

Reintroduction of the Griffon Vulture (*Gyps fulvus*) in Eastern Balkan Mountains, Bulgaria – completion of the establishment phase 2009-2020

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Abstract: The current work presents and analyzes the results from the just completed 12 years establishment phase of the reintroduction of the Griffon Vulture (*Gyps fulvus*) in Kotelnska Planina SPA and Sinite Kamani Nature Park in the Eastern Balkan Mountains in Bulgaria that took place in the period 2009-2020. The number, age and origin of the released birds, methods of release, survival rate, roosting and breeding sites selection, conservation management techniques applied, breeding performance and home-range's dynamics were studied, analyzed and presented. Based on the success of the reintroduction project described here, since 2016 the Griffon Vulture started to reproduce again in Eastern Balkan Mountains after more than 40-50 years of the last known record. In 2020 the local population counts of about 80-115 individuals, 22-24 pairs in 4 different colonies and two more frequently used roosting sites, but yet with relatively low breeding success raising 6-10 offspring a year. The establishment phase of the reintroduction of the species in this particular area is considered completed now.

INTRODUCTION:

A total of four species of vultures were known to nest in Bulgaria: Eurasian Griffon Vulture (*Gyps fulvus*), Black Vulture (*Aegypius monachus*), Egyptian Vulture (*Neophron percnopterus*) and Bearded Vulture (*Gypaetus barbatus*) (Patev 1950, Simeonov and Michev 1990).

In the beginning of XXI century only two of the species remained as nesting – Griffon and Egyptian Vultures in the country. The last breeding of Black Vulture was confirmed in 1992 (Marin, Rogev et al. 1998, Stoykov, Kurtev et al. 2007) after a gap of some 30+ years, while Bearded Vulture has been considered extinct since the 70s of XX century, despite occasional sightings of individual birds (Donchev 1974, Stoykov 2007).

In 2003, following over 20 years of local conservation efforts, a long-term International Action Plan for the Recovery and Conservation of Vultures on the Balkan Peninsula and Adjacent Regions (BVAP) was initiated. It provides for a step-by-step recovery of the species, starting with Griffons in some strategic historic breeding sites and finishing with Bearded Vultures. As an initial step, in 2003 a Griffon Vulture adaptation aviary was constructed in the area of Kotelnska Planina (UTM MH65), near the town of Kotel, by the Fund for Wild Flora and Fauna (FWFF) and 3 vultures were released in 2007. In 2008 an additional adaptation aviary was also constructed by Green Balkans – Stara Zagora NGO in the territory of the Sinite kamani Nature Park (UTM MH43), 25 km away from the release site near Kotel. Considering the proximity of the two adaptation aviaries and the behavior of the birds released, the two release sites, the current publication considers them as a common, Eastern Balkan Mountains release site. Both sites are known to be historical breeding area for the Griffon Vulture (Demerdjiev, 2007, and citations there in).

Site description

Kotelnska Planina

Kotelnska Planina is located in the central part of the Eastern Balkan chain. Many clearly formed secondary ridges with steep slopes and deeply cutting gorges and ravines descend from the main ridge of the mountain to the Ticha and Luda Kamchia river valleys. The terrain is steep and heavily indented. The region is sparsely populated, mainly in its periphery and along the river valleys. About 23 % of the mountain territory is occupied by primary broad-leaved forests mainly of *Fagus sylvatica* subsp. *moesiaca*, at places mixed with *Carpinus betulus*. More limited are the forests of *Quercus daledampii*, sometimes mixed with *C. betulus* and *Carpinus orientalis*, the mixed forests of *Quercus cerris* and *Quercus frainetto*. A small location of natural mixed forests of White Fir *Abies alba* and Beech *Fagus sylvatica* has been established in the western part of the mountain. The secondary forests and shrubs of Oriental Hornbeam have a very limited distribution in the region. The rest of the territory is occupied by open grasslands, used as pastures and farmland. A considerable part of the open areas, including the agricultural plots, have a secondary origin, i.e. they spread on territory previously occupied by old forests. The wet areas and the river valleys cover a comparatively small part of the mountain territory. Limestone rocks and karst formations are dispersed everywhere in the high mountain areas (Kostadinova & Gramatikov 2007). The mean altitude of the site is about 500 m above sea level and the highest peak is little over 1000 m.

Sinite Kamani Nature Park

The area is located in Sliven Mountain, which is a part of the southern slopes of the Eastern Balkan Mountain (part of Balkan Mountain chain). The western part and southwestern limit of the area is defined by Asenovets Reservoir and the Asenovska River. On the north it passes along a watershed ridge, which is practically the highest part of the area- over 1000 m. The northern slopes are steep, covered by beech forest. The area's southern limit passes along the southern slopes of the mountain just next to the town of Sliven. A considerable part of the area is covered by broadleaved forests. The mixed oak forests of *Quercus daledampii*, *Q. cerris*, *Q. frainetto* and *Q. pubescens* prevail. Forests of *Fagus moesiaca* and *Carpinus betulus*, as well as *Tilia tomentosa* and *Carpinus orientalis* are also represented. Shrub and grass associations on silicate base occupy 2% of the area and about 6% is covered by secondary steppe and dry calciphile grass communities. The grass formations have secondary origin. The rock formations, which have given the name of the site, occupy 7 % of its total area.

A specialized project "Recovery of the Populations of Large European Vultures in Bulgaria" LIFE08 NAT/BG/278 was triggered in 2010. The project was carried out by Green Balkans in partnership with the Fund for Wild Flora and Fauna (FWFF) and the Birds of Prey Protection Society (BPPS).

The overall aim of the project was restoring the populations of the three large vulture species in Bulgaria through reintroduction of the Griffon Vulture along the whole Balkan Mountain chain (four releases sites – from west to east – Vrachanski Balkan, Central Balkan, Sinite Kamani and Kotelnska Planina). A complex of preparatory and direct conservation measures was applied and the capacity increased of NGOs and local institutions for conservation action. Here we report the results of the Griffon Vulture reintroduction in Eastern Balkan Mountain for the period 2010-2015.

MATERIALS AND METHODS:

The original plan was to follow the release methodology successfully used for the restoration of Griffon Vulture in the Alps (Terrasse & Choicy, 2007). Their methodology provides for soft release (open the cage and wait the birds to go out on their own) in autumn of subadult (more than 3 years old) birds that stayed about 2-3 years in the aviary, as to avoid dispersal and migration. Based on some experiments in Bulgaria we adapted the method as follows- we practiced also hard release (release from hand), of immature birds (1-2 years old), after stay from a month to 1-2 years in the acclimatization cage. We released most of the birds in late winter, spring and summer as to use the good flight conditions (warm weather), and to give more time to the birds to adapt to the wild and store fats prior to the winter.

Year	Eastern Balkan Mountains		Total
	Sinite Kamani Nature Park UTM MH43	Kotelnska Planina SPA UTM MH65	
2007	0	3*	3*
2009	0	5	5
2010	7	7	14
2011	12	11	23
2012	19	7	26
2013	8	0	8
2014	16	10	26
2015	3	4	7
2016	4	0	4
2017	11	0	11
2018	4	0	4
2019	11	4	15
2020	7	0	7
Общо	102	51	153

Number of released Griffon Vultures in Eastern Balkan Mountain by releases site

A total of 153 Griffon Vultures were shipped and accommodated at the two adaptation aviaries in Eastern Balkan Mountains – Sinite Kamani Nature Park and Kotelnska Planina SPA between January 2010 – October 2020. A total of 123 of those birds originate from rehabilitation centres in Spain (thus wild birds that have some previous flying experience, but suffered some kind of injury and collected and rehabilitated by those centres), other 10 birds came from rehabilitation centres in France, while the rest were captive bred in several European Zoos. It should be however be noted that later, in the course of the project implementation, some of these birds were transferred to other release sites (such as Kresna Gorge release site), so when analyzing the results, the number of released vultures should be considered rather than the number of initially accommodated.

Fenced feeding sites (vulture restaurants) were established just next to the acclimatization aviaries and food (carcasses of livestock and/or slaughter offal were provided on regular basis). It appears that the amount, but mainly the frequency of the food provision is of great importance for the settlement of a nucleus of birds, for the survival of the releases ones and thus for establishment of a colony.

The vultures were frequently (every 2 to 4 days) observed by binoculars and spotting scopes at the feeding site and the known roosting sites. Local people and tourist reports on seen vultures and identified tags were used, as well as photo-traps in order to record and identify the birds present at the supplementary feeding site, adjacent to the release aviary. Initially the project employed a Microsoft Office Excel spread-sheet with individual data on every bird imported within the Vultures Return in Bulgaria Project.

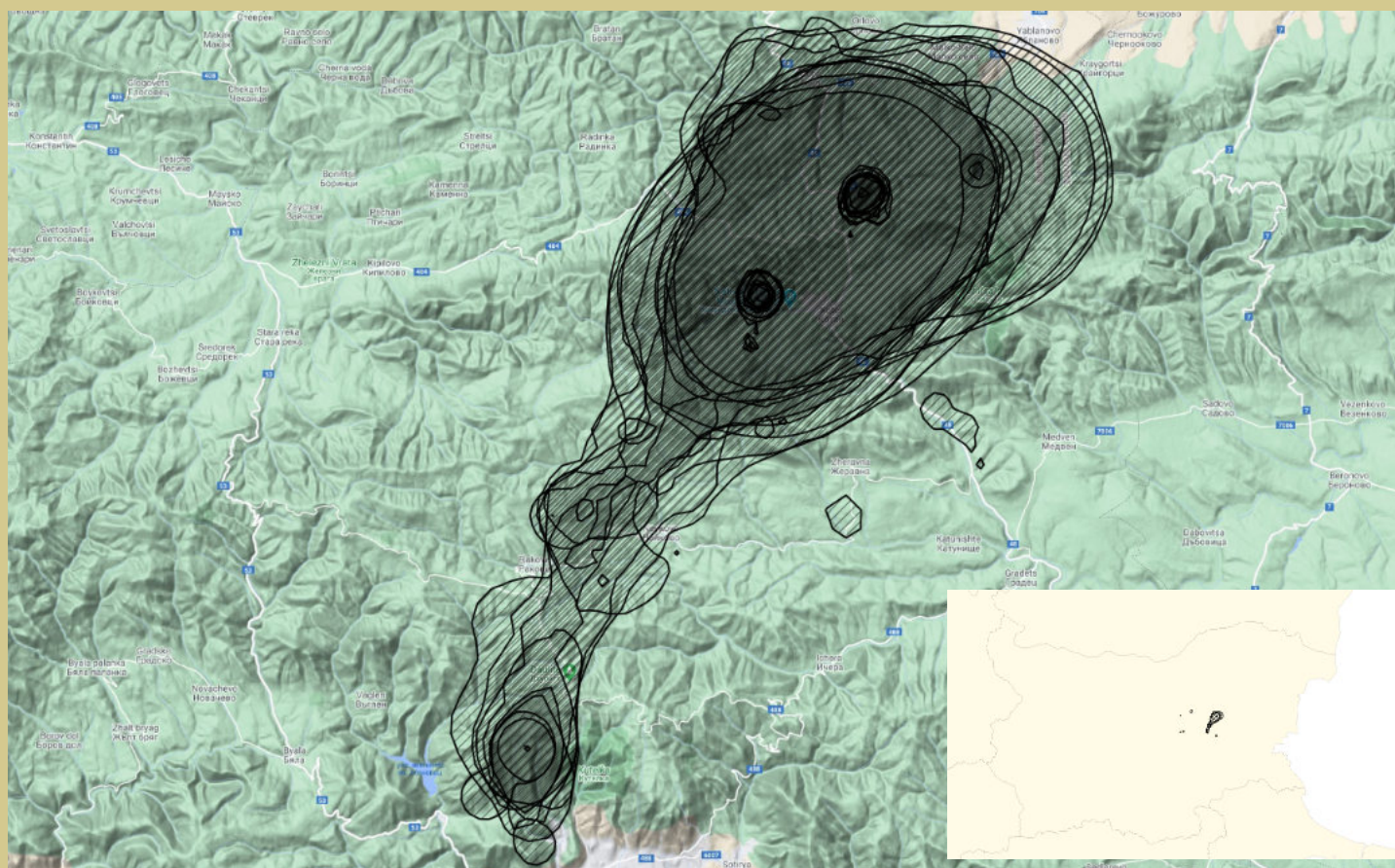
An interactive web-database was later developed within the Vultures Return in Bulgaria Project and tested for optimizing the storing and processing of information.

The database currently stores individual information on every bird, supplementary feeding site and observation. It is also compatible with the data sent by the GPS/GSM transmitters and it is able to visualize the points of observation of a given bird in chronological order, thus tracking its overall movements and behavior following release.

RESULTS AND DISCUSSION:

Nowadays there is a fixed group of some 75-100 Griffon Vultures constantly present in the area of release in Eastern Balkan Mountain. The maximum number of vultures seen together is 115 in December 2019 near Kotel.

Home ranges calculated by dBMM



Site description

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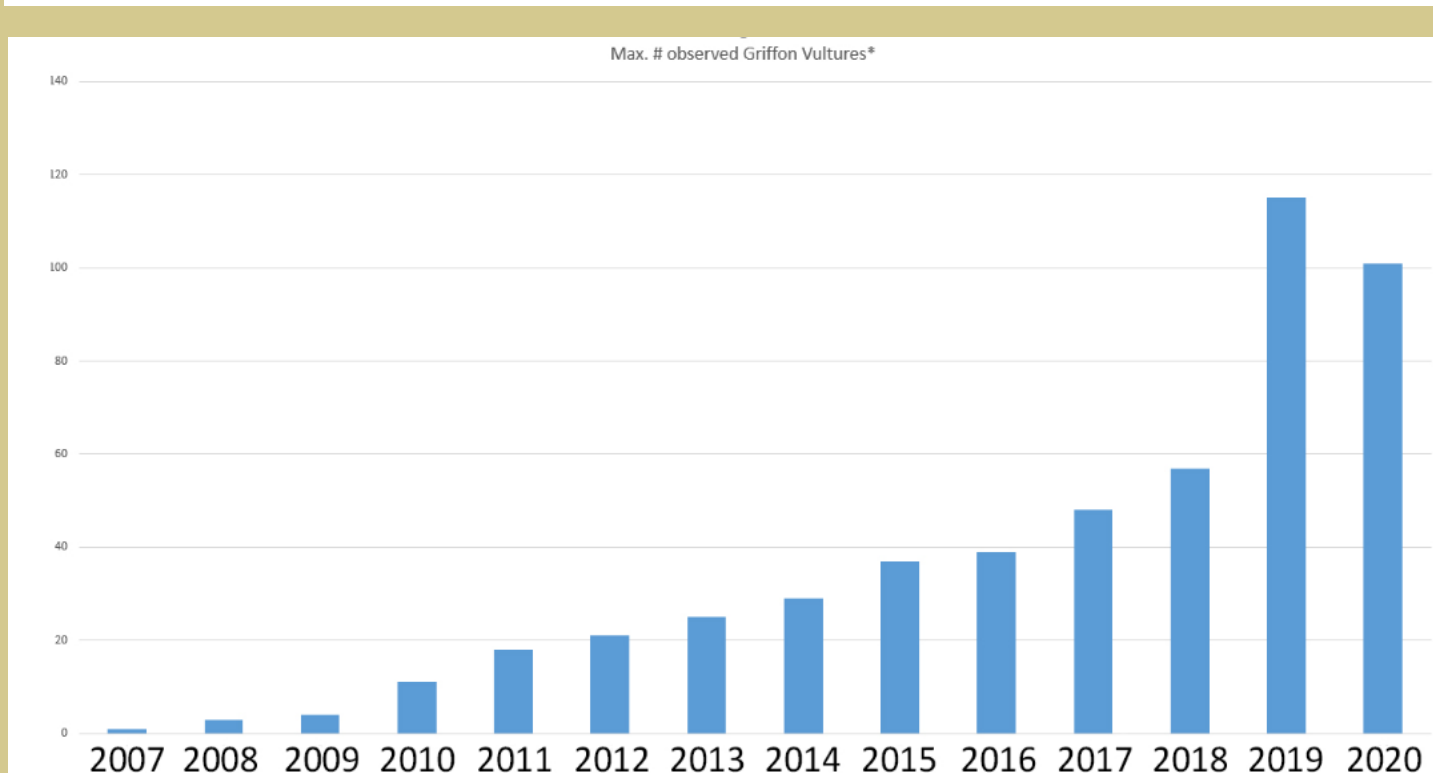
Site	Year	# Colonies	# Territorial pairs (b)	# Breeding pairs (c)	# Fledglings (d)	Breeding success (d/b)	Fledging success (d/c)	
Eastern Balkan Mountain	2012	1	1	1	0	0	0	
	UTM, MH65	2013	1	1	1	0	0	0
		2014	1	2	2	0	0	0
		2015	1	3	2	0	0	0
		2016	2	10	6	5	0.50	0.83
2017	3	11-12	8	5	0.45	0.62		
2018	3	12-14	9	5	0.41	0.55		
2019	3	21-23	15-16	6-8	0.28-0.34	0.40-0.50		
2020	4-5	23-25	16-18	6-8	0.26-0.32	0.38-0.44		

Breeding performance of the Griffon Vulture in Eastern Balkan Mountain in the period 2012-2020. Years of successful breeding are given in bold.

Origin	2010	2011	2012	2013	2014	2015	2016	2017	2018
Eastern Balkan	11	18	21	25	29	37	39	48	57
Central Balkan	0	0	3	4	4	5	0	2	0
Kresna Gorge	0	1	2	2	3	1	1	0	0
Vrachanski Balkan	0	0	0	1	3	3	5	3	1
Eastern Rhodopes	0	0	0	2	2	2	2	2	2
Serbia	0	1	1	2	2	3	1	2	2
Croatia	0	0	0	1	1	1	3	0	2
Israel	0	0	0	1	2	2	2	3	2
Unknown	1	2	10	18	22	27	30	34	39

Number and origin of the Griffon Vultures observed in Eastern Balkan Mountain by years in the period 2010-2018.

A total of 54 of the 153 Griffon Vultures released in the area were eventually found dead between January 2010 – October 2020, which means mortality of about 35 %. A total of 41 of the cases were proven or suspected cases of electrocution, since the remains were found under electric pylons, or the carcasses undergone necropsy. Three of the cases (5.7%) tested positive for pesticides (organo-phosphates/carbamates).



Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Max. # observed Griffon Vultures*	1	3	4	11	18	21	25	29	37	39	48	57	115	101	-
# dead individuals (of them - immigrants)**	0	0	1	0	8	3	1	3	2	2	2	5 (1)	2	3	25 (1)
Balance – fledged locally vs. destroyed immigrants in the area	0	0	0	0	0	0	0	0	5	5	4	8	8	8	30

Dynamics of the number and mortality of the Griffon Vulture in Eastern Balkan Mountain by year in the period 2007-2020. And analysis of the population source/sink balance – the number of locally died immigrants vs. the number of the locally fledged individuals.

* Simultaneously observed; ** in brackets is given the number of immigrant Griffon Vultures that died in Kresna Gorge.

Attracted other species

The feeding sites and the presence of the Griffon Vultures attracted conspecifics, but also other species, that have been extinct from the area or never reported.

A young Eurasian Black Vultures have been attracted to the region of the Eastern Balkan Mountains and it has been documented to use the feeding sites in the area for a first time in the past thirty years.

The species was observed in three serial years as follows: first observation on the supplementary feeding site in Sliven in April 2013, photographed by the photo-trap set on site. Second observation of a single individual on September 25th 2014. The bird was roaming above the supplementary feeding site but feeding was not confirmed. Third observation in June 2015, the bird stayed for over a month in the area of Sliven – Kotel in a group with Griffon Vultures, using the same roosting sites.

In addition to that, the two feeding sites in the Eastern Balkan Mountains are often used by Egyptian Vultures. Two Egyptian Vultures – an immature and an adult were attracted to the area and stayed for nearly a month in July 2010. A juvenile Egyptian Vulture was observed at the feeding site of Kotelnska Planina in May 2012, while in 2014 three different Egyptian Vultures, one Imperial Eagle and one White-tailed Sea Eagle (*Haliaeetus albicilla*) were observed. In 2015 two or three different Egyptian vultures were observed for several times in the period May-July, once again in Kotel.

There are several well-documented visits of young Imperial Eagles (*Aquila heliaca*) to the feeding site in Sliven. A single bird has been observed every year between 2012-2015, most commonly in September – October. It is usually a second- or third year old bird, in several cases, ringed.

A single juvenile White-tailed Eagles have been reported at both release sites in the Eastern Balkan Mountains. Between June-August a single individual was seen at the feeding site of Sliven. A juvenile individuals were also reported at the feeding site of Kotel on 02.12.2011, and 23.03.2013.

There are known breeding pairs of Golden Eagles (*Aquila chrysaetus*) in the areas of both the Sliven (2.5 km away) and the Kotel feeding sites (5 km away). The species can be seen at both sites all-year-round. The pair breeding to the Kotel feeding site, has been particularly aggressive towards the Griffon Vultures in the area and actively pushing them off suitable roosting sites.

Black kites (*Milvus migrans*) are frequently observed to feed at the feeding site in Kotel.

CONCLUSION:

The Griffon Vulture is successfully reintroduced to Eastern Balkan Mountain, yet since the first successful breeding in 2016, and in 2020 with the first reproduction of locally fledged individuals. Thus the establishment phase of this local reintroduction is considered finished.

The newly established colonies in Eastern Balkan Mountain are forming a common refuge and are acting as source with a positive balance of produced individuals and are now well integrated within the Balkan Griffon Vulture population. Many birds with origin of Serbia, Croatia, Eastern Rhodopes and others are using it for summering, wintering, during migration or short visits etc.

Although all breeding pairs are now in Kotelnska Planina SPA, the Griffon Vultures started to express interest and will probably soon start breeding also in Sinite kamani Nature Park (Sliven).

There is a well-documented movement of Griffon Vultures between the Eastern Balkan Mountains and the two natural colonies of Griffon Vultures in the area of Studen kladenets (UTM LG80) and Madjarovo (UTM MG01), Bulgaria and Dadia (UTM MF35), Greece in the Eastern Rhodopes. This movement is valid for both birds released within the Balkan restoration programme, which move to the south and then back north, as well as birds originating from the natural colonies visiting the release sites to their north.

The feeding sites are also used by Black Vultures (locally released and immigrants), Egyptian Vulture, Golden Eagle, Imperial Eagle, White-tailed Eagle, Black Kite, Raven etc.

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