LIFE RE-Vultures

Conservation of Black and Griffon vultures in the cross-border Rhodopes mountains

LIFE 14 NAT/NL/000901

GRIFFON VULTURE POPULATION SIZE AND AGE STRUCTURE IN THE EASTERN RHODOPES

TECHNICAL REPORT
under
Action A4 of LIFE RE-VULTURES project LIFE14NAT/NL/901

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About the project:

This survey and report are developed under action A4 of the LIFE project Conservation of Black and Griffon vultures in the cross-border Rhodopes mountains (LIFE Re-Vultures LIFE14NAT/NL/000901) funded by the European Commission. The project aims to reduce acute threats to black and griffon vultures and thus allow them to recover in the Bulgarian/Greek cross-border area of the Eastern Rhodope Mountains.

Contents

I. Introduction

The Eurasian griffon vulture (*Gyps fulvus, Hablizl 1783*) is a large Old World vulture with a wide range of distribution spreading from Spain to the Himalayan region. The Griffon Vulture was one of the most abundant vulture species breeding in Bulgaria with a population of probably more than 1000 pairs in the whole country in the beginning of the 20th century (Demerdzhiev et al., 2014). The first large decline of the species probably began in the years of the World War I (Stoyanov, 2010). Subsequently, during 1950s and 1960s, a massive campaign to exterminate the then called „pest" carnivores, mainly wolves and foxes, by use of poisoned baits, was conducted at national level, which resulted in the complete Griffon Vulture population crash as a breeding species in the country (Stoyanov, 2010) and the vulture was considered extinct as a breeder by the beginning of 1970s (Baumgart, 1974). However, in 1978 the species was rediscovered as a breeder in the Eastern Rhodopes, making this population the only wild native population of the species survived nowadays in Bulgaria (Demerdzhiev et al., 2014). Since the late 1980s the population is a subject of a regular monitoring scheme with all the breeding parameters of the population recorded annually (Dobrev, Stoychev, 2013). Currently, Griffon Vultures are breeding in the following SPAs: Madzharovo, Studen Kladenets and Most Arda, with a total population number of 89 pairs in 2017 (this study). Historically, the Griffon Vultures' nests in the Greek part of Rhodopes Mountain are abundant with max 11 nests in the National Park of Dadia-Lefkimmi-Soufli forest in 1994 and 3-5 pairs in South Evros (Skartsi et al. 2010). During 2016-2017, there are 2 - 7 pairs breeding in the neighbouring Greek part of the Rhodope Mountains which respresents about less than 50% of the Griffon Vulture pairs breeding in continental Greece (WWF unpublished data). The Griffon Vultures' nests are located in the following Greek SPAs: Notio Dasiko Symplegma, Filiouri valley and Kompsatos valley.

Studying the demography of raptor species is an essential part of the conservation process and is obligatory for understanding the population dynamics of raptors (Steenhof, Newton, 2007, Donazar et all., 2016). The Griffon Vulture is one of the most studied birds among the raptor species in regards to the demography and population status along its range. The breeding success and population numbers of the Griffon Vulture have been

studied widely across Europe and the Balkans particularly (Demerdzhiev et al., 2014) as in many countries there are regular schemes for monitoring both the breeding parameters and the major population threats (Botha et al., 2017, Donazar et all., 2017). Therefore, obtaining long term information on the species demography, its habitat requirements and threats affecting the main breeding parameters of the Griffon Vulture may help informing the conservation of the species and taking relevant management actions (Mateo-Tomas, Olea, 2010).

II. Materials and methods

1. Study area

The study was restricted to 12 project SPAs, 7 in Bulgaria and 5 in Greece with an area of almost 370 000 ha (Fig. 1).

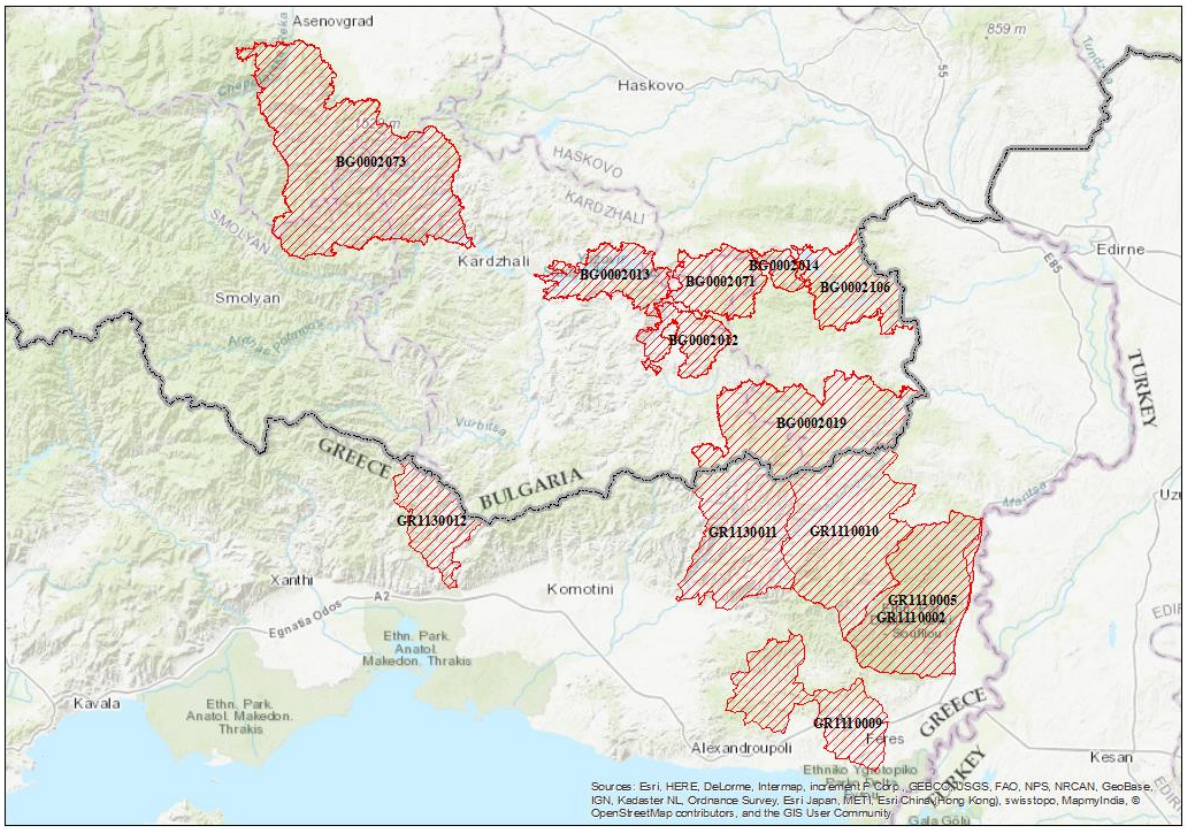


Figure 1. Project SPAs where the study was conducted

2. Monitoring in the breeding season

The monitoring was implemented in the period January – August 2016 and 2017. All known breeding and historical sites described in the literature in the Eastern Rhodopes (both Bulgarian (Fig. 2) and Greek part (Fig. 3) of the mountain) were visited, GPS coordinates and pictures were taken. Up to four visits to every cliff each year were performed. The first visit was conducted in late January or early February to record the number of incubating pairs and pairs that didn't start breeding. The second visit took place during the period mid-April – early May in order to register the number of new pairs that had started breeding and to record new pairs that were missed, as well as to establish the number of pairs failed during incubation or after hatching. The third visit was implemented in June for recording the number of juveniles in nests before fledging and the number of pairs that have lost their hatchlings. The fourth visit was implemented in July – early August to establish the number of fledged juveniles. In each visit the cliffs were observed from elevated viewpoints. Observations were made under suitable weather conditions for adequate visibility (no fog, heavy rain etc.) by experienced observers with spotting scopes (20x60) and binoculars (10x50, 10x42). For each nest a record of its location, position (niche or ledge) was noted and picture was taken (Annex 1). When possible the age of the birds in the pairs was recorded. If a marked bird was observed the field expert registered the type of the tag (ring, wingtag, transmitter etc.), the colour and the number of the tag, whether it is on the left or on the right wing/leg.

For each breeding cliff the following information was recorded: the number of occupied nests (all nests occupied by breeding and non-breeding pairs); the number of breeding pairs (pairs that were observed incubating); number of successful pairs (pairs that raised juvenile until fledging); breeding success (fledged juveniles per incubating pairs); productivity (fledged juveniles per occupied nest); percentage of successful pairs (number of successful pairs per number of laying pairs multiplied by 100). The criteria for counting non-breeding pairs (pairs that did not lay eggs) was considered when observing that both birds in the pair are attached to a particular niche/ledge of the cliff suitable for breeding, where nest may or may not be present, and engaged in at least two of the following behavior activities: courtship flights, mutual preening, copulation, nest building, and

defence of the immediate vicinity of the chosen nest site from conspecifics. A juvenile is considered fledgling if it is aged at least 125 days old.

In order to register the presence of marked birds and their age structure as well as the population size, observations during organized feedings were carried out throughout the whole year of 2016 and 2017 as described in Arkumarev et al. (2018).

3. Monitoring in the pre-breeding season

Additional survey on the Griffon vulture population size and structure was conducted annually in November 2016 and 2017. The study aimed at identification of the species range and population size in the pre-breeding period by registering the birds' roosting sites on the whole Balkan Peninsula, except for Croatia. The observations began at noon time simultaneously within one day in the whole study area. Observations were made under suitable weather conditions with good visibility by experienced observers with spotting scopes (20x60) and binoculars (10x50) from elevated view points. Roosting sites were identified beforehand based on the monitoring data from the breeding season, but also by the GPS telemetry data. Once the observer reaches the view point to a cliff he registers the number and the age of the birds that are roosting on it. The birds were differentiated into 5 age classes: adults, subadults, immatures, juveniles (0 calendar years) and unidentified. Vultures that fly off the cliff were registered together with information for the direction of their flight and the time of their departure in order to: (1) obtain information on unknown roosting sites, (2) avoid double count of a bird. As a consequence, such birds were discounted by the number of the birds that stayed roosting. The observations last until dusk**.**

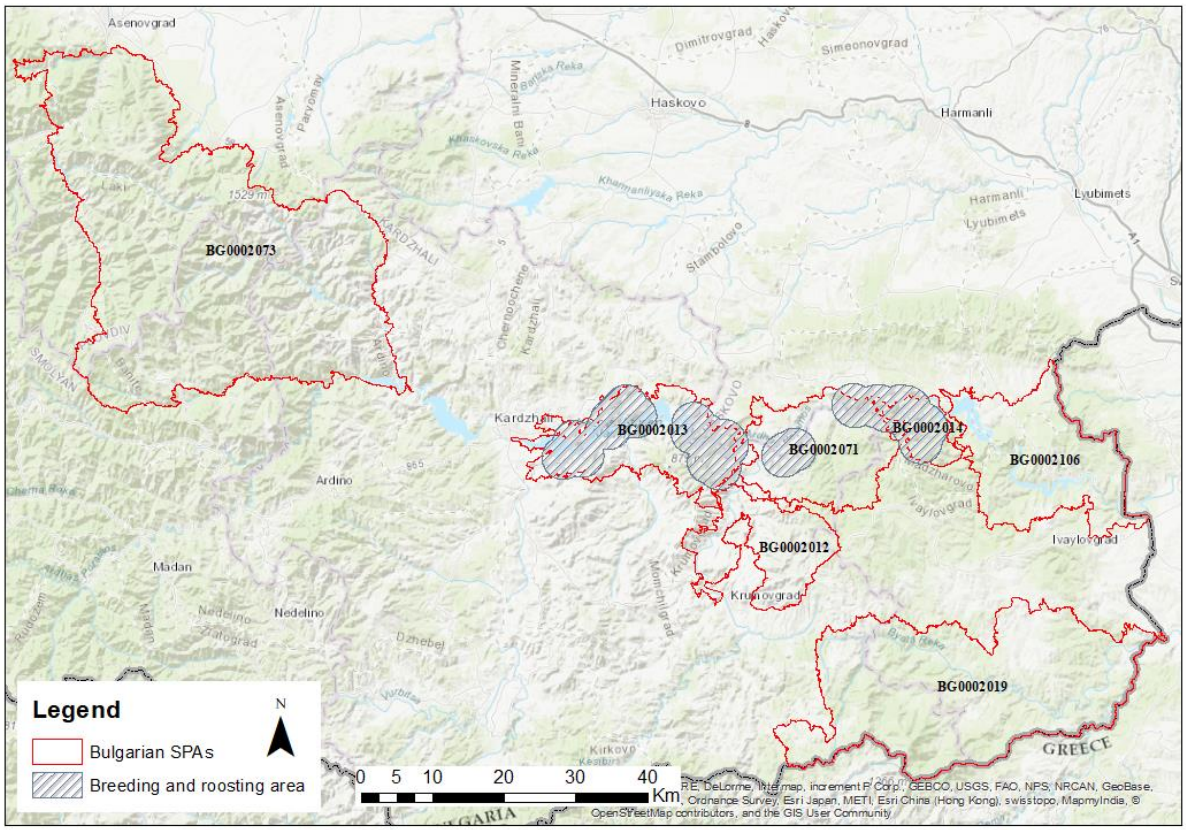


Figure 2. Surveyed territories in Bulgaria

In the Greek part of the Rhodopes, WWF conducted roosting survey furthermore than the Balkan common roosting monitoring; visits during autumn-winter (September-January). The increase of the roosting monitoring effort was decided in order to count any extra number of Griffon Vultures and demonstrate the importance of the cliffs for roosting activity, as only few nests occur in the study area the last two years**.**

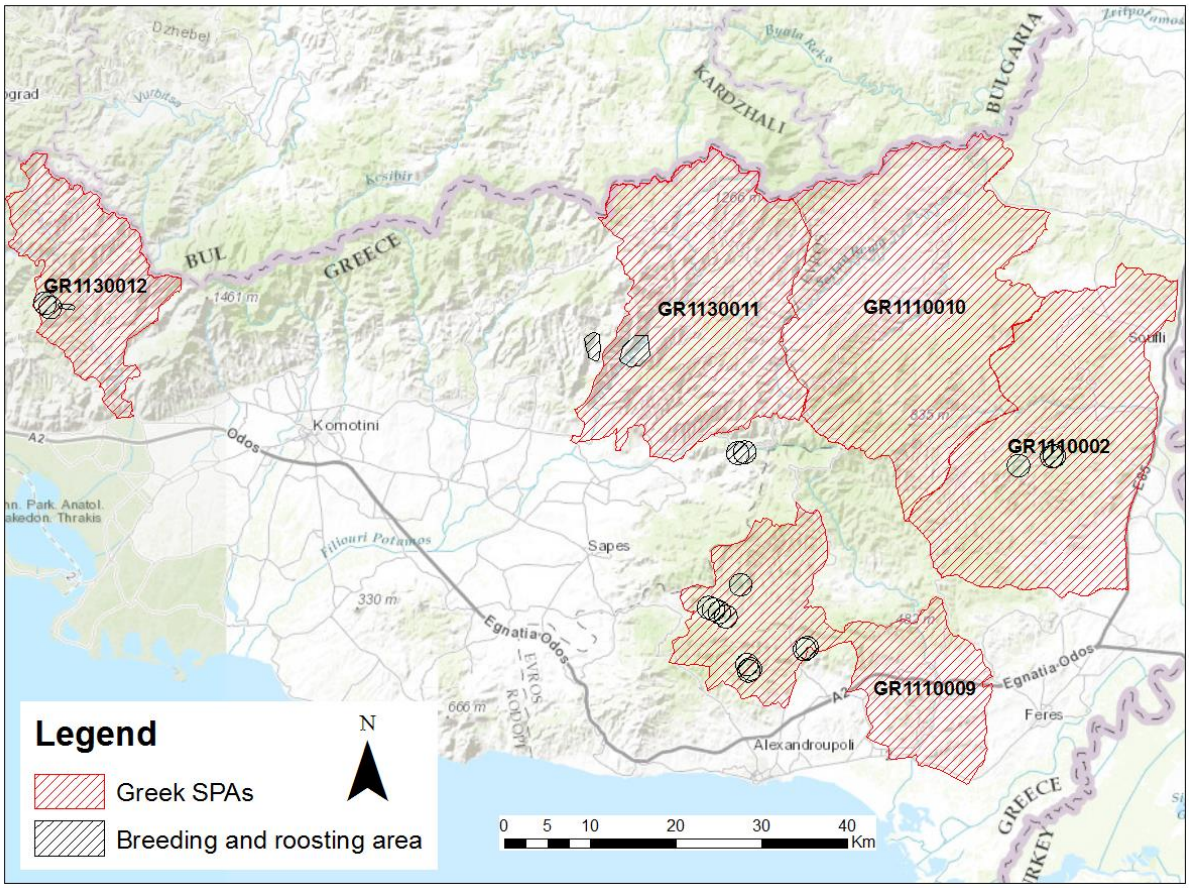


Figure 3. Surveyed territories in Greece

III. Results

1. Breeding performance in Bulgaria and Greece

For the whole study period 170 nests were occupied and 130 breeding attempts were registered in the Bulgarian part of the Rhodopes. The number of occupied cliffs by pairs in both 2016 and 2017 was 13. As a result, 101 chicks fledged successfully for the surveyed period. In 2016 the number of registered pairs was 81, which is 6 pairs more than in the previous year. Incubation was registered for 64 of the pairs. The number of successful pairs was 50 and 50 juveniles successfully fledged. The productivity measured at the end of the season was 0.62. The percentage of successful pairs was relatively high and was equal to 78% in 2016. In 2017 the number of registered pairs was 89 of which 66 started

incubation. In total 53 chicks hatched, but two died and 51 fledged successfully. The productivity index of the population was 0.59 while the percentage of successful pairs was 80% that year of the survey. The breeding success of the Griffon Vulture population in the Eastern Rhodopes was monitored and established for the studied period as well. It was 0.78 in 2016 and 0.77 in 2017 respectively. The trend of the population kept increasing during the first two years of the project and in the long term perspective as well (Fig.4).

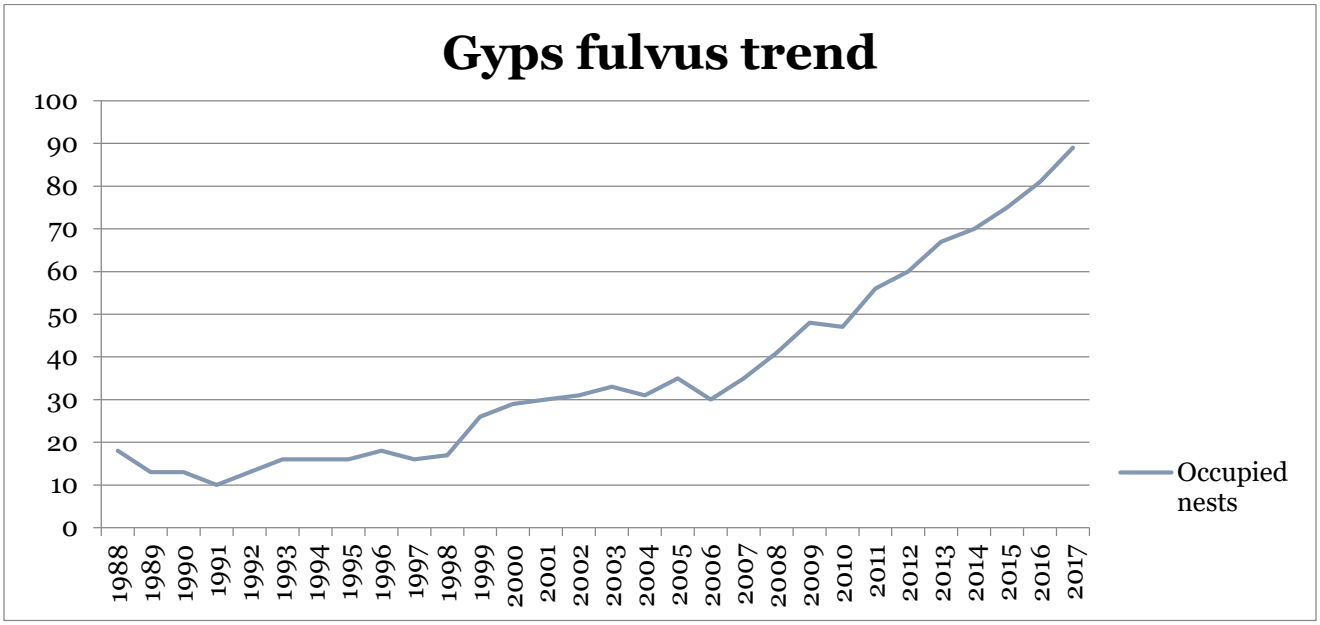


Figure 4. Long-term Griffon Vulture population development in the Eastern Rhodopes, Bulgaria

The breeding performance of the Griffon Vultures in Madzharovo and in the area of Studen Kladenets Reservoir differed significantly in 2016 as the breeding success of Madzhrovo colony was 0.59 against 0.94 in Studen kladenets. The following year, however, this parameter was not significantly different between the two colonies, being 0.81 for Madzharovo and 0.75 in Studen kladenets (Fig.5).

The age structure of the pairs was also established during the study period whenever possible. In 2016 12 of the established pairs consisted of adult birds, 11 of the pairs were mixed (ad *x* subad, ad *x* imm., subad. *x* imm. birds) while for the rest 58 pairs only one

adult bird was registered during the field visits and the age of the second partner remained unknown.

In 2017 13 of the pairs consisted of adult birds, 6 of the pairs were mixed (ad *x* subad, ad *x* imm., subad. *x* imm. birds) and for the rest 70 pairs only one bird was registered during the field visits and the age of the second partner remained unknown.

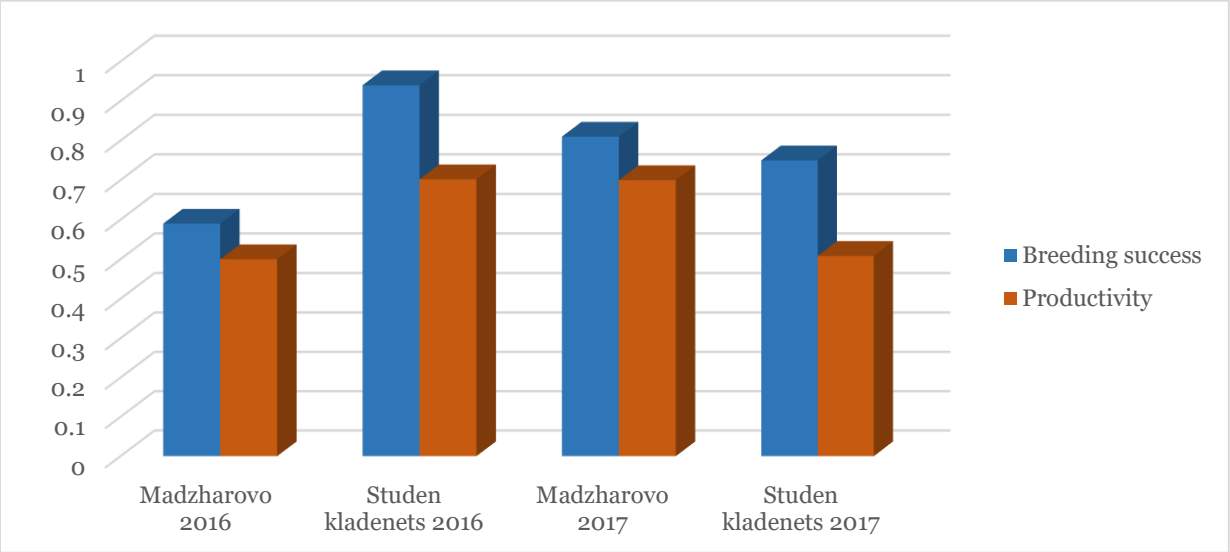


Figure 5. The breeding success and productivity of the studied colonies

At the Greek part of Rhodopes, 7 pairs nested in 2016 and 2 pairs in 2016 along Thrace with a breeding success of 85,7 and 100% respectively. In 2017, two nests were recorded in the Notio Dasiko Symplegma-GRGR1110009, a historical breeding site for Griffon Vultures. Even though, there were always nests there, a continuous data set was established by WWF Greece for the period 2003-2017 (excluding the year 2015, where no monitoring took place). Based on that, the average of 4-6 nests occurred at this site, but in 2012 a peak of 13 pairs were recorded (Figure 6).

For the same period 2003-2017, in Dadia National Park-GR1110002, the Griffon Vultures started to breed in 2007, after 11 years of abandonment the breeding cliff with 1-4 pairs in two different cliffs (Skartsi et al. 2010). In 2016-2017, none pair was recorded (Zakkak et al. 2017a, Zakkak et al. 2017b).

In the other two SPAs of the study area, Kompsatos valley-GR1130012 and Filiouri valley-GR1130011, the Griffon nests started to be recorded annually by WWF from 2013. In every site nest 1-2 pairs. In 2016, there were two pairs in Kompsatos and one in Filiouri and in 2017, none pair was recorded in both sites.

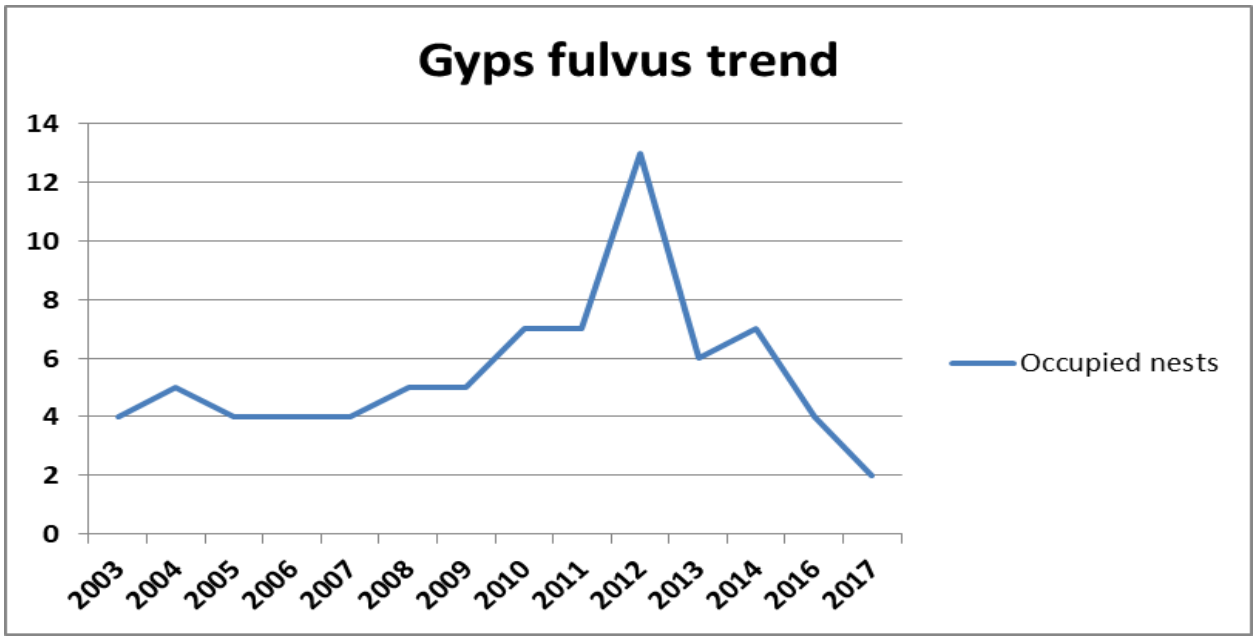


Figure 6. Long-term Griffon Vulture population development in Notio Dasiko Symplegma, Greece (GR1110009)

2. Monitoring at supplementary feeding stations in Bulgaria

In order to register the presence of marked Griffon Vultures, their age structure and population demography, 81 observations during specially organized feedings (Arkumarev et al. 2018) were carried out in the reporting period. The highest number of Griffon Vultures per one feeding was 128 birds together. The average number of Griffon Vultures per feeding was 54 birds as the prevalent number of birds were adults, followed by the immature vultures (Fig.7).

During the observations 108 marked Griffon Vultures with different origin were identified of which 11 were with Serbian origin, 14 were tagged in Greece, 16 were tagged in Israel,

38 were released or tagged at the reintroduction sites in the Balkan Mountains and Kresna gorge and 29 were tagged in the frame of the current project (Fig. 8).

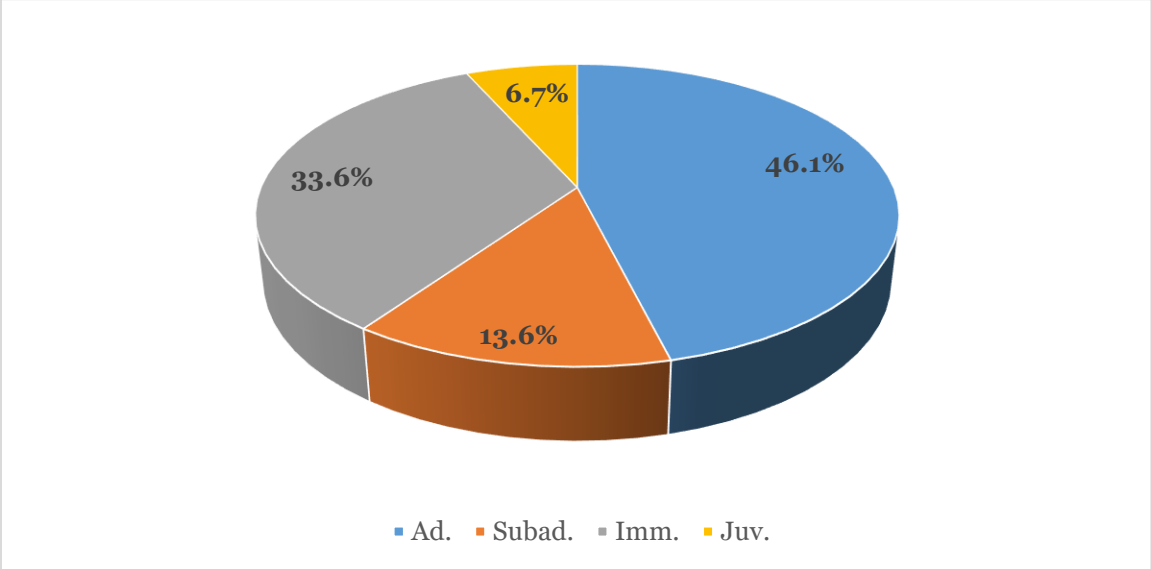


Figure 7. Percentage of different age classes established for the Griffon Vultures during feedings

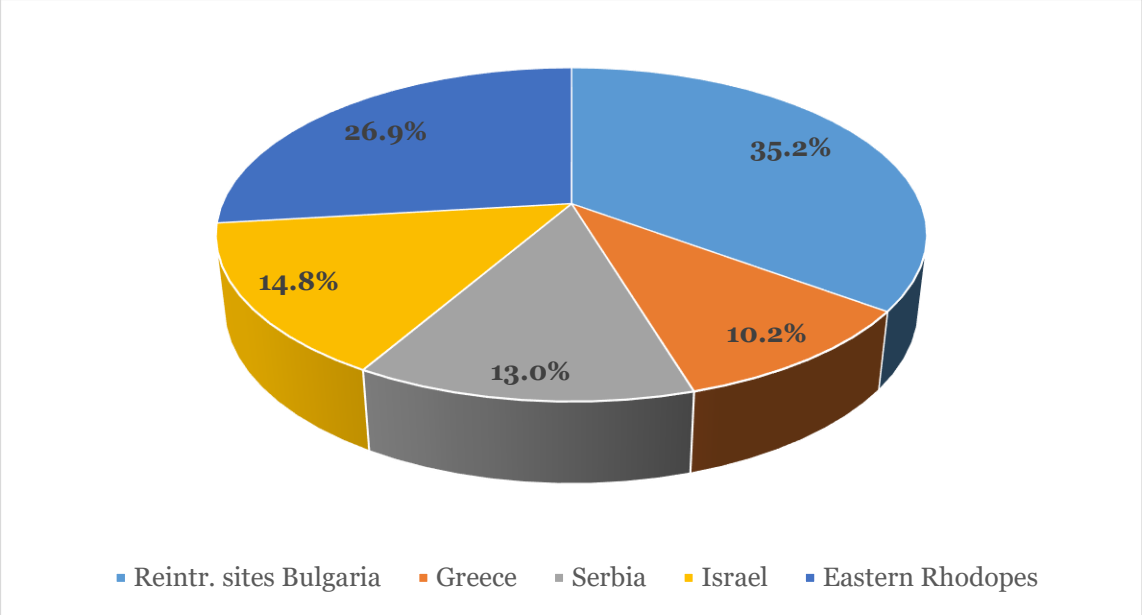


Figure 8. Percentage of marked Griffon Vultures observed in the Eastern Rhodopes in accordance to their origin

3. Census of roosting sites in Bulgaria and Greece

Griffon Vulture roosting site census was conducted annually each November for the study period in order to establish the age structure (Fig. 10) and the population numbers in the pre-laying period on the Balkans (Fig. 11). More than 35 volunteers and field experts were simultaneously counting on all roosting cliffs in Eastern Rhodopes to determine the exact number of the roosting Griffon Vultures. Simultaneous counts were conducted in the reintroduction sites in the Balkan Mountains and Kresna Gorge but also in other Balkan countries – Greece, FYROM and Serbia. In 2016 a total of 184 Griffon Vultures were registered roosting on the Bulgarian side of the Eastern Rhodopes and 12 on the Greek side of the mountain. Most of the birds were observed in Studen kladenets area – 120 birds and 64 were registered in Madzharovo area (Fig.9). Vultures used 5 cliffs for roosting in Madzharovo area and 7 in Studen kladenets. In Greece birds roosted on 5 cliffs.

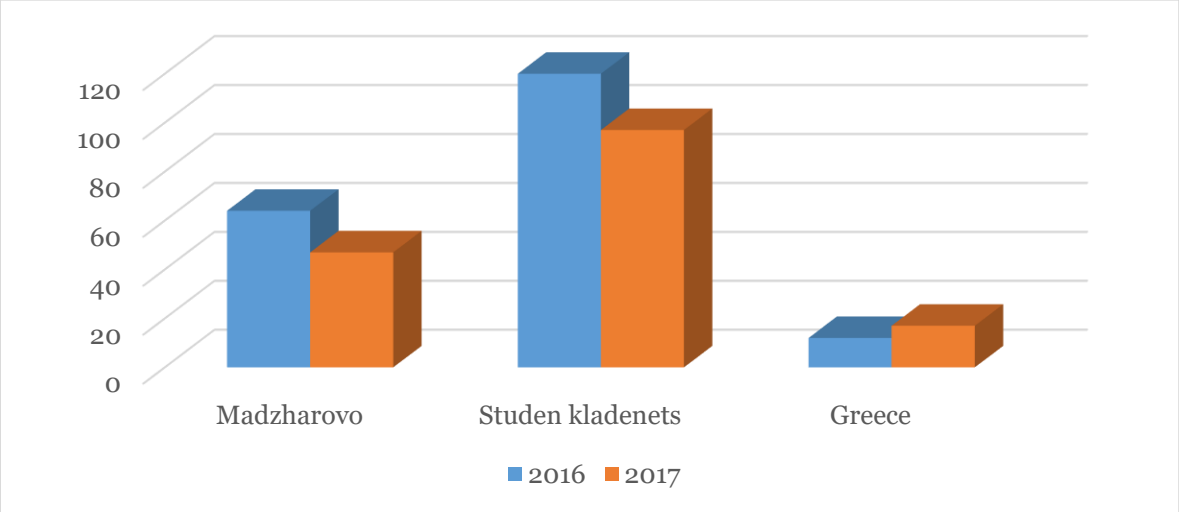


Figure 9. Number of roosting Griffon Vultures in Madzharovo, Studen kladenets and Greece

The majority of the observed vultures were adults in both territories. Due to bad weather and low visibility in 2017 slightly lower numbers of roosting Griffon Vultures were registered in the Eastern Rhodopes, 145 birds in Bulgaria and 17 in Greece, respectively. In Madzharovo 47 Griffon vultures were registered roosting on 4 cliffs and 97 birds in

Studen kladenets area on 6 cliffs. In Greece the Griffon Vultures used 3 cliffs for roosting. In both years most of the immature and non-breeding birds were observed at Studen kladenets area and also Greek part of the Mountain. As a result the age structure of the population was revealed during the study period (Fig. 7). Adult birds predominated and comprised 63% of all individuals, followed by immatures (15%), juveniles (6%) and subadults (5%).

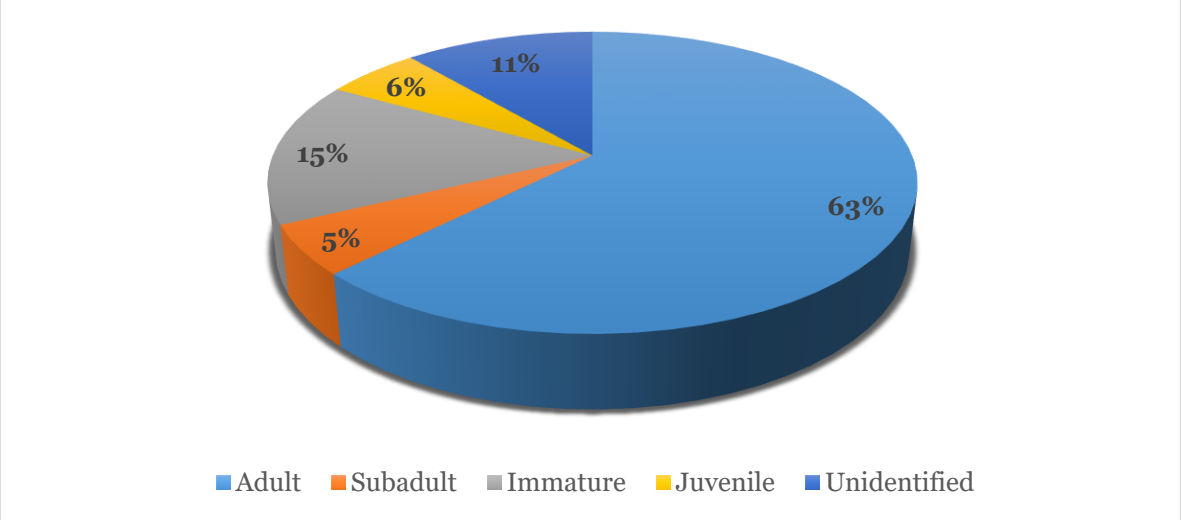


Figure 10. Age structure of the Griffon Vulture population in Eastern Rhodopes

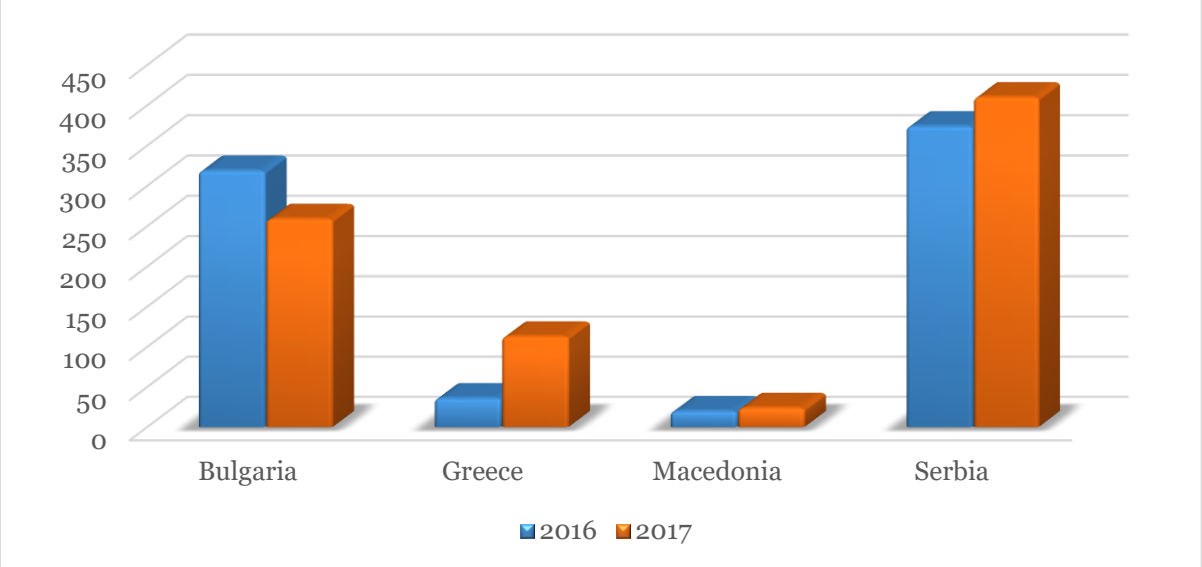


Figure 11. Numbers of recorded Griffon Vultures during the annual roosting censuses by countries

Apart of the two days of the common Balkan roosting monitoring (2016 & 2017), during the other visits in the Greek part of the Rhodopes, some interesting max number of roosting Griffon Vultures were recorded mainly in Kompsatos valley: 20 individuals (October 2016), 40 individuals (September 2017) and 13 individuals (October 2017). In Dadia National Park, the max of 22 individuals roosted on a cliff (October 2017). In Notio Dasiko Symplegma, only 2-4 individuals were recorded mainly on the breeding cliff**.**

IV. Discussion

The population of the Griffon Vulture in the Eastern Rhodopes-Bulgaria kept its positive trend in the last decade and reached 89 pairs in 2017, following a gradual population recovery since 1980s. The progressive increase of the population on the Bulgarian side of the Rhodopes Mountain could be followed by a shift of the pairs breeding in Greece before that and attracted by the growing numbers and density of the population along Arda river. At recent times this meta population is one of the few increasing vulture populations on the Balkans with a moderate increase. At the same time neighboring populations experienced a strong decrease in FYROM and in northern Greece. Nowadays a fluctuating number of breeding pairs are registered annually mainly in South Evros (Notio Dasiko Symplegma) and in Rhodopes (Kompsatos and Filiouri valleys). In contrary, in the Dadia-Lefkimmi-Soufli National Park, the Griffon vultures aren't breeding the last two years but they are abundant as visitors of the Dadia feeding station using closer trees or cliffs to roost in high numbers. Even though the breeding pairs at the Greek part of Rhodopes Mountain are few, the Griffon vulture is present in many sites, travelling among the Bulgarian and Greek feeding stations, foraging in areas with high concentration of livestock and roosting on trees or cliffs (breeding or non-breeding cliffs). Use of poisons is the most serious threat to vulture species worldwide and has a major influence over the population numbers and range (Botha et all., 2017). There are many documented cases of species extinction due to poisoning. In the Bulgarian part of Eastern Rhodopes there was no registered major poisoning event since mid-1990s. Thus, the area is considered to be

one of the safest for the vulture species in Bulgaria and the Balkans. Nevertheless, major poisoning incident was registered in the fall of 2016, affecting many domestic and wild animals. No vultures were found poisoned, however. Occasional poisoning incidents are registered annually on the Greek side of the mountain as well. This inevitably underlines the need of further indebt work on this major problem for all vulture species in the region so that the population growth will continue in the next years.

The operation of wind farms on the Greek side has already affected negatively on Griffon and Black vultures. During the assessment study, carried out by WWF in the Greek part of the Rhodopes, 4 Griffon vultures were found dead (Carcamo et al. 2011, Douteau et al. 2011) and out of the assessment study period, one dead Griffon Vulture and one alive but amputated were found (WWF unpublished data). The establishment of new wind farms is an ongoing process as Thrace was selected as a Wind Priority Area based by the Greek law with a capacity of 960MW. The risk of collision and mortality will be increased in the case that all the planned wind farms will be established (Vasilakis et al. 2016, Vasilakis et al. 2017). One of the main activities of WWF Greece is strong policy lobby in order to achieve the proper planning of the future wind farms in the area (WWF 2013).

The measured breeding success of the Griffon vulture is above the average for Europe, being higher than number of countries in the Mediterranean region. It is well documented that the breeding success in colonial raptors is often influenced by the size of the colony. Thus, small or very large colonies would show density-dependent effect. In this regard the Eastern Rhodopean population still does not show any signs of this effect, however there are still some major differences between the different breeding groups in the colony in space and time. In 2016 there was a significant difference in the breeding performance between Madzharovo and Studen kladenets breeding colonies, which however could be still due to habitat and foraging conditions. Very often the breeding success and the population trend could be directly related to the age of the breeders. In our study for the majority of the pairs the age of the second partner remained unknown. Nevertheless, the high breeding success of the colony and the positive trend of the population is a strong evidence that the rest of the pairs that were left unidentified as one of the partners was not aged, are more likely to consist of two adult birds, or at least one adult and one

subadult bird. If the latter case is valid, this could explain the good breeding success of the population. We have also to bare in mind that the breeding success in vulture species can be highly influenced by the abundance of food. Thus, in areas with high food abundance immature birds might be encouraged to attempt breeding earlier than expected. Eastern Rhodopes seems to sustain very good foraging conditions as in many occasions even with a food supplied at the feeding site, Griffon Vultures preferred to utilize natural carcasses. A decade ago, study surveying the human-wildlife conflict outlined the importance of Studen kladenets area for the vultures that can take advantage of the many wolf kills in the area. This fact is once more proved by the visual observations of marked birds during the organized feedings. By the number of the observed marked birds we can conclude that out of 108 vultures, at least 72% come from different colonies, either from the Balkans or the Middle East. Nevertheless, areas with high vulture abundance have to be closely monitored in order to avoid any poison incidents that could extirpate the whole population in a very short period. Vulture populations' crashes have been registered across the whole range of the species nowadays. Therefore, taking opportunely conservation measures must be applied a priori emerge of such threats.

Obtaining the population numbers and age structure of the Griffon Vulture population in the pre-breeding season could be very useful and may support the consequent population monitoring. Very often the cliffs most preferred for roosting are the ones with most numerous breeding pairs in the breeding season. This could be due to different factors like: type, size and aspect of the cliffs, proximity to feeding sites, conspecifics and/or human infrastructures. The Griffon Vulture is a colonial cliff nesting raptor and thus, the stronger and the densest the population, the more attractive is to conspecifics. In this regard, suitable cliffs may stay unoccupied, if situated in areas with low population densities. The age structure of the population is an important demography parameter as well, especially in terms of the reproductive capacity and health status of the population. If the population consists of only adult birds it may indicate high juvenile mortality and thus in a long-term the population may suffer a shortage of new breeders and fresh gene flow from off springs. Vice versa, the very high number of immature birds may indicate the same problems with the adult birds and will also suggest major problems in the breeding territories. In many occasions non-breeding and immature birds congregate

along the feeding sites and thus create a social cluster that can attract and vacuum conspecifics from distant areas. However, this can also have a negative effect on the breeding success of the Griffon Vultures in these sites, as most of these birds will affect the breeders both in temporal and spatial aspect. In conclusion, the regular monitoring of the Griffon Vulture demography and social community is an essential tool in taking adequate management decisions for conservation of the species and fighting the main threats in situ.

V. Conclusions

- In the Eastern Rhodopes (both Bulgaria and Greece) the Griffon Vulture breeding population can be considered as one unique population with exchanges and movements among them;
- The Griffon Vulture population in the Eastern Rhodope Mountains increased from 88 pairs in 2016 to 91 pairs in 2017;
- The majority of the population is concentrated along Arda river and the rest in Notio Dasiko Symplegma Evrou area with pairs shifting between these territories;
- The average breeding success of the Eastern Rhodopean population is around the average registered for Europe;
- 25% of the Griffon Vultures observed in the pre-laying season are not mature indicating a healthy and increasing population;
- More than 100 marked vultures were observed in the study area, indicating the attractiveness of the region to vulture species;
- The average number of Griffon Vultures at a feeding event shows a high rate of carcass utilization, however vultures use natural carcasses preferably in comparison to the disposed carcasses at the feeding stations;

VI. References

Arkumarev, V., Dobrev, D., Stoychev, S., Stamenov, A. 2018. Black Vulture pattern of presence in the Eastern Rhodopes, Bulgaria. Technical report under Action A3, LIFE14 NAT/NL/901. Bulgarian society for the protection of birds, 16 pp.

Baumgart, W. 1974. Wie steht es um Europas Geier? – Falke, 21 (8): 259-267.

Botha, A.J., Andevski, J., Bowden, C.G.R., Gudka, M., Safford, R.J., Tavares, J., Williams, N.P. 2017. CMS Multi-species Action Plan to conserve African-Eurasian Vultures. Coordinating Unit of UNEP/Raptors MoU, Abu Dhabi.

Dobrev, D., Stoychev, S. 2013. Vulture conservation in Bulgaria. Proceedings of the Griffon Vulture Conference, 6-8 March 2013, Limassol, pp. 38 – 52.

Donazar, J.A., Avizanda, A., Fargallo, J., Margalida, A., Moleon, M., Morales-Reyes, Z., Moreno-Opo, R., Perez-Garzia, J., Sanchez-Zapata, J., Zuberogoitia, I., Serrano, D. 2016. Roles of raptors in a changing world: from flagships to providers of key ecosystem services. Ardeola 63 (1), 181-234 pp.

Carcamo, B., Kret E., Zografou C.,Vasilakis, D. 2011. Assessing the impact on nine established wind farms on birds of prey in Thrace, Greece. Technical reort. pp93. WWF Greece, Athens.

Doutau, B., Kafkaletou – Diez A., Cárcamo B., Vasilakis D., Kret, E. 2011. Impact assessment of wind farms on birds of prey in Thrace - Annual Report August 2009 – August 2010. Technical Report. pp43. WWF Greece, Athens.

Demerdzhiev, D., Hristov, H., Dobrev, D., Angelov, I., Kurtev, M. 2014. Long-term population status, breeding parameters and limiting factors of the Griffon Vulture (Gyps fulvus) population in Eastern Rhodopes, Bulgaria. Acta zool. bulg., 66 (3): 373-384.

Mateo-Tomas, P., Olea, P.P. 2010. Anticipating Knowledge to Inform Species Management: Predicting Spatially Explicit Habitat Suitability of a Colonial Vulture Spreading Its Range. PLoS ONE 5(8): e12374. doi:10.1371/journal.pone.0012374.

Reiser, O. 1894. Materialen zu einer Ornis balcanica. II. Bulgarien. Wien. – In Commission bei Carl Gerold's Sohn. 204 p.

Skartsi, T., Elorriaga, J., Vasiliakis, D., 2010. Population trends and conservation of vultures in the Dadia-Lefkimi-Soufli Forest National Park, 183-194. In: Catsadorakis, G. & Kallander, H. (eds.). The Dadia – Lefkimi – Soufli Forest National Park, Greece: Biodiversity, Management and Conservation. WWF Greece, Athens.

Steenhof, K., Newton, I. 2007: Assessing nesting success and productivity – In: Raptor research and management techniques (ed. Bird, D.M. & Bildstein, K.L.), Hancock House, Surrey, Canada 181–192.

Stoyanov, G. 2010. Past and current distribution of the Griffon Vulture (Gyps fulvus) in Western Bulgaria. – Ornithologische Mitteilungen, 7-8/2010.

Vasilakis, D., Whitfield, P., Schindler, S., Poirazidis, K., Kati, V. 2016. Reconciling endangered species conservation with wind farm development: Cinereous vultures (Aegypius monachus) in south-eastern Europe. Biological Conservation, 196, 10-17.

Vasilakis, D.P., Whitfield, D.P., Kati, V. 2017. A balanced solution to the cumulative threat of industrialized wind farm development on cinereous vultures (Aegypius monachus) in south-eastern Europe. PLoS ONE 12(2): e0172685. doi:10.1371/journal.pone.0172685.

WWF Greece 2013. Wind farms in Thrace: Updating the proposal for proper site selection. pp41. WWF Greece, Athens.

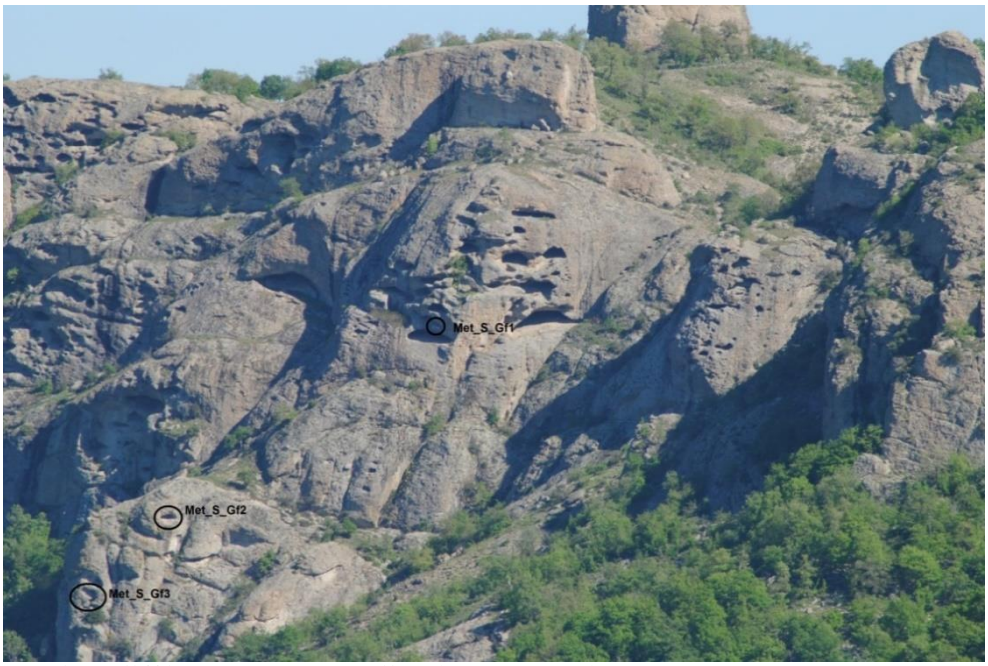
Zakkak, S., Babakas, P., Chaliveletzios, A., Tziabazis, I. 2017a. Annual report of the monitoring for the EC species and habitats for the year 2016. Management Body of the National Park of the Dadia-Lefkimmi-Soufli Forest, Dadia, Evros. Pages 47+Annexes (Unpublished data)

Zakkak, S., Babakas, P., Chaliveletzios, A., Tziabazis, I. 2017b. Annual report of the monitoring for the EC species and habitats for the year 2017. Management Body of the National Park of the Dadia-Lefkimmi-Soufli Forest, Dadia, Evros. Pages 59 +Annexes (Unpublished data)

VII. Annexes

Annex 1. Nesting cliff in: (A) Madzharovo (BG002014); (B) Kompsatos valley (GR1130012)

A. Nesting cliff in Madzharovo (BG002014)



B. Nesting cliff in Kompsatos valley (GR1130012)