RESEARCH REGARDING THE SUCCESS OF WHITE-TAILED EAGLE NESTING (AVES: *Haliaeetus albicilla* Linnaeus 1758) BETWEEN 2009 AND 2017 WITHIN THE DANUBE DELTA BIOSPHERE RESERVE AND ITS SURROUNDINGS (ROMANIA)

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Abstract. During the research conducted between 2009 and 2017 in the Danube Delta Biosphere Reserve and its surroundings, a total of 74 occupied nests were registered, 61 of which showed successfully completed nesting. A total of 193 chicks resulted, so the mean of the reproductive rate in all the years, was calculated to be 1.2 chicks/nest, a value that fit within the limits of the other averages in literature. From a total of 61 nests where breeding was successfully completed, the average in 2009 was 1.36 chicks/nest, in 2010 - 1.33 chicks/nest, in 2011 it was 1.3 chicks/nest, in 2012 - 1 chick/nest, in 2013 - 1.17 chicks/nest, in 2014 - 1.15 chicks/nest, in 2015 - 1.08 chicks/nest, in 2016 - 1.12 chicks/nest, and in 2017 the mean was 1.35 chicks/nest. Out of 61 nests where breeding was successfully completed from 2009 to 2017, 29 nests were used (and breeding was successfully completed) once, 8 nests were used twice, 7 three times, 4 four times, 5 five times, 4 six times, 3 were used seven times, and only 1 nest was used eight times.

Keywords: nesting, chicks number, White-tailed Eagle, DDBR.

Rezumat. Cercetări privind succesul cuibăritului la codalb (Aves: *Haliaeetus albicilla* Linnaeus 1758) în perioada 2009 – 2017, din Rezervația Biosferei Delta Dunării și împrejurimi (România). În cursul cercetărilor în perioada 2009 - 2017, în Rezervația Biosferei Delta Dunării şi împrejurimi, s-au înregistrat în total 74 de cuiburi ocupate, din care la 61 cuibăritul s-a finalizat cu succes. În total au rezultat 193 de pui, astfel, media sporului în toți anii, a fost calculată la 1,2 pui/cuib, valoare care se încadreaza în limitele altor medii din literatură. Din totalul de 61 de cuiburi la care reproducerea s-a finalizat cu succes, în 2009 media a fost de 1,36 pui/cuib; în 2010 - 1,33 pui/cuib; în 2011 a fost 1,3 pui/cuib; în 2012 - 1 pui/cuib; în 2013 - 1,17 pui/cuib; în 2014 - 1,15 pui/cuib; în 2015 - 1,08 pui/cuib; în 2016 - 1,12 pui/cuib, iar în 2017 - media a fost de 1,35 pui/cuib. Tot din cele 61 de cuiburi la care reproducerea s-a finalizat cu succes din perioada 2009 - 2017, 29 de cuiburi au fost folosite (iar reproducerea s-a finalizat cu succes) o singură dată, 8 cuiburi de două ori, 7 de 3 ori, 4 de 4 ori, 5 de 5 ori, 4 de 6 ori, 3 de 7 ori și doar 1 cuib de 8 ori.

Cuvinte cheie: cuibărit, numărul puilor, codalb, RBDD.

INTRODUCTION

Most of the Romania's White-tailed Eagle (*Haliaeetus albicilla*) population is in the Danube Delta Biosphere Reserve (DDBR) and in the neighboring forests (Romania). This species belongs to the transpalearctic fauna. It is a large diurnal bird of prey that has a vast and continuous range from the Atlantic coast to the Pacific Ocean including western Greenland in the Nearctic, where a distinct subspecies exists, recognized as *H. albicilla groenlandicus* (SALOMONSEN, 1979).

The size of the global population of *H. albicilla* is estimated at about 12,100-24,500 nesting pairs, of which 18,000-24,600 adult birds are found on our continent, representing 50-74% of the world's population (*** 2016). The largest White-tailed Eagle populations are located in Norway, Russia, Poland, Germany, Sweden, Finland and Greenland (HAGEMEIJER & BLAIR, 1997; *** 2004).

Anthropogenic factor effects between 1950 and 1960 led to an accelerated decrease of the size of the White-tailed Eagle population in Romania, but also in many other countries in Europe, the main causes being: pesticides use, poaching and habitats destruction (BIJLEVELD, 1974; BODEA et al., 1957; CĂTUNEANU, 1973; DOMBROWSKI, 1912; DRAGOMIR & KISS, 1972; KLEMM, 1973; KORNIS, 1936; LINȚIA, 1954; PUȘCARIU, 1968; RADU, 1973; ROSETTI-BĂLĂNESCU, 1957; TĂLPEANU, 1967; SCHNELL, 1936; STEINBACHER, 1957). This decline continued until the early 1990' s (DRAGOMIR & ALMĂȘAN, 1973; GRIMETT & JONES, 1989; KISS, 1982, 1985; KLEMM, 1973; STĂNESCU et al., 1985; MARINOV & KISS, 1991; MUNTEANU, 2005). Only in 1990, after the establishment of the DDBR, the White-tailed Eagle population started to recover in the Danube Delta and its surroundings. During this period, the number of breeding White-tailed Eagles pairs was estimated at 10-20 (BURFIELD & BOMMEL, 2004; CIOCHIA, 1992, 2001; DARÓCZI & ZEITZ, 2001; GÂSTESCU & ȘTIUCĂ, 2006; HAGEMEIJER & BLAIR, 1997; HEATH & EVANS, 2000; MUNTEANU et al., 1994, 2002,; MUNTEANU, 1998, 2009) in some years even falling to under 10 pairs. Some recent studies regarding the White-tailed Eagles from the DDBR and its surroundings have been made during the last few years in sub-subchapters in doctoral and dissertation papers, some of them being published (DOROȘENCU, 2011; POCORA & ION, 2005, 2006; POCORA, 2007; POCORA & POCORA, 2008; STANCIU, 2017) but a more comprehensive situation regarding the current nesting of this bird of prey within the Danube Delta Biosphere Reserve is dealt with in other recent papers (KISS et al., 2013, 2014; SÁNDOR et al., 2015).

MATERIAL AND METHODS

In the present study, the monitoring of White-tailed eagle pairs in the DDBR and the surroundings began in 2009 and was intensified starting with 2015. The number of nests varies from year to year. New nests appeared, others were destroyed by weathering or other causes. Identification of the White-tailed Eagle nests was carried out in two stages: the first was carried out during the winter period (December - March), when trees are bare of leave and the nests are visible - they can be observed even from a few kilometres, the second stage, was during the spring-summer period (from April to June), to investigate the nesting success of the White-tailed Eagles. Among the methods used to identify the White-tailed Eagle nests, we used the method of transects and fixed point (in the areas: Parcheş, Somova, Nufăru, Victoria, Baltenii de Sus, Enisala, Mandra forest (Agighiol) and Murighiol-Dunavăţ described in literature (BIBBY et al., 2000).

The effort for nest searching within the DDBR was particularly complex, especially as a rule, each pair of eagles builds several nests. The method used for locating the nests was to navigate the territory by boat on the DDBR canals and lakes. Thus, on a lake or in backwaters, the trees around the lake were scanned using binocular. When an adult bird was seen in a tree, the observer headed in the bird's direction by boat and started looking for the nest in a 300 meter radius. Usually, the adult bird (generally the male) was standing guard near the nest. This method has given good results and in this way a significant number of White-tailed Eagle nests were found.

A large part of the nests were located with the help of the ornithologists and the field workers of the Danube Delta National Institute for Research and Development (DDNIRD) and others were reported by the inspectors and the environment agents (rangers) of the Danube Delta Biosphere Reserve Authority (DDBRA) and the environment commissioners within the Danube Delta Biosphere Reserve Commissariat, but also with the help of the forestry engineers and technicians, who are assigned to on the territory of Tulcea County. At the same time, fishermen and locals from the study area were also involved, following the check of the nests by the author.

Vehicles were used for terrestrial routes and boats with engines ranging from 6 to 20 HP for aquatic routes. The identification of birds from a distance was done using optical instruments (binoculars and photo camera), from the Institute.

The GPS (Global Positioning System 62s) was used in order to locate the White-tailed Eagle nests as accurately as possible. Coordinates were taken at the tree or, where this wasn't possible, near it (maximum 100 m of nest), followed by coordinates correction using ArcGIS.

RESULTS AND DISCUSSION

The current distribution of White-tailed Eagle pairs is practically limited to the territory of the DDBR, with only two pairs located in the Babadag - Enisala and Mandra (Agighiol) forests in the western part of the DDBR (several areas from Northern Dobrogea were verified, where the species' nests have been reported previously, but currently they have not been found).

During the investigations conducted in the study area, in the 9 years of research, a total of 74 inhabited nests were registered, out of which 61 nests showed successful nesting and 193 chicks were recorded. The success of the nest is significantly influenced by a number of natural factors, as well as by the anthropic ones, even in this biosphere reserve. Therefore the mean reproductive rate for all the years was calculated to 1.2 chicks/nest (Table 1). In contrast, at the beginning of the 20th century in Romania, especially in the Danube Delta, after a suvey of 208 nests, the result was a mean of 1.955 eggs or chicks per nest (DOMBROWSKI, 1912). We do not have a mean number of eggs, lacking the actual data for Northern Dobrogea, but there is some information on the number of hatched and juvenile chicks which left the nest. Among the more recent data, regarding nests on Letea between 2004 and 2009, for the 4 nests under observation an average of 1.93 chicks nest is indicated (POCORA & POCORA, 2008; POCORA, 2010). Our mean in the same area for a period of 9 years is 1.2 chicks/nest. Another study, that refers to the situation of the White-tailed Eagle pairs on the territory of the DDBR during 2009-2011, mentions that the nesting success rate was 1.37 chicks nest (SÁNDOR et al., 2015). In this respect, our mean of 1.2 chicks/nest can be considered as having values close to those described in the reference literature.

In Table 1 we present the nesting success of the White-tailed Eagles families monitored during 2009-2017 in DDBR and surroundings.

It should be noted that some of the monitored nests within the DDBR and its surroundings territory are over 9 years old. The literature states that a single White-tailed Eagle nest can be used for more than 20 years.

Table 2 shows the number of inhabited and used nests and the nesting success, as well as the mean number of chicks from the successfully used nests between 2009 and 2017, from the study area.

Table 1. The number of White-tailed Eagle chicks (*Haliaeetus albicilla*) in the DDBR and its surroundings (Romania), which left the nest during 2009-2017 (n = 61).

No. crt.	Location of nest	No. of chicks /year									Total
		2009	2010	2011	2012	2013	2014	2015	2016	2017	
1	Partizani, north shore, Mile 33	2		1		1	1		1		6
2	Huntea S (Şontea Nouă area)	2									2
3	Grindul Cabanei (Ilganii de Sus area)				1	1	1			2	5
4	Lake Ulasova 1	1	1								2
5	Huntea N (Şontea Nouă area)	2	1					1			4
6	Head Cosburun (Holbina Gulf)							1			1
7	Periteasca Mica (between Goloviţa and Zmeica)				1	2	2	1	1	2	9
8	Lake Zmeica									2	2
9	Crişan, Torba Goală V (Incinta Ceamurlia)							1			1
10	Crişan, Torba Goală E (Incinta Ceamurlia)							1	1	1	3
11	Letea, forest margin 1	1	2		1	1	1	1			7
12	Letea, forest margin 2								1	1	2
13	Letea, Haşmacul lui Bercea	1	1	1							3
14	Letea, Haşmacul lui Bercea 2				1	1	1		1	1	5
15	Letea, Târla Popii	1		2	1	2	1	2	1	1	11
16	Letea, Cardon, Schitu area	1	1	1	1	2					6
17	Letea, Cardon, Schitu 2 area						1	1	2	2	6
18	Păpădia Veche-Şontea	2									2
19	Lake Argintiu	1				1	1	1			4
20	Lake Roşca N									1	1
21	Martinca, west shore	1								1	2
22	Pădurea Babadag, Dealul Cartalului			1	1	1	1	1	1	2	8
23	Pădurea Mandra (Agighiol)									2	2
24	Channel Taranova		2			1	2	2	2	2	11
25	Lake Merheiul Mare V		1		1	1	1	1	1	1	7
26	Pisceanei S-Arhipenco - L. Alb			2							2
27	Lake Văcaru									1	1
28	Iulia Mile 22 - 2									2	2
29	Sf. Gheorghe, cherhana 1				1	1	1		1	1	5
30	Channel Ciobănică Nou			2							2
31	Lake Leahova Mare			1	1	1	1	1	1	1	7
32	Channel Palade			1							1
33	Mile 5 Sud (br. Sulina)						1		1	1	3
34	Lake Ulasova 2							1			1
35	Channel Călugăr 1 (area L. Parcheş)					1			1	1	3
36	Channel Letieni						1	1			2
37	Sf. Gheorghe plantation N-V							1	1		2
38	Lake Nebunu E				1	1	2	1	2	2	9
39	Scaunele (Gârla Şontea)				1	1		1	1	1	5
40	Lake Obretinul Mic V							1			1
41	Lake Obretinul Mic E							1			1
42	Lake Trei Iezere						1		1	1	3
43	Lake Oaia				1						1
44	Lake Macovei						1		1	1	3
45	Lake Cuzmintii Vest								1	1	2
46	Lake Gorgova E								1	1	2
47	Chilia Branch Km 5								1	1	2
48	Ostrovul Babina								1		1
49	Channel Lejai									1	1
50	Channel Ivancia									2	2
51	Sf. Gheorghe Branch Km 80									1	1
52	Bălteni de Jos N-V									2	2
53	Păpădia incintă, northeast part		2								2
54	Lake Meşterul N									1	1
55	Lake Meşteru 1			1							1
56	Channel Ciobănică 1							1			1
57	Corciovata 1 V (Păpădia Nouă area)		1								1
58	Lake Vătafu V					1	1		1	1	4
59	Channel Sfiştofca 1							1			1
60	Sf. Gheorghe Branch Km 65									2	2
61	Channel Candura– Stipoc (L. Băclăneştii area)							1			1
Total		**15**	**12**	**13**	**13**	**20**	**22**	**25**	**27**	**46**	**193**
Mean chicks/ successfully completed nesting		**1.36**	**1.33**	**1.3**	**1**	**1.17**	**1.15**	**1.08**	**1.12**	**1.35**	**1.2**

Table 2. The evolution of White-tailed Eagle (*Haliaeetus albicilla*) nesting success between 2009 and 2017, within the DDBR and its surroundings (Romania).

Years	No. of nests visited	No. of occupied nests	No. of alternative nests (feeding, rest, etc.)	No. of successfully completed nesting	Mean no. of chicks/ successfully completed nesting
2009	36	21	15	11	1.36
2010	43	21	22	9	1.33
2011	55	20	35	10	1.3
2012	71	25	46	13	1
2013	71	26	45	17	1.17
2014	71	31	40	19	1.15
2015	63	29	34	23	1.08
2016	64	34	30	24	1.12
2017	62	38	24	34	1.35

As shown in Fig. 1, from the total number of 61 nests where the breeding nesting was successfully completed between 2009 and 2017, 29 nests were used (and breeding was successfully completed) once, 8 were used twice, 7 three times, 4 four times, 5 five times, 4 six times, 3 were used seven times, and only 1 nest was used eight times.

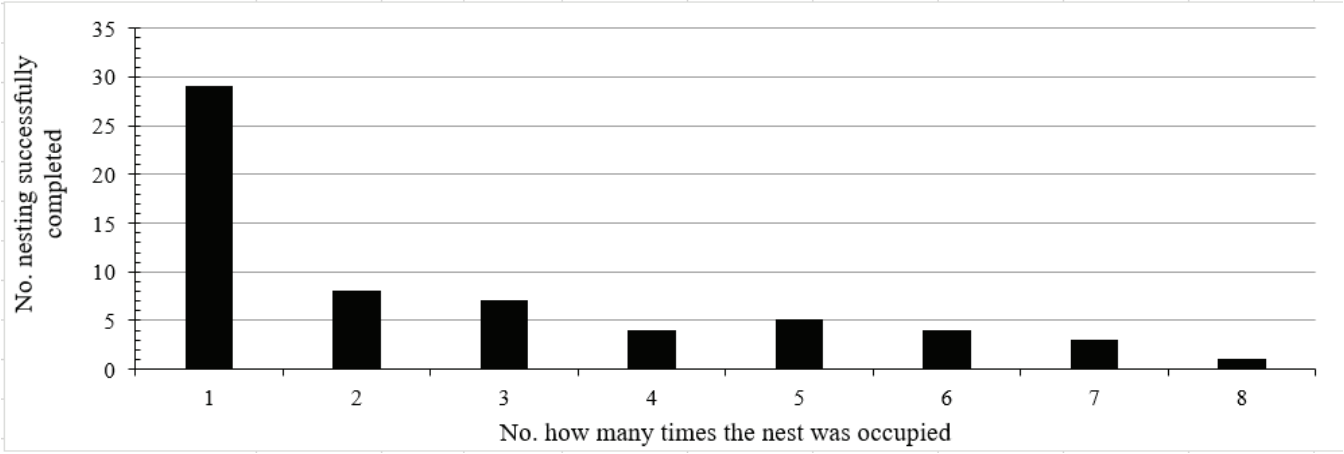

Figure 1. Numerical distribution of the White-tailed Eagle nests (*Haliaeetus albicilla*) where breeding was successfully completed in relation to the number of years in which the nest was used for breeding (n = 61), within the DDBR and its surroundings, from 2009 to 2017.

Thus, from a total of 61 nests successfully used for breeding during the above mentioned period, in 2009 the mean was 1.36 chicks/nest; in 2010 - 1.33 chicks/nest; in 2011 - 1.3 chicks/nest; in 2012 - 1 chick/nest; in 2013 - 1.17 chicks/nest; in 2014 - 1.15 chicks/nest; in 2015 - 1.08 chicks/nest; in 2016 - 1.12 chicks/nest, and in 2017 - the mean was 1.35 chicks/nest (Fig. 2).

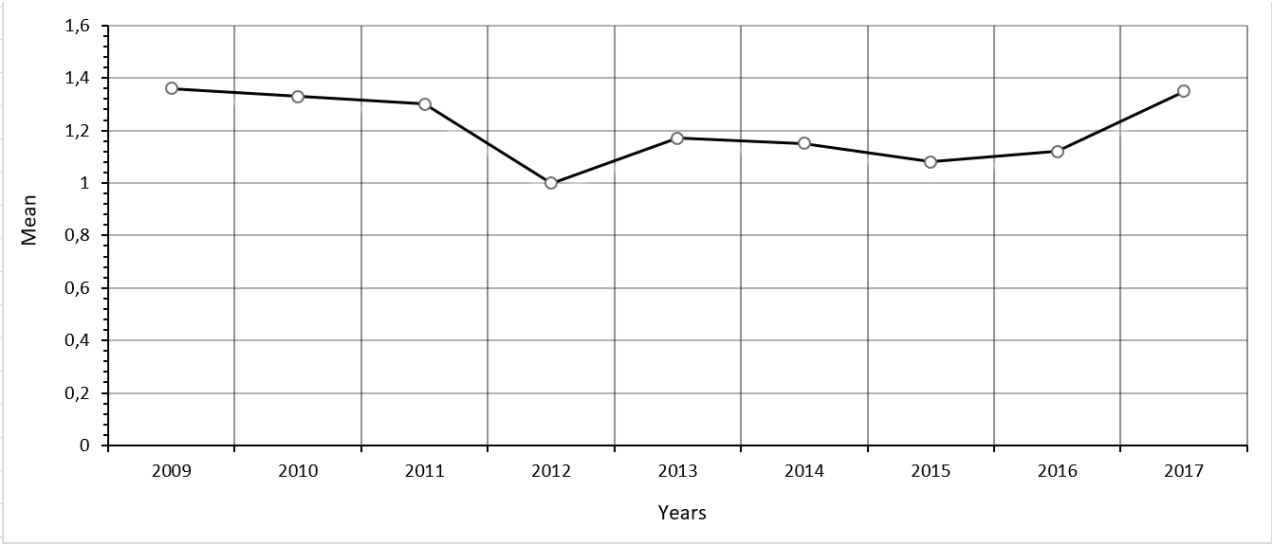

Figure 2. Annual mean of White-tailed Eagles' chicks per nest (*Haliaeetus albicilla*) (n = 61) in the DDBR and its surroundings (Romania) between 2009 and 2017.

Even after they leave the nest, the chicks stay for 1-2 months in the vicinity of their parents, learning hunting techniques. During this time, the White-tailed Eagle families with chicks can be observed around large colonies in the delta, feeding with other species' chicks still not fully confident in their own wings. Similar concentrations of White-tailed Eagles have been observed in the bird colonies of Purcelu, Nebunu, Martinca, Rosca-Buhaiova. The chicks become completely independent, capturing-food themselves, at the age of 95-100 days (BAUER & BERTHOLD, 1996; BEZZEL, 1985; CIOCHIA, 1992; LINTIA, 1954; ROSETTI-BĂLĂNESCU, 1957; PUŞCARIU, 1968; unpublished information).

In Fig. 3 we present the situation of the nesting effectiveness trend and that of the White-tailed Eagle chicks in the DDBR and its surroundings from 2009 to 2017.

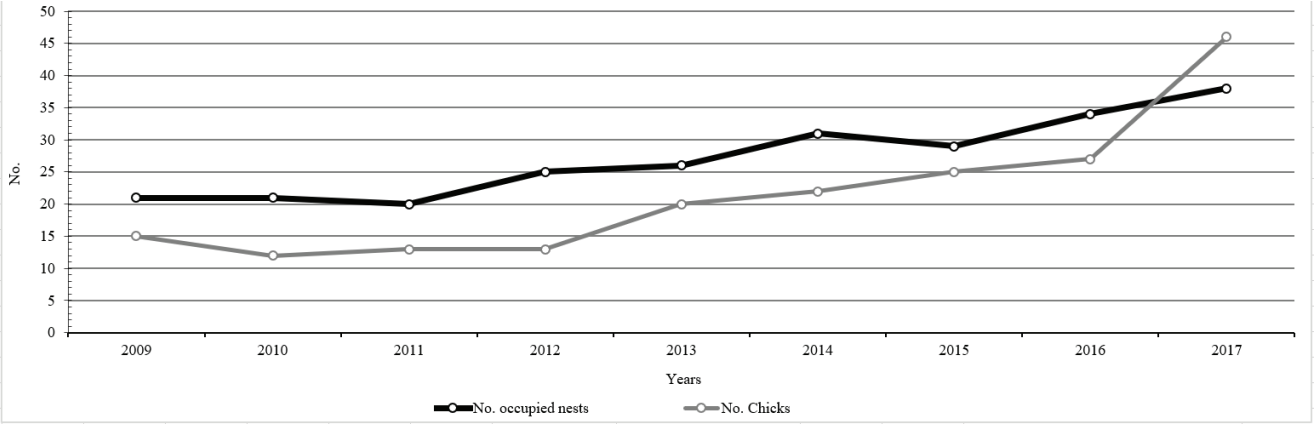

Figure 3. The trend of White-tailed Eagle (*Haliaeetus albicilla*) effectiveness in the DDBR and its surroundings from 2009 to 2017.

As can be seen in Fig. 3, the population has a slightly increasing trend over the years. Similar situation was also found in Hungary (HORVÁTH, 2007; HORVÁTH & PINTÉR, 2005).

As we have seen, the situation of the nest of the species in question is dynamic, in constant change. Considering the role of emblematic species on the territory of DDBR of White-tailed Eagle, we consider it necessary to continue the monitoring of the herds and the transmission of the results to other institutions, especially to DDBRA and forestry institutions. The presence of the nest support trees must be taken into account both in the regulations issued by the DDBRA and in the elaboration of the forest planning plans, which are found on the forestry background.

CONCLUSIONS

From the data presented above, it appears that the White-tailed Eagle population within the DDBR is increasing slightly. Limiting factors to population growth may be natural or anthropogenic.

At the moment, the anthropogenic factors that are damaging White-tailed Eagle nests in DDBR are disturbance by fishermen during the White-tailed Eagle's breeding period, the construction of fishing huts near nests, fires caused by locals, shooting at the nest during the hatching period etc., which adds to the ones caused by natural factors (falling of trees or branches which support the nest, strong winds throughout the year, rain and snow fall).

As a result of the observations regarding the nesting of White-tailed Eagle on the territory of RBDD, we consider it necessary to monitor the flocks and further.

Nesting site information has to be communicated to institutions, ARBDD and forestry.

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BIBLIOGRAPHY SELECTIVE

BAUER H. G. & BERTHOLD P. 1996. *Die Brutvögel Mitteleuropas. Bestand und Gefährdung*. Edit. Aula Verlag. Wiesbaden: 92-93.

BEZZEL E. 1985. *Kompendium die Vögel Mitteleuropas. Nonpasseriformes*. Edit. Aula Verlag. Wiesbaden: 224-226.

BIBBY C., JONES M., MARDSEN S., MUNTEANU D. 2000. *Metode de teren pentru studiul păsărilor*. *Metode de evaluare a abundenţei păsărilor*. BirdLife International. Societatea Ornitologică Română. Cluj. **12**. 104 pp.

BIJLEVELD M. (Ed). 1974. *Birds of Prey in Europe*. Macmillan Press Ltd. London. 263 pp.

BODEA M., CĂTUNEANU I., COMIȘA A. M., CREȚEANU A., MANCIUR E., NICULESCU D., POPESCU A., ROSETTI B., RUDESCU L., SĂULESCU N., VASILIU D. G., VOLOSCIUC A. 1957. *Din viața Deltei Dunării*. Asociația Generală a Vânătorilor și Pescarilor Sportivi din R. P. R. București: 178-179.

BURFIELD I. *&* BOMMEL V. F. (Eds). 2004. *Birds in Europe: population estimates, trends and conservation status.* BirdLife International (BirdLife Conservation). Cambridge. Series No. 12: 72.

CĂTUNEANU I. I. 1973. Păsările răpitoare din Dobrogea de nord şi situaţia lor actuală. *Peuce*. Muzeul „Delta Dunării" Tulcea. **3**: 419-452.

CIOCHIA V. 1992. *Păsările clocitoare din România*. Edit. Ştiinţifică. Bucureşti: 129-131.

CIOCHIA V. 2001. *Aves Danubii: Pasările Dunării de la izvoare la vărsare.* Societatea de Ornitologie, Protecția Păsărilor și a Naturii din România. Edit. Pelecanus. Brașov. 282 pp.

DARÓCZI SZ. *&* ZEITZ R. 2001. *Indrumător pentru protecţia păsărilor răpitoare diurne din România. Metode, recomandări şi sugestii, lista completă a speciilor*. Edit. BirdLife International. Tg. Mureș: 33-34.

DOMBROWSKI R. 1912. Ornis Romaniae. Die vogelwelt Rumanien's. Systematisch und biologisch-geographisch beschrieben. *Buletinul Societății Ştiinţifice*. Bucureşti. **19**: 1395-1401.

DOROȘENCU A. 2011. *Ecologia speciilor de păsări răpitoare diurne din Parcul Național Munții Măcin*. Teză de Doctorat. Universitatea „Al. I. Cuza" Iași: 2-171.

DRAGOMIR N. I. *&* KISS JANOS-BOTOND. 1972. Probleme ale cercetării cinegetice în Delta Dunării. *Simpozionul "Noi orientări în cercetarea cinegetică"*. Academia R. S. R., Academia de Ştiinţe Agricole şi Silvice Bucureşti, 1 februarie 1972: 58-73.

DRAGOMIR N. I. *&* ALMĂȘAN H. 1973. Dinamica efectivelor la principalele specii de păsări acvatice de mare importanţă faunistică şi cinegetică din Delta Dunării. *Peuce*. Muzeul „Delta Dunării" Tulcea. **3**: 519-538.

GÂȘTESCU P. *&* STIUCĂ R. (Eds). 2006. *Delta Dunării Rezervaţie a Biosferei*. Edit. Dobrogea. Tulcea: 380-383.

GRIMETT R. F. A. *&* JONES T. A. 1989. *Important Bird Areas in Europe*. International Council for Bird Preservation. Edit. Technical Publication. Cambridge. **9**: 567-580.

HAGEMEIJER W. J. M. *&* BLAIR M. J. 1997. *The EBCC atlas of European breeding birds*. Edit. T & A D Poyser. London: 136-137.

HEATH F. M. *&* EVANS M. I. (Eds.). 2000. *Important Bird Areas in Europe: priority sites for conservation*. Cambridge. BirdLife Conservation Series. **10**: 31.

HORVÁTH Z. 2007. White-tailed Eagle (*Haliaeetus albicilla*) in Hungary between 1987–2007. Denisia. Biologiezentrum Linz. **27**: 85–96 pp.

HORVÁTH Z. *&* PINTÉR T. 2005. A hazai rétisas (*Haliaeetus albicilla*)-állomány fészkelőhely-választása a 2000. év felmérése alapján. *Aquila.* Budapest. **112**: 23–32.

KISS J. B. 1982. Câteva specii mai rare de păsări, observate în timpul verii anului 1978. Delta Dunării. *Peuce*. Muzeul „Delta Dunării" Tulcea. **2**: 99-108.

KISS J. B. 1985. Câteva specii de păsări mai rare, observate în Dobrogea de nord, în perioada 1980-1982, Delta Dunării. *Studii şi comunicări de ecologie*. Tulcea. **1**: 103-108.

KISS J. B., ALEXE V., DOROȘENCU A., MARINOV M. jr., SANDOR A. 2013. Situaţia actuală şi preferinţele faţă de locurile de cuibărit ale codalbului (*Haliaeetus albicilla*) în Delta Dunării (România). *Revista de Silvicultură şi Cinegetică*. Braşov. **18**(32). 139-143.

KISS J. B., SANDOR A., ALEXE V., DOROSENCU A., MARINOV M. 2014. Date privind situaţia actuală a codalbului (*Haliaeetus albicilla* (L.) în Delta Duării - România şi contribuţii la cunoaşterea regimului său trofic în perioada reproducerii. *Revista Pădurilor*. București. **129**(1-2): 77-86.

KLEMM W. 1973. Situaţia codalbului (*Haliaeetus albicilla*) şi a şoimului dunărean (*Falco cherrug*) în primăvara anului 1971, pentru Delta Dunării. *Peuce*. Muzeul „Delta Dunării" Tulcea. **3**: 625-631.

KORNIS K. 1936. *Măsuri de protecţie pentru avifauna Deltei Dunării*. Edit. Carpații. Cluj. **4**(10). 272 pp.

LINȚIA D. 1954. *Păsările din R. P. R.,* Edit. Academiei R. P. R. București. **2**: 268-274.

MARINOV M. 1990. Consideraţii privind situaţia codalbului (*Haliaeetus albicilla*) şi a şoimului dunărean (*Falco cherrug*) în Delta Dunării (1986 - 1989). *Ocrotirea Naturii şi a Mediului Inconjurător*. Edit. Academia Română. București. **34**: 51 pp.

MARINOV M. *&* KISS J. B. 1991. A rétisas (*Haliaeetus albicilla*) és a kerecsen sólyóm (*Falco cherrug*) fészkelése a Duna deltájában 1980 - 1990 között. A Magyar Madártani és Terméazervédelmi Egyesület Tudományos Ülése. Szombathely. Budapesta. **3**: 302-320.

MUNTEANU D. 1998. *The status of birds in Romania*. Publicaţiile Societăţii Ornitologice Române. Cluj-Napoca. **17**: 63.

MUNTEANU D. 2009. *Păsările rare, vulnerabile şi periclitate în România*. Edit. Alma Mater. Cluj-Napoca: 75-76.

MUNTEANU D. 2005. Păsări. În: Botnariuc & Tatole (Eds.) *Cartea Roşie a Vertebratelor din România*. Edit. Academiei Române. Bucureşti: 260 pp.

MUNTEANU D., PAPADOPOPOL A., WEBER P. 1994. *Atlasul provizoriu al păsărilor clocitoare din România*. Publicaţiile Societăţii Ornitologice Române. Cluj-Napoca. **2**: 40.

MUNTEANU D., PAPADOPOL A., WEBWR P. 2002. *Atlasul păsărilor clocitoare din România*. Ediţia II. Publicaţiile Societăţii Ornitologice Române. Cluj-Napoca. **16**: 32.

PETRESCU M. 1988. *Răpitoarele de zi din Delta Dunării. Lucrare pentru susţinerea gradului I.* Universitatea din Bucureşti. 124 pp.

POCORA V. 2007. Codalbul (*Haliaeetus albicilla*). *Despre păsări*. Societatea Ornitologică Română. Tulcea. **2**: 10-11.

POCORA V. 2010. Diurnal birds of prey (*AVES*) from Letea Forest (the Danube Delta Biosphere Reservation, Romania). *Travaux du Muséum National d'Histoire Naturell "Grigore Antipa"*. Bucureşti. **53**: 303-318.

POCORA V. *&* ION C. 2005. Preliminary data concerning ornithofauna of the protected area Letea forest. *Scientific Annals of the Danube Delta Institute for Research and Development*. Tulcea. **11**: 84-86.

POCORA V. *&* ION C. 2006. Aspects concerning ornithofauna distribution in Letea Forest (Danube Delta Biosfere Rezervation). *Analele ştiinţifice ale Universităţii „Al. I. Cuza"*. Iaşi. **52**: 143-149.

POCORA V. *&* POCORA E. I. 2008. Nesting bird species in Letea forest (the Biosphere Reservation of Danube Delta). *Analele Ştiinţifice ale Universităţii „Al. I. Cuza"*. Iaşi. **54**: 207-220.

PUŞCARIU V. 1968. Observations sur la repartition et l'ecologie de *Haliaeetus albicilla* dans le Delta du Danube. *Travaux du Muséum d'Histoire Naturelle "Grigore Antipa"*. Bucureşti. **8**: 959-968.

RADU D. 1973. Populareа cu păsări a Deltei Dunării. *Peuce.* Muzeul „Delta Dunării" Tulcea. **3**: 507-518.

ROSETTI-BĂLĂNESCU C. 1957. *Păsările vânătorului*. Edit. Vânătorul şi Pescarul Sportiv. Bucureşti. 268-273.

SALOMONSEN F. 1979. *Ornithological and ecological studies in SW Greenland*. *Med-delelser om Groenland*. Nyt Nordisk Forlag Arnold Busck, Copenhagen. 204 pp.

SANDOR D. A., ALEXE V., MARINOV M., DOROŞENCU A., DOMŞA C., KISS J. B. 2015. Nest-site selection, breeding success, and diet of white-tailed eagles (*Haliaeetus albicilla*) in the Danube Delta, Romania. *Turkish Journal of Zoology*. Scientific and Technological Research Council of Turkey. Ankara. **39**: 300-307.

SCHNELL H. 1936. *Ghid de vînatoare în Delta Dunării*. Edit. Carpaţii. Cluj: 89-96.

STANCIU C. R. 2017. *Studiu privind biologia şi dinamica populaţiilor de păsări răpitoare de zi (Aves: Falconiformes) din Dobrogea*. Teză de Doctorat, Universitatea din Bucureşti: 30-34.

STEINBACHER J. 1957. Tierleben in Donaudelta. Vögel. *Natur und Wolk*. Edit. Senckenbergiana Biologica. Frankfurt. **37**: 177 pp.

STĂNESCU D., WEBER P., BÉRES J., MIHĂILEANU AL. 1985. Analiza calitativă şi cantitativă a populaţiilor de păsări din pădurea Letea-Delta Dunării. *Studii şi comunicări de ecologie*. Edit. Arta Grafică. Tulcea. **1**: 89-102.

TĂLPEANU M. 1967. Les Falconiformes de Roumanie (II). *Travaux du Muséum d'Histoire Naturelle "Grigore Antipa"*. Bucureşti. **7**: 397-407.

***. 2004. *Bird in Europe: population estimates, trends and consevation and status*. BirdLife International. (BirdLife Conservation Series No. 12). Cambridge: 72.

***. 2016. BirdLife International. *Haliaeetus albicilla*. *The IUCN Red List of Threatened Species 2016*: e.T22695137A93491570. http://dx.doi.org/10.2305/IUCN.UK.20163.RLTS.T22695137A93491570. en. (Accessed at March 08, 2018).

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