ACTA ZOOLOGICA BULGARICA
Acta zool. bulg., Suppl. 4, 2012: 141-146

Data from Egyptian Vultures (*Neophron percnopterus*) Tagged with GPS/GSM Transmitters in Bulgaria

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Abstract: The current publication presents results of the first tracking of three Egyptian Vultures (*Neophron percnopterus*), tagged with GPS/GSM transmitters in Bulgaria in 2008 and 2011. The species is enlisted as 'Endangered' in the Red List of Threatened Species of the IUCN. Birds of various ages – a juvenile, a bird of transitional plumage (subad.), and a mature breeding bird (ad.) were tagged. Data on the movement of Egyptian Vultures on the territory of three continents – Europe, Asia and Africa has been collected. The established positions reveal information on the migratory route of Bulgarian population of the species, the movement of breeding birds in search of food and the vagrancy of young, non-breeding Egyptian Vultures.

Key words: Egyptian Vultures, tracking, GPS/GSM transmitter

Introduction

Egyptian Vulture *(Neophron percnopterus* Linnaeus, 1758) is represented with three sub-species. The population nesting in Bulgaria is referred to *N. p. percnopterus*, also found in Southern Europe, Africa, and Southwestern Asia, reaching Tian-Shan and Pakistan to the East. The species is much smaller and lighter than other vultures (Cramp, Simmons 1980). Its European population is estimated at some 3300-5050 pairs (BirdLife International 2012), but not exceeding 5600 pairs, concentrated in several isolated areas (BirdLife International 2004). On a global scale, the number of Egyptian Vultures are decreasing at high rates almost everywhere (BirdLife International 2007). Egyptian Vulture is enlisted as 'Endangered' (A2bcde+3bcde+4bcde, ver 3.1) in the Red List of the International Union for Conservation of Nature (BirdLife International 2012). The new issue of the Red Data Book of Bulgaria also classifies Egyptian Vulture as 'Endangered' (Kurtev *et al.* 2011).

The species was once wide-spread all over Bulgaria and considered numerous (Patev 1950, Michev 1968, 1985, Simeonov *et al*. 1990). In the beginning of XX century the population of the species reached 300-500 pairs, possibly much more (Kurtev *et al.* 2008). An assessment carried out in the period 1961-1966 reported a decline in the number and distribution of the species, despite discovering a number of new nesting localities (Michev 1968). In 1980 Bulgarian population was estimated at no less than 140-160 pairs. In 1989 the decline continued and the population decreased to 90-100 pairs. The overall decline for the period 1989-2003 is estimated at 35% and in 2003 only 57 breeding pairs were confirmed, mostly located in the Eastern Rhodopes, Provadia-Royak Plateau, Eastern and Western Balkan Mountains, Russenski Lom, Strandzha and Sakar (Kurtev *et al.* 2008). Comparable number of some 70 breeding pairs was also reported by Nankinov *et al.* (2004). In 2006-2007 the overall nesting popu-

lation in the country was reduced to 40-45 pairs (Kurtev *et al.* 2007, 2008). The drastic decline of the number continued afterwards. In 2011 the population was estimated at slightly more than 30 pairs (Angelov 2011), while in 2012 it has already been limited to barely 29 nesting pairs (BSPB 2012).

While the trends and distribution of the national population of Egyptian Vulture are well known, there is very little data on the migration and wintering of the birds of the Bulgarian population. At the start of the present study in 2008, there was information on a juvenile Egyptian Vulture fitted with a satellite transmitter in Bulgaria, which migrated to Africa, wintering in Chad and Nigeria (Meyburg *et al.* 2004). Later, in 2010, yet another juvenile Egyptian Vulture hatched in Bulgaria was tagged with a satellite transmitter which showed that it also wintered in Chad (Angelov 2011). There is data on other birds from the European population known to winter in Africa – to the South of Sahara (Hagemeijer, Blair 1997). Birds tagged with satellite transmitters in Spain, France and Italy have been reported wintering in Mauritania, Mali and parts of Senegal (Benitez *et al.* 2004, Meyburg *et al.* 2004, Ceccolini *et al.* 2009, García-Ripollés *et al.*2010).

The current study was initiated in 2008 in order to fill in the gaps of knowledge considering the movement, migration and vagrancy of Egyptian Vultures from Bulgaria and therefore to collect additional data for undertaking adequate and timely conservation measures for the species.

Materials and Methods

Within the current study, a total of three Egyptian Vultures inhabiting two of the strongholds of the species in Bulgaria – Eastern Rhodopes and Russenski Lom (Kurtev *et al.* 2008) were marked. The three birds were of different ages and different origin.

The first Egyptian Vulture named Milko hatched in 2008 in the area of Russenski Lom Nature Park – Northern Bulgaria was found in distress and sent to the Wildlife Rescue Centre of Green Balkans on 06. 08. 2008 by the staff of the NP Directorate. Following a period of treatment and rehabilitation, in the beginning of October 2008 Milko was released back into the wild from a supplementary vulture feeding site in the area of the Eastern Rhodopes.

The Egyptian Vulture (Mitko) was an adult bird estimated at over-six-year-old.

The third tagged Egyptian Vulture (Mitka) was estimated at approximately 4 year-old.

The two birds were trapped in May 2011 in the area of Eastern Rhodopes, close to the state border with Greece. They were caught using a snap-shut trap (constructed specifically and used by Borislav Borisov), triggered with a remote control (constructed by Dobromir Dobrinov). A carcass of a cow was used as a lure, completely covered by the trap. The trap itself consisted of two carrying arms bearing netting sized 4 x 6 m.

The age of the bird was determined using the description of Egyptian Vultures described by Clark, Schmitt (1998).

GPS/GSM transmitters with solar panels were used for the tagging and tracking of all three vultures described. The devices were set to record exact geographic location, speed and direction of flight, altitude, date and timing of every given position.

Milko was fitted with a prototype transmitter developed by Spanish company EagleEye® and granted by Luis Escribano and Victor García for the aims of the current research. The device registers the location of the bird recording geographic coordinates and sending them using the network of a Spanish mobile operator. The fitting of the transmitter was done using standard 'pack-back' harness (Garcelón 1985) of Teflon.

The other two vultures – Mitko and Mitka were tagged with similar transmitters, developed by the Bulgarian producer Elektroninvest Ltd. The transmitters were fixed to the backs of the birds using thin metal cords, connected with metal bushes at the breasts of the birds. The method was copies by an experimental method introduced by Dr. B. Meyburg.

The visualization and the analysis of the data obtained through the transmitters were done using the ESRI ArcMap software.

Results

The young Egyptian Vulture Milko was observed in the area of the supplementary feeding site the day following his release. The transmitter did not send any information initially so there is no data from the first days of the adaptation of the bird into the wild. The first coordinates the transmitter sent were received on 11. 11. 2008 from an area in Israel, close to the state border with Egypt (Fig. 1). The coordinates revealed a section of the migratory route of Egyptian

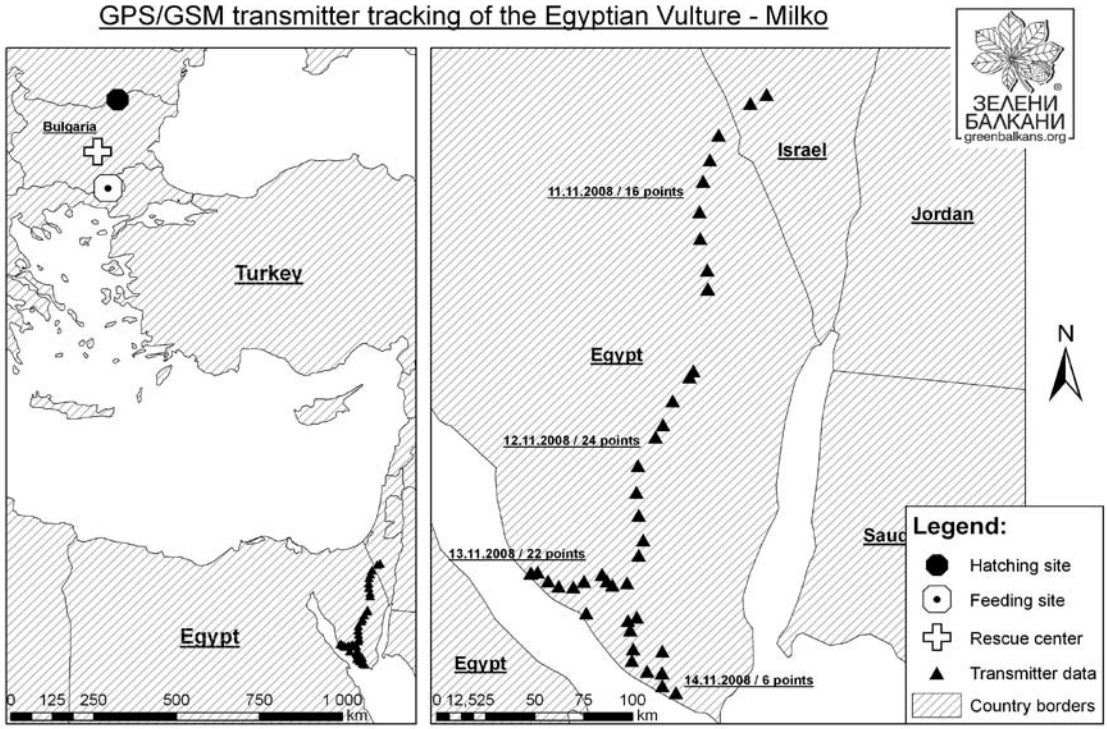

Fig. 1. GPS/GSM transmitter tracking of the Egyptian Vulture – Milko.

Vulture which had headed to Africa. Approximately the same route was identified while tracking two other Egyptian Vultures which migrated from Bulgaria to Africa in 2001 (Meyburg *et al.* 2004) and 2010 (Angelov 2011). Once the vulture reached Egypt and the coast of Red Sea – the Southwestern part of the Sinai Peninsula, Milko remained in the area until 14. 11. 2008, moving along the coast of Red Sea, probably seeking for an opportunity to cross Red Sea and reach the coasts of Africa (Fig. 1). The last signal from the transmitter was received on 14. 11. 2008 and no additional data has been sent by that transmitter since then. The bird had travelled over 1670 km from the release site to the last coordinate sent by the transmitter. The reason for the loss of signal from the transmitter remains unclear. Several hypotheses can be argued – a defect in the device causing the ceasing of its operation; an unsuccessful attempt of the bird to cross Red Sea, etc.

The transmitter of Milko has sent a total of 68 positions with the location of the bird. A total of 36 of them indicate active movement (speed of over 5 km/h); 9 of them indicate poor activity (less than 2 km/h –the bird was possibly flying over very short distances during foraging or at roost) and 23 of the positions indicated rest (no speed reported).

The average speed (Av.Sp1) reported during active movement within the period of operation of the transmitter is 38.65 km/h, while the maximum speed (Max.Sp1) recorded for Milko during active flight reaches 71.34 km/h. The last positions sent by the transmitter on November 14th (n=6), all indicate active flight. The average speed recorded that day (ASld) is 40.5 km/h. This value is higher than the overall average speed recorded during the entire period (Av.Sp1) of normal operation of the transmitter. This fact suggests that the bird was in good condition so a crossing of the Red Sea was potentially possible. The width of the section of Red Sea in the area where the last coordinates were sent is about 30 km from West to East. Such distance should have been no insuperable obstacle for the young vulture. This suggestion is supported by the data of yet another young Egyptian Vulture tagged in FYROM, which had attempted to cross Mediterranean Sea from Peloponnese towards Libya during migration in September. That bird is reported to have covered about 485 km for 16 h, which means an average speed (Asp4) of some 30 km/h, a value much lower than the average speed of Milko (ASld), reported in the last day at the coast of the Red Sea. For a single day the vulture from FYROM flew over 120 km inlands, crossing the Peloponnese from North to South and then continued its flight for 300 km over

Mediterranean Sea before sending its last coordinates from around 75 km on the North of Libyan coast (BSPB 2012a). Considering all of the above, it can be suggested that the transmitter of Milko has possibly shown a defect and this is the most probable reason for ceasing of the transmission.

The results of the second vulture tagged – Mitko, reveal a very different picture. The behaviour of the bird following the days of the tagging showed that it was a part of a breeding pair, nesting some 12.5 km from the supplementary feeding site maintained by Green Balkans. The transmitter of Mitko also does not work well and sent very little data. The information is however enough to confirm that the bird regularly covered the distance of 12.5 km from the nest to the supplementary feeding site in search of food (Fig. 2). In addition to the data sent by the transmitter, there were several visual observations confirming the presence of the bird in the area. Due to the easily identifiable transmitter, Mitko was observed on numerous occasions at the supplementary feeding site, the area of the nest (during the breeding season) and together with a recently fledged young also at the supplementary feeding site at the end of the summer (14. 08. 2011, 08. 09. 2011, 09. 09. 20011, 13. 09. 2011, 14. 09. 2011 – Mitkov, pers. comm; Klisurov, pers comm.). These observations confirm that the tagged vulture together with its mate had successfully raised a single chick, which was also visiting the supplementary feeding site.

The transmitter of Mitko sent a total of 16 positions indicating an average speed (Av.Sp2) of 34 km/h and maximum speed (Max.Sp2) of 35 km/h.

Despite being scarce, these are the first data on tracking of an adult, breeding Egyptian Vulture in the country.

The data received from the transmitter of the third Egyptian Vulture (Mitka) tagged, reveal very interesting details on the sub-adults' behaviour. The day the bird was trapped, it moved to south to the supplementary feeding site in Dadia Forest National Park, Northern Greece. The birds stayed in Greece shortly and then, on 11. 06. 2011 moved to the area of Eastern Balkan Mountains – Royak-Provadia Plateau, where it stayed for several days. Later the vulture returned to the Eastern Rhodopes and Dadia in Greece. The bird repeated these trips among the supplementary feeding sites in Eastern Rhodopes and Dadia and the rock terraces of Royak-Provadia Plateau several times (Fig. 2), also once entering Turkey, close to the state border with Greece. The signals of the transmitter allowed for the identification of a total of three areas, generally preferred by the vulture for longer periods. Two of them

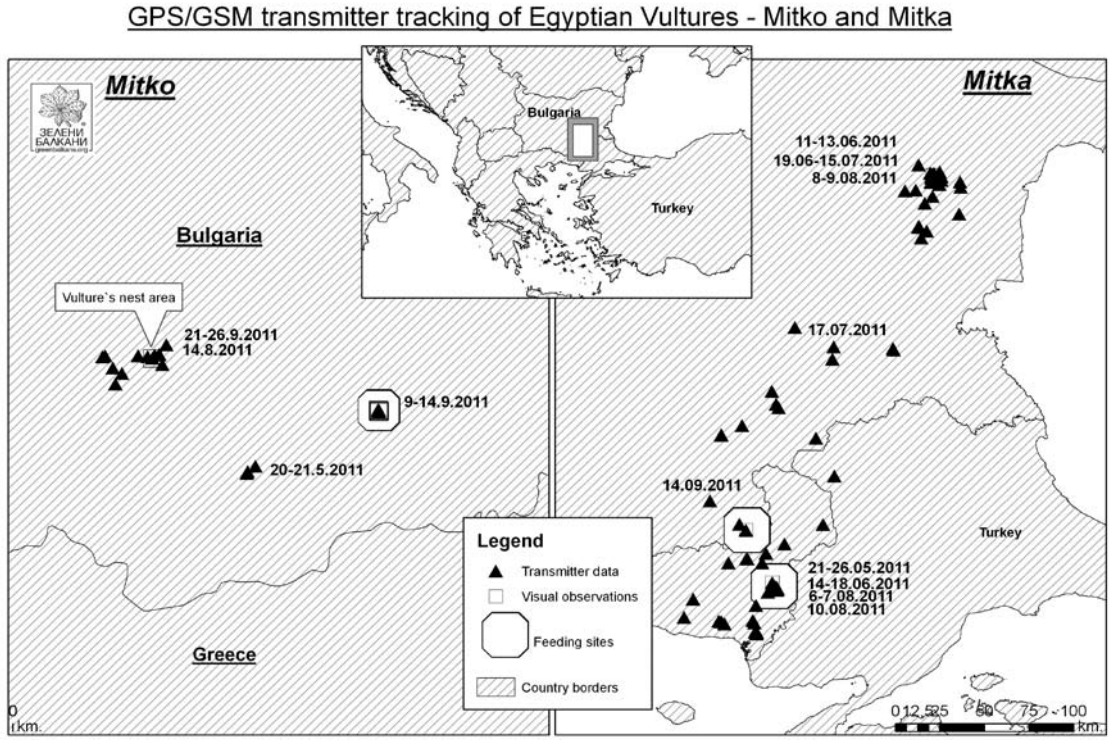

Fig. 2. GPS/GSM transmitter tracking of the Egyptian Vultures – Mitko and Mitka.

were the supplementary feeding sites maintained in the Eastern Rhodopes and Dadia National Park, Northern Greece. There were also additional visual observations of the bird from these two areas (14. 09. 2011 – observed by T. Mitkov, pers.comm. and 15-16. 11. 2011, observed by WWF – Greece – T. Pagnon, P. Babakas, pers. comm.). The rocks of Royak-Provadia Plateau however prove most significant for the bird. The area most frequently visited by the vulture, suggested as its home range, covered some 865 sq km (Fig. 3). There were also visual observations of Mitka in that area – 09. 07. and 15. 07. 2011 and a third observation on 13.07.2011, reported by Vladimir Dobrev and Sanie Mumun (pers. comm). The vulture was observed displaying nesting behaviour together with another Egyptian Vulture at similar age. Both birds were seen entering a rock niche known to have been a historic location of the species until recent years. Their behaviour suggests the formation of a territorial pair despite the birds being non-fully mature.

During its wanderings Mitka covered a total area of 15 603 sq km. The most distant locations sent are found at a distance of 295 km (North to South) and 72 km (East to West). The transmitter of this vulture sent a total of 95 positions for 48 days, 40 of which in state of active movement. The average speed of Mitka (Av.Sp3) is 42.8 km/h, at a maximum speed (Max.Sp3) of 75 km/h.

Conclusions

The data received from Egyptian Vulture Milka, as well as the behaviour of the bird confirm that the vulture has been successfully rehabilitated in Wildlife Rescue Centre of Green Balkans and is following already existing migratory routes.

The data collected on the migration of this Egyptian Vulture confirms the existing information that birds from Bulgarian population of the species migrate towards Africa, following Eastern Mediterranean coast and crossing the territories of Israel and Egypt.

The data collected by the transmitter of the second vulture – Mitko, reveal that Egyptian Vultures in Bulgaria can regularly fly over 12 km from the nest in search of food during the breeding season. This data should be taken into consideration when processing various threatening investment intentions in areas where the species is known to nest.

The observations of a young bird together with a tagged adult suggest that the transmitter has no significant negative impact on the adult bird during raising of their offspring.

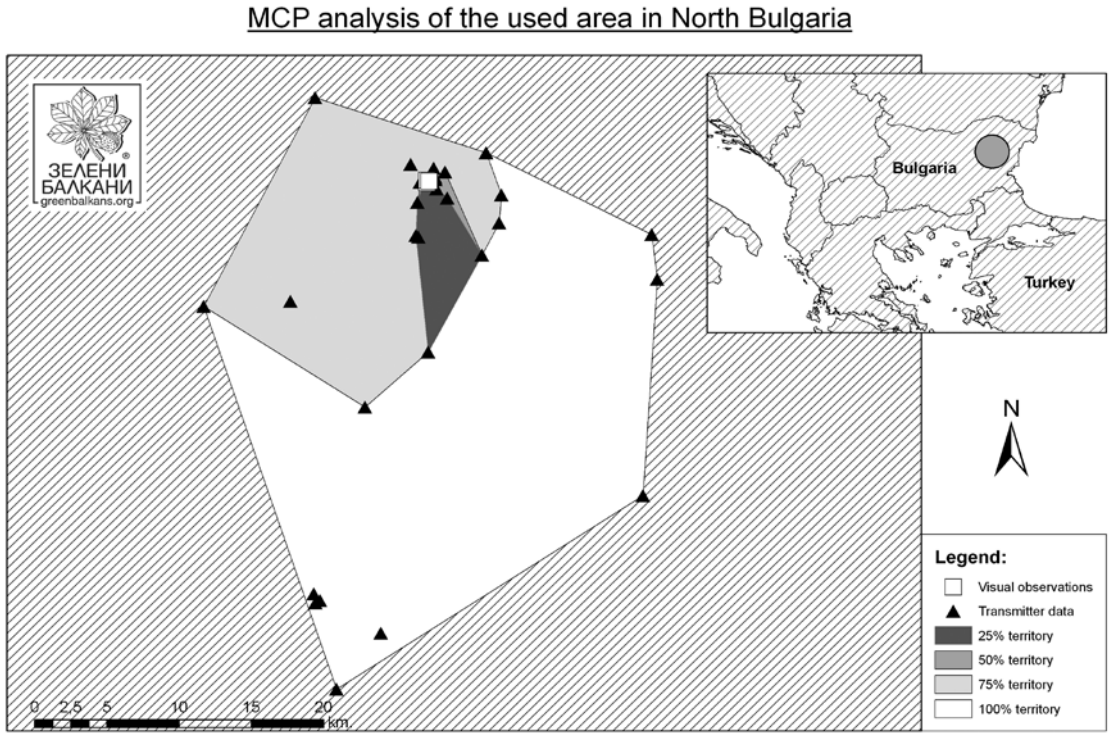

Fig. 3. MCP analysis of the used area in North Bulgaria.

The behaviour shown by the third bird tagged suggests that the formation of territorial pairs and taking of a nesting area in Egyptian Vultures can occur before reaching full maturity. In addition, it is clear that during the vagrant period, immature Egyptian Vultures fly over areas of over several hundred square kilometers in search of suitable nesting habitats.

The data from the transmitter as well as the numerous observations confirm that Egyptian Vultures readily visit supplementary feeding sites where available. This requires the establishment of new feeding sites especially at sites where the species is known to have been nesting in the past.

Acknowledgments: We are grateful to all experts and supporters of Green Balkans, who have contributed to the implementation of the current study, providing information and expert assistance. We are especially grateful to Borislav Borisov, Dobromir Dobrinov, Simeon Marin, Todor Mitkov, Ivailo Klisurov, Konstantin Dichev, Hristina Klisurova, Ivailo Angelov, Vladimir Dobrev – BSPB and Nikolay Stoyanov. The preparation of the article would not be possible without the kind support of PTES, Euronatur, KCM 2000 Group, Russenski Lom Nature Park, EagleEye®, WWF –Greece, Wildlife Rehabilitation and Breeding Centre – Stara Zagora. The current study was developed within the Vultures Return in Bulgaria Project LIFE08 NAT/BG/278, supported by the LIFE+ financial instrument of the European Commission.

References

Angelov I. 2011. Schmutzigier in Bulgarien. – *Der Falke*, **58**: 372-378

Benítez J. R., J. A. Donázar, M. De la Riva, F. J. Hernández, O. Ceballos, M. Barcell, J. M. Grande and J. A. Sánchez-Zapata 2004. Tras la pista del alimoche en África. – *Quercus*, **222**: 13-18.

BirdLife International 2004. Birds in Europe: population estimates, trends and conservation status. Cambridge, U.K (BirdLife International), 374 p.

BirdLife International 2007. Species factsheet: *Neophron percnopterus*. Downloaded from http://www.birdlife.org.

BirdLife_International 2012. Neophron percnopterus In: BirdLife International (ed.) IUCN Red List of Threatened Species. Version 2012.1. IUCN 2012. www.iucnredlist.org. Downloaded on Downloaded on 05 October 2012

Bulgarian Society for Protection of Birds (BSPB) 2012. Website. http://bspb.org/show/2418-33

Bulgarian Society for Protection of Birds (BSPB) 2012a. Neophron website. http://www.neophron.bspb.org

Ceccolini G., A. Cenerini and A. Aebischer 2009. Migration and wintering of released Italian Egyptian Vultures Neophron percnopterus. First results. – *Avocetta,* **33**: 71-74.

Clark W., N. Schmitt 1998. Ageing Egyptian Vultures. – *Alula,* **4**: 122-127.

Cramp S. K., E. L. Simmons 1987. The Birds of the Western Palearctic. Volume II. Hawks to Bustards. Oxford (Oxford University Press).

Garcelon D.K. 1985. Mounting backpack telemetry packages on bald eagles. Institute for Wildlife Studies, Arcata, California, 2 p.

García-Ripollés C., L. Pascual and V. Urios. 2010. First description of migration and wintering of adult Egyptian Vultures Neophron percnopterus tracked by GPS satellite telemetry. British Trust for Ornithology, – *Bird Study*, **57:** 261-265.

Gradev G., V. Matarranz, E. Dobreva, D. Popov, I. Ivanov, I. Klisurov, E. Kmetova and D. Vasilakis 2011. First results of the tracking of an Eastern Imperial Eagles (*Aquila heliaca*) tagged with s GPS/GSM transmitter in Bulgaria. – *Acta zoologica bulgarica*, **Suppl. 3**: 15-20.

Hagemeijer E., M. Blair (Eds.) 1997. The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance. London (T&AD Poyser). 903 p.

Kurtev M., I. Angelov, D. Demerdzhiev, E. Stoynov, P. Yankov and H. Hristov 2007. Egyptian Vulture (Neophron percnopterus) – In: Yankov P. (Ed.): Atlas of the nesting birds in Bulgaria. Nature conservation edition. Book 10. Sofia (BSPB): 132-133.

Kurtev M., I. Angelov and P. Yankov 2008. Action Plan for the Conservation of the Egyptian Vulture in Bulgaria. Sofia (BSPB) (In Bulgarian).

Kurtev M., I. Vatev and D. Demerdzhiev 2011. Egyptian Vulture (*Neophron percnopterus* Linnaeus, 1758). In: Golemanski, V. (Eds.): Red Data Book of the Republic of Bulgaria. Volume 2. Animals. IBEI – BAN & MOSV. Accessible at (http://e-ecodb.bas.bg/rdb/bg/vol2/Nepercno.html).

Meyburg B., M. Gallardo, C. Meyburg and E. Dimitrova 2004. Migrations and sojourn in Africa of Egyptian Vultures (Neophron percnopterus) tracked by satellite. – *Dt. Ornithologen-Gesellshaft,* **145**: 273-280.

Michev T. 1968. On the distribution and nesting biology of Egyptian Vulture (*Neophron percnopterus* L.) in Bulgaria. – *Izv. Zool. inst. s muzey,* **27**: 65-79. (In Bulgarian).

Michev T. 1985. Egyptian Vulture (*Neophron percnopterus*). Red Data Book of Bulgaria. Volume 2. Sofia (BAS), 183 p. (In Bulgarian).

Nankinov, D., Dutsov, A., Nikolov, B., Stoyanov, G., Gradev, G., Georgiev, D., Popov, D., Domuschiev, D., Kirov, D., Tilova, E., Nikolov, I., Ivanov, I., Dichev, K., Popov, K., Karaivanov, N., Todorov, N., Shurulinkov, P., Stanchev, R., Aleksov, R., Tzonev, R., Ivanov, S., Marin, S., Staikov, S., Nikolov, S., Dalakchieva, S., Ivanov, S. & Nikolov, H. 2004. Breeding totals of the ornithofauna in Bulgaria, 2004. Green Balkans, Plovdiv. 32 p.

Patev P. 1950 Birds of Bulgaria. Sofia (BAS), 364 p. (In Bulgarian).

Simeonov S., T. Michev and D. Nankinov. 1990. Fauna of Bulgaria. Birds. Part I, Sofia, (BAS), 350 p. (In Bulgarian).