and unpublished data have been used, especially the information concerning breeding of this species in the above referenced countries. The last cases of breeding, as well as the last date of appearance of individuals have been also stressed, and the dynamics of the breeding population in Serbia for the period between 1963-2017 has been presented. Temporal and spatial dynamics of the breeding population, population trends, threats and executed active conservation measures were analysed.

Introduction

This paper discusses the distribution and population of the Glossy Ibis in Serbia and neighbouring countries in the Balkan Peninsula: Bosnia and Herzegovina, Montenegro and North Macedonia. Literature and unpublished data have been used, especially concerning the information related to breeding of this species within these countries. The last cases of breeding, as well as the last data of appearance of individuals have been also stressed, and for Serbia, breeding dynamics for the period between 1963 and 2017 are presented. Temporal and spatial dynamics of the breeding population, population trends, threats and executed active conservation measures were analysed.

Study Area

Study area covers four Balkan countries: Serbia, Bosnia and Herzegovina, Montenegro and North Macedonia. Their total area is 179,015 km². Suitable habitats for Glossy Ibis breeding and migration exist in each of them. In recent times these habitats are

predominantly located in the north Pannonian part of Serbia (Vojvodina Province), north Bosnia (Posavina Region), south Herzegovina (Neretva River Basin), south Montenegro (Skadar Lake, Ulcinj and Tivat Regions) as well as in south North Macedonia (Ohrid and Prespa Lakes, Pelagonia Valley, Lower Vardar River Valley).

Methods

Published literature, unpublished data from the authors and their contributors, as well as the data from museums and other collections have been used in this overview. For the purpose of developing the survey, we reviewed all available literature and unpublished accessible reports, personal observations and/or communication. Where appropriate, the last cases of breeding, single cases of breeding or the last observations were reported. The paper summarizes temporal and spatial breeding population dynamics in particular countries, trends, threats and protection measures implemented so far.

Results

Serbia

First published observation of Glossy Ibis comes from the late 17th century and originates from Danube region in Vojvodina (Vasić and Džukić 1977). Reports were numerous during the 19th and the first half of 20th century, especially along the Sava River, in Obedska Bara and Zasavica (Šćiban *et al.* 2015). According to Landbeck (1843), in first half of 19th century, it was a common nesting species, mainly in wetlands along the Sava River, mostly within the vicinity of Obedska Bara, where around 1,000 pairs bred. Lobenstein (1840) reported a large colony on the island near Belgrade. The maximal estimated numbers on Obedska Bara was 4,500 pairs in 1869, however the species no longer used that site for breeding at the beginning of 1960s (Puzović 1998). In the following decades, until the 1910s, Glossy Ibis was observed at several locations throughout Vojvodina, while breeding was recorded in the vicinity of Titel, Novi Sad, Kovin, Opovo, in Pančevački Rit near Besni Fok, Zemun and Fenečka Bara (Schenk 1918; Šćiban *et al.* 2015). At the beginning of the 20th century, the species was exceptionally numerous along the Sava River in particular, until it gradually disappeared during following decades (Matvejev 1950; Puzović *et al.* 1999). A large colony existed in Interwar period in Novosadski Rit (20-600 pairs; large fluctuation, Marčetić 1955). Known breeding sites in Serbia south of the Sava and Danube were in the Negotinska Krajina region in East Serbia (Rašković 1905), at Makiš near Belgrade - large flocks in 1900 (Rajzer 1904), Krupačko Blato near Pirot - 25 pairs in 1947 (Matvejev 1950) and in Zasavica (max. 250 pairs, Dombrowski 1895). Dombrowski (1891) mentioned that in 1890 a certain number was recorded in Kumanački Rit (Braničevo Region), however he failed to establish whether it nested.

In the second half of the 20th century the Glossy Ibis has become a scarce and irregular breeder in Banat and Bačka (near Uzdin in 1951, in Carska Bara 1950-1960s, near Čurug, 1943) and in Obedska Bara (Antal *et al.* 1971; Pelle *et al.* 1977; Garovnikov 2006; Šoti and Dimitrijević 1974; Ham 1975). Marčetić (1955,

1957) mentioned large fluctuations in the numbers from year to year in mid-20th century. There were no breeding records in Serbia between 1963 and 1985, except the period between 1963-65 and 1969, when one or two pairs bred in Carska Bara. After that, one pair has bred in 1986 in Dubovački Rit for the first time. The only periodical breeding site between 1986 and 2002 in Serbia was Dubovački Rit, wetland complex on the Danube in South Banat. Another nesting site in 1998 was Jazovo Fishpond in northern Banat, where this species has nested only once (four pairs). An increase in the number of pairs was recorded starting from 1996. In the period between 2003 and 2007 number of pairs fluctuated between 2 and 5, and Sutjeska Fishpond was identified as a new breeding site (Ham 2007).

Table 1. Estimated number of breeding pairs of Glossy Ibis in Serbia between 1963 and 2017

Year/Period	Breeding site	Number of breeding pairs in Serbia
1963-1965	Carska Bara: 1-2	1-2
1966-1968		0
1969	Carska Bara: 1	1
1970-1985		0
1986	Dubovački Rit: 1	1
1987-1989		0
1990	Dubovački Rit: 3	3
1991	Dubovački Rit: 5	5
1992-1995		0
1996-1997	Dubovački Rit: 5-11	5-11
1998	Jazovo Fishpond: 4; Dubovački Rit: 3-5	7-9
1999-2002	Dubovački Rit: 0-1?	0-1
2003	Potamišje: 2-4; Dubovački Rit: 0-1?	2-5
2004	Jazovo Fishpond: 0-1; Potamišje: 2-3	2-4
2005	Potamišje: 2-5	2-5
2006	Potamišje - Sutjeska Fishpond: 3	3
2007	Potamišje - Slatina: 2-6	2-6
2008	Potamišje - Slatina: 2-5, Sutjeska Fishpond: 6; Dubovački Rit: 2-5	10-16
2009	Potamišje - Slatina: 10-12	10-12
2010	Potamišje - Slatina: 15-20	15-20
2011	Potamišje - Slatina: 7-10	7-10
2012	Potamišje - Slatina: 9-10; Bečej Fishpond: 0-1	9-11
2013	Potamišje - Slatina (Jer): 4; Dubovački Rit: 5	9
2014-2015		0
2016	Potamišje - Slatina: 1; Obedska Bara: 4	5
2017	Potamišje - Slatina: 4; Obedska Bara: 4	8

During the period between 2008 and 2013 it was a rare breeder only in Vojvodina Province, in only one or two colonies annually. It bred in Dubovački Rit and on Sutjeska Fishpond at the beginning of that period (Ham *et al.* 2008). At the same time, Glossy

Ibis started to breed in a floodplain along the river Tamiš (Szymanski *et al.* 2007; Ham 2007; Ham and Tucakov 2010; Tucakov 2011, 2013) and continues to do so up to today, with exception of 2013 and maybe 2015. However, in 2013 a colony in Dubovački Rit was recolonized and after that again vacated. It possibly bred on Bečej Fishpond in 2012, (Balog and Šćiban 2012). In 2016-2017, breeding colonies in Serbia existed only at Obedska Bara and along the Tamiš.

Glossy Ibis has CR (Critically Endangered) breeding population status in Serbia (Tucakov and Puzović 2018). Short-term (2000-2013) and long term (1980-2013) trends are fluctuating. According to Puzović *et al.* (2015), non-breeding population status in Serbia is EN (Endangered). Migrating populations were estimated at less than 250 mature individuals in the last three generations (20 years).

Non-breeding period: outside of the breeding season the Glossy Ibis was occasionally recorded at lakes, ponds, wet pastures and rivers throughout Serbia, even on karst poljes of Pešter Plateau, above 1,150 m a. s. l. (12 individuals on 11 April 2012; 1 individual on 23 August 2015; 10 individuals on 1 May 2016; 26 individuals on 31 July 2016; 10 individuals on 10 August 2016; 19 individuals on 15 August 2016 and 2 individuals on 30 April 2018 (Vučković 2012; Puzović *et al.*, 2019), and Vlasina Plateau, above 1,200 m a. s. l. (1 individual on 9 April 2006; 2 individuals on 16 April 2006; Kulić 2009).

Habitats used by this species in Serbia include: pastures, natural grasslands, inland wetlands, and water bodies. It prefers spacious, shallow marshes, ponds, fishponds, mud banks and wet meadows. Occasionally it appears at wastewater treatment pools of sugar factories and livestock farms. Outside of the breeding season, Glossy Ibis occupies shallow muddy water of ponds, rivers, reservoirs and fishponds (Tucakov and Puzović 2018).

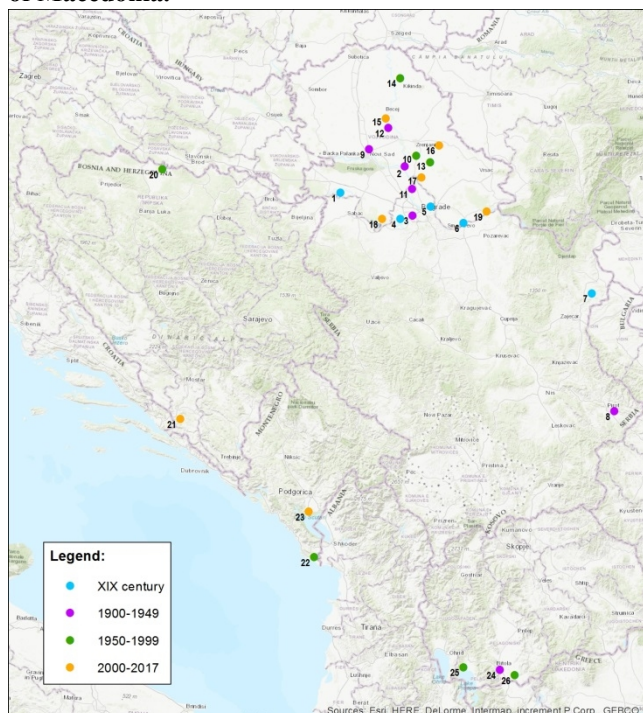
There are numbers of threats in Serbia that affect this species periodically or permanently. Some of them include: disappearance of appropriate nesting and feeding areas due to draining of marshes and other wetland habitats; regulation of rivers and decrease in the size of flooding zones, as well as large-scale land development with the goal of obtaining new arable land; demise of carp fishponds with extensive

production leading to a decrease in food base; overgrowth of open aquatic habitats with thick tree and shrub vegetation due to changes in water level or land use; burning of reed beds and other aquatic vegetation in breeding areas during the reproductive period; poaching for taxidermy or as accidental kills, as well as disturbance to birds in nesting and foraging areas and establishment of poplar and willow plantations in open wet meadows important for foraging (Tucakov and Puzović, 2018)

Depending on the number and distribution of colonies in a particular year, sometimes the entire population is breeding within the protected areas (for example in 2016 in Deliblatska Peščara and Obedska Bara, both Special Nature Reserves), while in other years all pairs are outside of protected areas (Tamiš Floodplain, Bečej Fishpond, Fishpond near Jazovo). Tamiš Floodplain is already proposed for protection as Potamišje Protected Landscape. Most (90%) of areas where this species occasionally breeds, or is recorded during migration and dispersal, are in Important Bird Areas, situated within the ecological network and Emerald Network (Tucakov and Puzović 2018).

There are several proposed and implemented conservation measures: conservation of wetlands which are necessary for reproduction and open wetlands for foraging; regular mowing of vegetation on wet meadows and periodical removal of vegetation from shallow ponds; banning of any forestation of open wetlands with poplar and willow plantations, especially in important areas such as Tamiš and Sava river floodplains; supporting semi-intensive production on carp fishponds; careful planning of hunting of aquatic birds and suppressing poaching, particularly on fishponds and other habitats used in migration period; decreasing disturbances to birds in breeding sites, through managing visitations to protected and other areas; prevention of any burning of emergent and shrub vegetation at breeding sites in reproductive period.

Figure 1. Confirmed breeding sites of Glossy Ibis in Serbia, Bosnia and Herzegovina, Montenegro and FYR of Macedonia.



Legend: 1. Zasavica, 2. Titelski Rit, 3. Makiški Rit, 4. Fenečka Bara, 5. Dunav island near Belgrade, 6. Kovinski Rit, 7. Negotinsko Blato, 8. Krupačko Blato, 9. Novosadski Rit, 10. Carska Bara, 11. Besni Fok, 12. Čuruški Rit, 13. Uzdinski Rit, 14. Jazovo Fishpond, 15. Bečej Fishpond, 16. Sutjeska Fishpond, 17. Opovo-Baranda (Slatina), 18. Obedska Bara, 19. Dubovački Rit, 20. Bardača Fishpond, 21. Hutovo Blato, 22. Bojna Delta, 23. Skadar Lake, 24. Bitolj Field, 25. Prespa Lake, 26. Pelagonia Plain.

Bosnia and Herzegovina

There are several historical records throughout the country, mainly during migration. The first breeding record was noticed in 1972 at Bardača Fishpond (Obratil 1972/73; 1983). It bred there until 1980, when it disappeared due to habitat destruction (Dalmatin *et al.* 2013). A breeding record was noted again in 2013 in Hutovo Blato near Neretva River, in a mixed colony with herons and cormorants. Maximum counted number of birds in colony was 141, with about 80-100 young fledging birds in July (Dalmatin *et al.* 2013). It was regularly observed during migration. No winter records exist.

Montenegro

According to Saveljić and Jovičević (2015), Glossy Ibis has regularly occurred as a breeding species and has been reported during migration in Montenegro. No winter records exist. In the period between 2000 and 2002 only 1-2 pairs were breeding, and a population decline of 30-50% was assessed (Puzović *et al.* 2003). In Plavnica near Skadar Lake, a total of 118 birds were observed on 8 April 1965 (Ivanović 1970). The species regularly breeds only on Skadar Lake (Vizi 2007). Bojana Delta in Ulcinj region (Puzović 2002) is a former breeding site. Breeding populations in this country were estimated at 5-10 pairs (Environmental Agency Montenegro 2013).

North Macedonia

According to Veleviski *et al.* (2010) in a period between 2002 and 2011 there were no breeding records. Several data from Skopje Valley have existed formerly, mainly during migration, with no breeding records (Karaman 1949). One breeding record exists from 1940: four eggs were conserved in museum collections from Bitolj Field (Studene Vode locality) and in total there were 24 museum specimens of Glossy Ibis in collections of tree museums: 15 in Struga, seven in Skopje, and two in Belgrade (Vasić *et al.* 2016). According to Veleviski and Vasić (2017) it bred for the last time possibly between 1957 and 1959 in former Crna Reka River marshes, Pelagonia Plain and/or Lake Prespa (in 1966).

Ringings and recoveries

In total, 13 chicks of Glossy Ibis have been ringed in former Yugoslavia (except Slovenia), from 1910 to 1992, but without any recoveries (Radović *et al.* 1993a, b). Several individuals have been ringed in Obedska Bara and in other parts of Vojvodina at the beginning of the 20th century. Between 1912 and 1933 there were 68 recoveries from ringing individuals, mainly in Vojvodina (Stanković *in litt.* 2017). Kralj *et al.* (2013) mentioned that an additional four individuals were ringed (in total 17) in Croatia after that period, with three recoveries of young birds ringed in Serbia (Vojvodina) and Hungary, but

without other data on the time and place of ringing and recoveries. According to the Data Base of Belgrade Center for Animal Marking (Stanković et al., 2018), 21 Glossy Ibis chicks were ringed in Vojvodina from 1993 to 2017, all in the period between 2010 and 2013 in Tamiš floodplain, by Ištvan Ham. There have been no recoveries until now. One adult was observed in the colony of Dubovački Rit on 15 June 2013 with a white plastic ring from Spain, on the left leg, originated from the FAO colony located in Doňana in 2011. (Figuerola, pers. comm. 2017). There is no information about ringing individuals of Glossy Ibis in other countries in Central Balkans.

Discussion

There were 12-15 colonies of Glossy Ibis in Serbia in 19th^h century, with 7,000-10,000 breeding pairs. In the first half of 20th century there were 10-11 colonies with 3,000-3,500 breeding pairs, while in the beginning of the second half of 20th century there were only 3-4 colonies with a maximum of 30-50 breeding pairs. In the last two years there were only few small colonies, with no more than 5-8 pairs.

“Return of the Ibis” project was been implemented within Obedska Bara beginning in 1992. During the first 25 years, about 220 ha of suitable foraging habitat were restored and maintained and water levels were improved, and after more than 60 years of absence four breeding pairs of Glossy Ibis were recorded at Obedska Bara in 2016 and 2017 (Puzović et al. 2016; Puzović 2017).

Populations of Glossy Ibis in Serbia, with thousands of pairs in 19th century and in the first half of the 20th century has suffered drastic reductions in the second half of the 20th century, when there were a considerable number of years without the presence of breeding pairs recorded. Since 1986 slow recovery has been observed, with fluctuations in numbers. Conditions in places of reproduction are important for the beginning of breeding and breeding success, but there is certainly a significant contribution from other populations in countries where the number is growing. This was confirmed by the observation of a Glossy Ibis that was hatched in NP Doňana in 2011, and found breeding in Dubovački Rit in 2013.

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