

Current Breeding Distribution and Conservation of White-tailed Eagle, *Haliaeetus albicilla* (L.) in Bulgaria

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Abstract: The current status of the breeding distribution of the White-tailed Eagle, *Haliaeetus albicilla* (L.) in Bulgaria in the period 2006-2012 is presented. The breeding distribution of the White-tailed Eagle in Bulgaria can be divided in three geographical regions with a total number of 23 pairs. The stronghold is Danube River with 11 breeding pairs. Thracian Plain and Black Sea Coast hold 9 and 3 pairs, respectively. The mean distance between two neighbouring pairs along the Danube River ($n = 5$) is 69 km (± 51 km), while in South Bulgaria ($n = 9$) is 87 km (± 53 km). The nests along the Danube ($n = 5$) are located at 90-522 m (mean = 210 ± 178 m) away from the water and in South Bulgaria ($n = 9$) between 1-8925 m (mean = 3632 ± 3453 m). The species breeds at altitude between 27-368 m ($n = 15$) (mean = 160 ± 130 m) a.s.l. The number of the wintering individuals is highly fluctuating in a range of 17 to 34 individuals. The preferred breeding habitats are riparian forests along the big rivers and wetlands. Black and white poplar trees are selected as most preferred for building the nest. Threats, such as forestry, land exploitation, human disturbance, wetlands drainage and river regulation are still high and very sensitive for the eagle's survival in Bulgaria.

Keywords: White-tailed Eagle, Breeding distribution, Habitats, Conservation measures, Forest management, Danube River

Introduction

The population of the White-tailed Eagle in Europe shows strong recovery at the beginning of the 1970s, particularly in the northern and western European part of its range. During the 20th century, the human persecution, poisoning and habitat destruction had the main role in the dramatic decline of the White-tailed Eagle in Europe population. The ban of DDT and PCBs used in most countries in its range, results in a normal eggshell thickness in this species and has probably been the most important single factor leading to population increases, although increased protection of the birds and their habitats have also promoted recovery (HELANDER, STEJERNBERG 2002). In Bulgaria in the beginning of the 20th century, the White-tailed Eagle was often nesting on the Danube River, Black Sea Coast and along the large inland rivers (FINSCH 1859; FARMAN 1869; ELWES BUCKLEY 1870; RADAKOFF 1879; ALLEON 1886; HRISTOVICH 1890; REISER 1894; LORENZ-LIBURNAU 1893; BOETTICHER 1927; HARRISON 1933; JORDANS 1940; PATEV 1950; ARABADJIEV 1962). The first evidences for decreasing of the population are reported after 1930 (HARRISON 1933). The population dropped sharply and continued to do so until the end of the 1970s when only one breeding pair was known in the country (IVANOV 1985). In the 1990s it began to increase gradually with fluctuating rates, with roughly one pair each year. Most of the new pairs appear in the areas where the species used to breed in the past. First overview of the current status is made in 2005 and reports for 12 breeding pairs in the country (IVANOV 2007). According to the Atlas

of breeding birds in Bulgaria the population is estimated at 10-15 pairs (TODOROV 2007). The backbone of the breeding population is located along the Danube River between Bulgaria and Romania with about 11 pairs, but in recent years eagles successfully breed inland, near big rivers and dams. Successful or probable breeding is reported near the valleys of Tundzha, Arda Rivers and some of biggest dams in Southeastern Bulgaria (SHURULINKOV, DASKALOVA 2007). Currently, the trend of the population can be evaluated as increasing.

This paper review the current status of the White-tailed Eagle breeding and winter distribution and numbers in Bulgaria, but also aims (1) to identify some of the major threats for the species and (2) to address the most priority conservation measures for the protection of the eagles' habitats.

Material and Methods

Since 2006, Bulgarian Society for the Protection of Birds/BirdLife Bulgaria started to collect more systematic data about the breeding distribution of the White-tailed Eagle in the country within the frame of different conservation and research projects. All available data of recent observations and preferred breeding habitats of the White-tailed Eagle was collected and carefully analysed. For the purpose of this

study, all observed immature and juvenile eagles were excluded as well as all habitats not suitable for the species, different than 22 Standing fresh Water, 24 Running water, 41 Temperate broad-leaved deciduous forests, 44 Temperate riverine and swamp forests and brush (IANKOV, 2007). As final output of the analysis we generated a list of sites, where adult birds were seen during the breeding season in suitable habitats and those sites, which are already known as breeding territories. The main field technique used for investigation if certain territory is occupied was observation from stationary point (BIBBY et al. 1999), situated in the vicinity of the potential nesting area, preferably vantage points which offer good visibility. In order to confirm the breeding occupancy of each potential site, field work was carried out at least twice in the breeding period between March and July 2006-2012. A breeding territory is considered occupied if a pair of adult birds is observed in the area during the breeding season or an active nest is found. During the field work we have collected data about the habitat type and tree species, where the nests were located. The habitats assessment was made based on the most abundant tree species found in the breeding area and by its geographical position. Habitats categorization is according to the Bulgarian habitats classification (MESHINEV, APOSTOLOVA, 2005). The exact geographical posi-

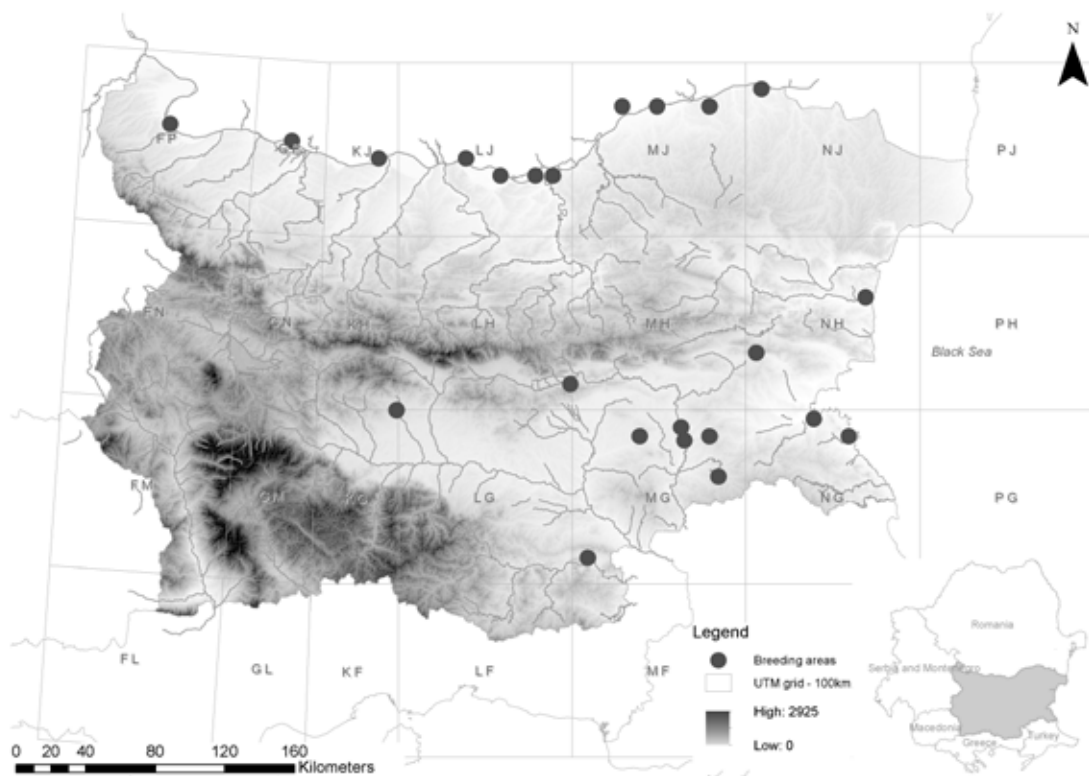


Fig. 1. Breeding distribution of White-tailed Eagle in Bulgaria (n = 23)

tion of each nest was marked using handheld GPS device. The distance between two neighbouring pairs and preferred breeding altitude was calculated through ESRI ArcMap 10.1 (ESRI Redland, CA, USA, 2013). The potential area suitable for breeding of the White-tailed Eagle was prepared based on several variables. Environmental variables such as distance to water bodies (lakes, dams, marshes > 25 ha), broad-leaved forest according to Corine Land Cover 2006 (EEA 2006) and digital elevation model (DEM < = 370 m a.s.l.). As disturbance variables we selected distance to settlements, road and railway network. The water bodies we defined as suitable hunting areas and the broad-leaved forest as suitable breeding areas, based on our field results. Due to lack of data about the locations of the timber plantation forests in the country we didn't exclude them from the analysis. The roads, railways and settlements were classified as sources of disturbance, which are normally avoided by the eagles. Then we created buffers of 10 km around the water bodies, 1 km around the roads, railways, settlements and DEM (< = 370 m a.s.l.) as preferred altitude for the species, based on our field results. Using sets of geoprocessing tools of ESRI ArcMap software we then clipped the layer of the broad-leaved forest with all these variables. The result of this analysis represents a map of the potential breeding areas for the species in Bulgaria.

Data about the wintering population is collected according to the methodology described in KOSTADINOVA, DERELIEV (2001) during the International Waterbird Census in mid of January.

Results

Breeding distribution

The current breeding distribution of White-tailed Eagle in Bulgaria can be divided in three geographical regions with a total number of 23 pairs. We found 14 occupied nests and another 9 breeding areas, where the pair of an adult eagles is presented, but the nests were not found. The stronghold is Danube River with total of 11 breeding pairs, Thracian Plain (including Eastern Rhodopes) holds 9 pairs and along Black Sea Coast - 3 pairs (Fig. 1). The mean distance between two neighbouring pairs along the Danube River (n = 5) is 69 km (\pm 51 km), while in South Bulgaria (n = 9) is 87 km (\pm 53 km). The nests along the Danube (n = 5) are located at 90-522 m (mean = 210 \pm 178 m) away from the water and in South Bulgaria (n = 9) between 1-8925 m (mean = 3632 \pm 3453 m). The species breeds at altitude between 27-368 m (n = 15) (mean = 160 \pm 130 m) a.s.l.

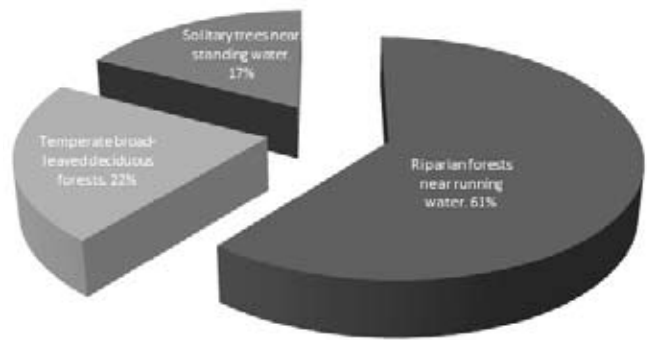


Fig. 2. Habitats preferred for nesting by the White-tailed Eagle (*Haliaeetus albicilla*) in Bulgaria (n = 23)

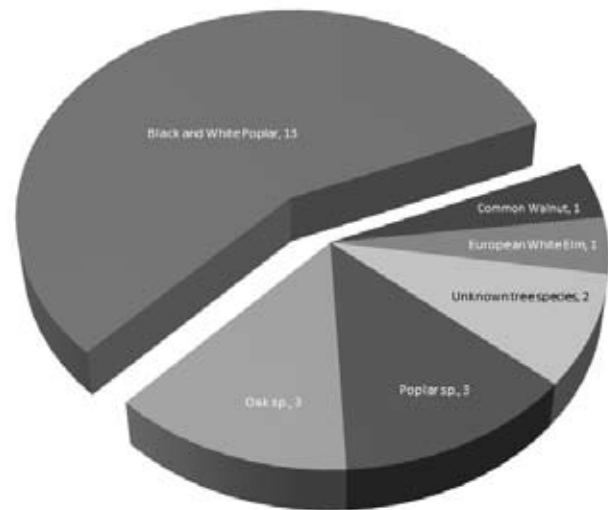


Fig. 3. Tree species preferred for nesting by the White-tailed Eagle (*Haliaeetus albicilla*) in Bulgaria (n = 23)

Habitat selection

The main preferred habitat occupied by the eagles are riparian forests (n = 14), followed by broad-leaved (oak) forests (n = 5) and solitary trees among arable land (n = 4) (Fig. 2). Along the Danube River the species' breeding areas (n = 11) are found on islands with riparian forests. These forests are mixed association of Pedunculate Oak (*Quercus robur*), European White Elm (*Ulmus laevis*), White Willow (*Salix alba*), Black Poplar (*Populus nigra*) and White Poplar *Populus alba*). As supporting nest trees along the Danube the eagles select mature poplar trees, mainly Black and White Poplar (Fig. 4). The Black Sea pairs are presented in very dense deciduous forests with the same tree species and dominant presence from association of Pedunculate Oak (*Quercus robur*) and European White Elm (*Ulmus laevis*). In Southern Bulgaria the White-tailed Eagle nests in riparian or other broad-leaved (oak) forests as well on solitary trees or group of trees among the arable



Fig. 4. Potential suitable breeding habitats for White-tailed Eagle in Bulgaria

lands or pastures. Riparian forests are represented by mixture of Pedunculate Oak (*Quercus robur*), European White Elm (*Ulmus laevis*), Common Ash (*Fraxinus excelsior*), Black Poplar (*Populus nigra*) and White Poplar (*Populus alba*).

Based on the obtained results from the analysis of the potential suitable area for breeding, we can conclude that 12 % of the broad-leaved forests near the water bodies in the country (Fig. 4) are suitable as breeding area of the eagles.

Wintering population

During the winter the White-tailed Eagle is registered near large and open wetlands, mainly along the Danube River, the coastal lakes – Durankulak, Shabla, Bourgas Lakes Complex and the biggest dams in South Bulgaria – Ovcharitza, Pyaschnik, Koprinka, Studen Kladenetz, Ivaylovgrad and Jrebchevo. More rarely it winters also on some of the large dam lakes in Northern Bulgaria as Ticha, Gorni Dabnik and Ogosta. Some birds overwinter annually also along Tundzha River. The winters in southern Bulgaria are mild and the dams there don't freeze most of the time and present large concentration of waterbirds, which are the main prey of the eagles during that period. In the period 2006-2012 the number of the wintering individuals fluctuated strongly, in a range between 17 and 34 individuals.

Discussion

The European population of White-tailed Eagle was greatly reduced over the species entire range in the 19th century and first half of 20th century as a result of persecution. In some European countries the species was even exterminated. During the 20th century the enforced legislative protection of the species and the ban of DDT stopped the decline, but new human-induced threats such as land and infrastructure development, intensive forestry and chemical pollution brought new declines of the population. Protective measures and the ban of some persistent, bio-accumulating chemicals during the last three decades of the 20th century eventually resulted in improved breeding success and increased populations, especially in northern and central Europe. However, populations remain small in several countries of the southeast species range and the species is currently classified as critically endangered in two, endangered in seven, and vulnerable in other seven countries in Europe (HELANDER, STJERNBERG 2002). The European population of White-tailed Eagle is currently estimated at approximately 7,000 pairs (HELANDER, STJERNBERG 2002).

In the Bulgaria's neighbouring countries the population of the White-tailed Eagles looks also stable or slowly increasing. Serbia holds the biggest

numbers in the region, nearly 90 pairs in the country, 43 of which along the Danube (PROBST, GABORIK 2012). The Romanian population is estimated at 40 pairs, concentrated mainly in the Danube Delta (KISS et al. 2013). Greece and Turkey are presented with 6 and 15 breeding pairs, respectively (BIRDLIFE INTERNATIONAL 2004, IUCN 2010). Previous study about the recent population of White-tailed Eagle in Bulgaria reported 9 breeding pairs along the Danube River and 3 pairs along the Black Sea (IVANOV 2007). Results from this study show definite increase of the breeding population of the White-tailed Eagle in Bulgaria (Fig. 1), especially in Thrace and Eastern Rhodopes (Southeast Bulgaria) after 2006 when the first occupied nest in that region since 1942 was found (SHURULINKOV, DASKALOVA 2007). According to the local foresters that nest had been occupied few years before 2006. After 2006 seven new pairs were found during the breeding period, and in five of these cases the nests were also found. The new pairs were found in the following years: 2008 - 1 pair (nest still not found); 2009: 2 nests; 2010: 1 nest; 2011: 2 nests and 1 pair (nest still not found). Two of the breeding territories in Thrace are far from any big rivers or big dam lakes, but are in areas rich of small fish-rearing dam lakes which supply food to these pairs. However the result from monitoring of the territory of Persina Nature Park in the period 2012-2014 indicates poor breeding success. Only one pair out of four had successful fledged two nestlings (S. CHESHMEDZHIEV, S., personal communication). Similar observations are reported from the Danube Delta in the period 2009-2011, when only 11 pairs succeed, out of 20 (SANDOR et al. 2014). The data collected for the wintering numbers of the eagles is gained within the frame of 3-4 days at the mid of January by visiting the wetlands for very short period of time, between few minutes to one hour per observation point. Our assumptions are that the numbers of the wintering eagles are much higher and can reach up to 70-100 eagles. In the winter months out of the scope of Mid-winter count we have records of large groups of eagles, observed from a single area. A group of eighteen eagles, mostly juveniles and immature is registered for one day at the end of January, 2012 at Shabla Lake (D. Georgiev, personal communication). Another group of 13 eagles is observed at the restored wetlands at Belene Island in November, 2011 (present authors, unpublished observation).

The White and Black Poplars are dominant as chosen trees for building the nests along the Danube River, while in South Bulgaria the species has no specific preferences. In the Danube Delta the species prefers mostly Willow (*Salix* spp.) as support nest

tree (SANDOR et al.), while in Croatia the majority of the population prefers Pedunculate oak (*Quercus robur*), Narrow-leaved ash (*Fraxinus angustifolia*) and White poplar (*Populus alba*) (RADOVIĆ, MIKUSKA 2009), which is closer to our results.

Worldwide threats, mainly for European countries were published by HELANDER, STJERNBERG (2002). More detailed overview for the White-tailed Eagles threats along the Danube River is given by PROBST, GABORIK (2012). There is no doubt that the Bulgarian population is increasing during the last decade and the eagles are observed in their former breeding areas from the 19th century. Despite of this, threats affecting the eagle recovery are still presented in the country. Forestry, land exploitation and disturbance during the breeding season are considered as high because of their highly direct impact on the breeding areas and eagle reproduction. The transformation of the Danube islands to hybrid poplar plantations (SCHNEIDER, GÜNTHER-DIRINGER 2004) started in 1960s is still running in full force. Often, areas with natural old-growth forest vegetation are completely cleared in order to open up additional areas for the hybrid poplars plantations or for creation of bushy habitat for Pheasants along the rivers in Southern Bulgaria. This reduces the availability of natural forests and suitable mature trees, preferred and used as nesting substratum by the eagles. The disturbance caused by the forestry is also high in the breeding season, no matter of the existing protected areas (in some categories of protected areas the forestry is allowed) and legal protection of the raptors nests. During the last three years a pair failed on its breeding attempts annually. The most probable reason is forestry activities executed during the incubating period. In these three years our ringing expeditions found abandoned eggs. On 2012 the pair left the island without occupying the nest (present authors, unpublished observations). Another two pairs failed in their breeding attempts in the same year, one of which with abandoned egg. Two of the failed pairs are on islands where the intensive hybrid poplar plantations are predominant. In Romania, an active nest located within hybrid poplar plantation was preserved from cutting operations in April and one month later during ringing activities, the experts found dead nestling of about 4 weeks age (M. TAMÁS, personal communication). Disturbance during the most critical period of February-March is probably the main reason for nesting failures due to egg cooling or abandonment of the nest. Disturbance by fishing farm guards during the incubation was the most probable reason for nest failure of one of the pairs in Southern Bulgaria in 2011. Degradation

of two key wetlands along the Danube, Orsoya and Mechka fishponds, recently abandoned as fish farms bereave the nearest eagle pairs from suitable feeding territories (present authors, unpublished observations). Recent plans for improving the Danube navigation between Romania and Bulgaria will have dramatic impacts on river morphology and habitat quality for long-term period. Drainage and fortification actions are planned for many areas in the Lower Danube, some of them no more than 50 m away from the eagle nests. Implementation of this project will not affect only the White-tailed Eagle population, but many other species will lose their suitable breeding and foraging habitats. Shooting of the species is very possible in some fish-rearing farms and dam lakes in Thracian plain. Threats as poisoning caused by lead ammunitions, pesticides and pollutants are not studied yet in Bulgaria, but the potential impact for the White-tailed Eagles population might be very high. In Germany every fourth White-tailed Eagle found dead has been killed by lead poisoning from hunting ammunition (KRONE et al. 2009). During this study there are no records of collision of the White-tailed Eagle with wind turbines in Bulgaria. Study about the collision risk of White-tailed Eagle at Smola archipelago in Central Norway reported 39 eagles found dead or injured in the period between 2005 and 2010 (MAY et al. 2011). Collision of other raptors and large bird species with wind turbines is already confirmed in Northeast Bulgaria. Dead Griffon vulture (*Gyps fulvus*) was found dead on October 28, 2010 under one of the turbines with totally detached wing (S. STOYCHEV, personal communication). Electrocution was the main cause of death of seven juvenile Eastern Imperial Eagle (*Aquila heliaca*) during the last few years (S. STOYCHEV, personal communication). Electrocuted and survived White-tailed Eagle is reported from the Danube Delta (R. POPESCU, personal communication). However, observations in Bulgaria show that the White-tailed Eagle do not have habit for perching on power lines (present authors, unpublished observations).

The White-tailed Eagle is classified as Least Concern (LC) on a global scale (BIRDLIFE INTERNATIONAL 2012). In Bulgaria the species is included in Annexes II and III of the Biological Diversity Act and listed as Vulnerable (VU) in the Bulgarian Red Data Book (GOLEMANSKI 2011). The legal penalty for illegal killing or nest destruction is 500 €. More than 70 % of the existing breeding areas are within the borders of protected areas under national legislation or in Natura 2000 sites. Some of the breeding areas are in strictly protected na-

ture reserves where all human activities are prohibited, while others have less stringent management regimes. There are also several nests of new pairs located in South Bulgaria which are not yet placed under legal protection.

In the last three years BSPB joined the International White-tailed Eagle colour-ringing programme (HELANDER 2003). Currently the ringing activities are implemented for the territory of Persina Nature Park, but future expand is necessary. Study regarding juvenile disperse of the eagles is currently running by BSPB, based on satellite telemetry (TODOROV, KRONE *in litt.*). More detailed monitoring of the breeding success and threats for each pair is needed in order to apply future conservation actions. Since the eagles are expanding their numbers and range it is likely the number of nests in commercial forests to increase. Forest managers that have, or are likely to have, breeding White-tailed Eagles, should plan carefully their forestry activities in order to minimise any disruption of the eagles. Below we are summarized the most crucial forestry management activities which have to be respected by the forestry authorities when the eagle's presence is confirmed in their territories.

Implementation of full ban of reconstructions – logging leading to change of the forest species and the type of the habitat in all natural forests on the Bulgarian and Romanian Danube islands. All the natural forest habitats on these islands are priority habitats for protection under the Habitat Directive 92/43 EEC. Thus the clear cuttings and replanting with hybrid poplars or other non-native forest types is an example of direct violation of the Directive.

Clear cutting (including terminal phases of the restorative cuttings) of natural riparian forests along the rivers Tundzha, Maritsa and Kamchia should be forbidden.

Protecting of the occupied and potential nest trees from any planned or illegal logging should be implemented everywhere around the wetlands in the low parts of the country (<370 m. a.s.l.);

Planting with native tree species should be implemented especially for the Danube islands and near the biggest wetlands in the open habitats. Planting of former breeding territories should be considered with high priority;

Development of White-tailed Eagle nest management plan for each breeding area in the country, setting out how to treat known nest sites will help the forestry management. A nest plan should combine the views of eagle experts with the knowledge of foresters to make every effort to ensure the nest safety.

Activities such as: forest logging, machin-

ery operations and works (planting, weeding, surveying and fencing); road and track building and maintenance; hunting management (stalking and shooting); use of existing forest roads and tracks by forestry-related vehicles (by public too for recreation events) must be strongly prohibited in a radius of 300 m around the active nests of white-tailed eagles. During the most sensitive breeding activity for White-tailed Eagle which lasts from January to July forest managers must take reasonable precautions to avoid disturbing of the active nests in a radius of 750 m. The avoidance of operations and activities near to the active roost sites during the period from two hours before sunset until two hours after sunrise must be applied too.

Encourage the White-tailed Eagles to nest in specific parts of the forest where least impact on their survival and reproductive success can be expected. This could be achieved by providing artificial nests in quiet areas. Such actions make the management of

the forest easier and contribute to the conservation of the species too.

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References

- ALLEON A. 1886. Memorie sur les oiseaux dans la Dobrodja et la Bulgarie. – *Ornis*, Wien, **2**: 397-428.
- ARABADJIEV I. 1962. The Birds of Prey in Bulgaria. Sofia, Nauka i izkustvo. 175 p. (In Bulgarian).
- BIBBY C., M. JONES and S. MARSDEN 1999. Expedition Field Techniques. *Bird Surveys* – Royal Geographical Society, London, 137 p.
- BIRDLIFE INTERNATIONAL 2004. Birds in Europe. Population estimates, trends and conservation status. BirdLife Conservation Series No. 12, Cambridge, 374 pp.
- BOETTICHER H. 1927. Kurze Uebersicht Über die Raubvögel und Eulen Bulgariens. – *Verh. Orn. Ges. Bayern*, **17**: 535-549
- EUROPEAN ENVIRONMENT AGENCY (EEA) 2006. Corine Land Cover. <http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2000-clc2000seamless-vector-database-4>
- ELWES H., T. E. BUCKLEY. 1870. A list of the Birds in Turkey. – *Ibis*, **2** (6).
- FARMAN C. 1869. On some of the birds of prey of Central Bulgaria. – *Ibis*, **2** (5): 199-204.
- FISCH O. 1859. Beiträge zur ornithologischen Fauna von Bulgarien mit besonderer Berücksichtigung des Balkans. – *Journ. Für Ornith.*, **7**: 378-387.
- GOLEMANSKI V. (Ed.). 2011. Red Data Book of Republic of Bulgaria. V. 2, Animal. Sofia. BAS.
- HELANDER B., STJERNBERG, T. 2002. Action plan for the conservation of White-tailed eagle (*Haliaeetus albicilla*). *Recommendation 92/2002*, adopted by the Standing Committee of the Bern Convention in Dec., 2002. BirdLife International, Strasbourg, France.
- HELANDER B. 2003. The international colour-ringing programme – adult survival, homing, and the expansion of the White-tailed Eagle in Sweden. Pages 145-154. – In: B. HELANDER, M. MARQUISS, AND W. BOWERMAN (Eds.): *Sea Eagle 2000: proceedings from an international conference at Björko*, Sweden. Swedish Society for Nature Conservation, Stockholm, Sweden.
- HRISTOVICH G. 1890. Materials for studying the Bulgarian Fauna. – In: Collection of folklore, **2**:185-225, (In Bulgarian).
- IUCN 2010: IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org).
- IVANOV B. 1985. White-tailed Eagle *Haliaeetus albicilla*. – In: BOTEV, B., TS. PESHEV (Eds.): 1985. Red Data Book of PR Bulgaria, V. 2, Animals. Sofia, BAS. 183 p.
- IVANOV B. 2007. Population development of the White-tailed Eagle *Haliaeetus albicilla* in Bulgaria in the period from 1977 to 2005. *Acrocephalus*, **28**:17-21.
- JORDANS A. 1940. Ein Beitrag zur Kenntnis der Vogelwelt Bulgariens. – *Mitt. Kgl. Naturw. Inst.* Sofia, **13**: 49-152.
- KISS B., ALEXE, V., DOROȘENCU, A., MARINOV, M., SÂNDOR, A. 2013. Situația actuală și preferințele față de locurile de cuibărit ale codalbului (*Haliaeetus albicilla*) în Delta Dunării (România). *Revista de Silvicultură și Cinegetică*. Anul XVIII, Nr. 32, 2013.
- KOSTADINOVA, I., S. DERELIEV 2001. Results from the Mid-winter Counts of Waterbirds in Bulgaria for the period of 1997-2001. BSPB Conservation Series. Book 3. Sofia. Bulgaria. 96 p.
- KRÖL W. 1983. The status of eagles in Poland. *WWGBP Bulletin*, **1**: 61.
- KRONE O., N. KENNTNER, F. TATARUCH 2009. Gefährdungsursachen des Seeadlers (*Haliaeetus albicilla* L. 1758). – *Denisia*, **27**: 139-146.
- LORENZ-LIBURNAU L. 1893. Ornithologische Bruchstücke aus dem Gebiete Donau. – *Orn. Jahrbuch*, **4**: 12-23.
- MAY R., T. NYGÅRD, E. L. DAHL, O. REITAN, K. BEVANGER, K. 2011. Collision risk in white-tailed eagles. Modelling kernel-based collision risk using satellite telemetry data in Smøla wind - power plant. – NINA Report, 692. 22 pp.

- MESHINEV T., I. APOSTOLOVA. 2005. Habitats in Bulgaria. – In: PETROVA A. (ed.). *Current state of Bulgarian biodiversity – problems and perspectives*. Sofia. Drakon, 351-373. (In Bulgarian with English summary).
- MEYBURG B.-U., T. BLOHM, C. MEYBURG, I. BÖRNER & P. SÖMMER 1994. Satelliten- und Bodentelemetrie bei einem jungen Seeadler (*Haliaeetus albicilla*) in der Uckermark: Wiedereingliederung in den Familienverband, Bettelflug, Familienauflösung, Dispersion und Überwinterung. – *Vogelwelt*, **115**: 115-120. (In German with an English summary).
- PATEV P. 1950. The Birds of Bulgaria. Sofia, BAS. 364 p. (In Bulgarian with English Summary).
- PROBST R., A. GABORIK 2012. Action Plan for the conservation of the White-tailed Sea Eagle (*Haliaeetus albicilla*) along the Danube, *Nature and environment* No. 163, Council of Europe, January 2012, Printed at the Council of Europe.
- RADAKOFF W. 1879. Ornithologische Bemerkungen über Bessarabien, Mouldau, Walachei, Bulgarien und Ost-Rumelien. – *Bull. Soc. Des Natur.*, Moscou, **13**: 150-178.
- RADOVIĆ, A., MIKUSKA, T. (2009). Population size, distribution and habitat selection of the white-tailed eagle *Haliaeetus albicilla* in the alluvial wetlands of Croatia. – *Biologia*, **64**: 156-164.
- RAISER O. 1894. Materialien zu einer Ornis balcanica. II. Bulgarien. Wien. In Commission bei Carl Gerold's Sohn. 204 p.
- SÂNDOR, A., ALEXE, V., MARINOV, M., DOROȘENCU, A., DOMȘA, C., KISS, B. J. (2014). Nest-site selection, breeding success, and diet of white-tailed eagles (*Haliaeetus albicilla*) in the Danube Delta, Romania. *Turkish Journal of Zoology*, Turk J Zool (2014) 38: doi:10.3906/zoo-1401-64
- SCHNEIDER E., D. GÜNTHER-DIRINGER 2004. Ecological and restoration potential of the Lower Danube floodplains. Problems and perspectives. – In: Proceedings of the 3rd European Conference on River Restoration, Zagreb, Croatia, 337-344.
- SCHNEIDER-JACOBY M. 2005. The Sava and Drava floodplains: Threatened ecosystems of international importance. – *Large Rivers*, **16**: 249-288.
- SHURULINKOV P., G. DASKALOVA 2007. Rückkehr des Seeadlers *Haliaeetus albicilla* als Brutvogel nach Bulgarisch-Thrazien – Erste Brut am Tunja-Flub nach 1942. – *Orn. Mitteilungen*, **59** (10): 330-332.
- TODOROV E., 2007a. “White-tailed Eagle (*Haliaeetus albicilla*). – In: IANKOV P. (Ed.): Atlas of breeding birds in Bulgaria. Bulgarian Society for the protection of Birds, Conservation Series, Book 10. Sofia, BSPB, 128 p.
- TODOROV E., 2007. “Belen Island Complex”. – In: KOSTADINOVA, I., M. GRAMATIKOV (Eds.): Important Bird Areas in Bulgaria and Natura 2000. Bulgarian Society for the Protection of Birds, Conservation Series, Book 11. Sofia, BSPB, p. 173.

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