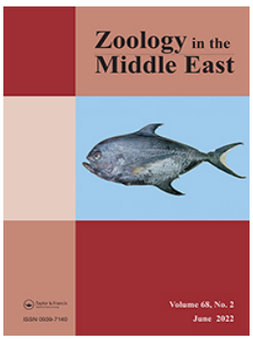

Taylor & Francis
Taylor & Francis Group

Zoology in the Middle East

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tzme20

Breeding biology of the Egyptian Vulture, *Neophron percnopterus*, in the Beypazarı area, Turkey

Şafak Arslan, Adem Akyol & Serdar Özuslu

To cite this article: Şafak Arslan, Adem Akyol & Serdar Özuslu (2022): Breeding biology of the Egyptian Vulture, *Neophron percnopterus*, in the Beypazarı area, Turkey, Zoology in the Middle East, DOI: 10.1080/09397140.2022.2109814

To link to this article: https://doi.org/10.1080/09397140.2022.2109814

Published online: 25 Aug 2022.

Zoology in the Middle East, 2022
http://dx.doi.org/10.1080/09397140.2022.2109814

Taylor & Francis
Taylor & Francis Group

Breeding biology of the Egyptian Vulture, *Neophron percnopterus,* in the Beypazarı area, Turkey

Şafak Arslan[a,b,*], Adem Akyol[a] and Serdar Özuslu[a]

[a]*Doğa Derneği / BirdLife Turkey, Seferihisar, Izmir, Turkey;* [b]*Department of Forest Engineering, Faculty of Forestry, Bartın University, Bartın, Turkey*

(*Received 8 March 2022; accepted 9 July 2022*)

The Egyptian Vulture *Neophron percnopterus* is globally endangered and its population shows a decreasing trend. Within Turkey, the largest breeding population is found in the Beypazarı region north of Ankara. In the breeding season of 2020, we identified 109 occupied nest sites and breeding activities were recorded in 90 of them (breeding propensity 82.6%). Seventy-one young fledged from 62 nests and 28 nests failed, which gives a breeding success of 0.69 successful pairs per active nest, a fledging success of 1.15 fledglings per active nest, and a productivity of 0.65 fledglings per occupied nest site. Electrocution and collision, poisoning, and habitat loss are the main threats to the species in Turkey. In our study area, the number of active nests increased from 69 in 2016 to 90 in 2020.

Key Words: Poisoning; habitat loss; endangered species; population; nest

Introduction

The Egyptian Vulture, *Neophron percnopterus,* is classified as endangered (EN) on a global scale and its population is estimated at 12,000-38,000 adult individuals (BirdLife International, 2021). The European population is estimated at 3,000-4,700 breeding pairs, i.e. 6,000-9,400 individuals (Oppel & Margalida, 2020). In Europe, the Egyptian Vulture is considered Vulnerable (VU) (Burns et al., 2021). Turkey and Spain are the two countries with the highest Egyptian Vulture populations in the Western Palaearctic region (Katzenberger et al., 2019). In Turkey, the species was widely distributed throughout the country until the middle of the 20th century and was exterminated from the Aegean Region and reduced in number in other regions (Boyla et al., 2019; Keller et al., 2020). In the 19th century, 1000 individuals fledged annually in Central Istanbul. This number declined to a few pairs at the beginning of the 1900s, and today no Egyptian Vultures breed in Istanbul (Kasparek, 1992). The breeding population of Turkey is estimated at 1500-3000 pairs and Beypazarı is one of the most important breeding areas known (Eken et al., 2006, Şen, 2017; Katzenberger et al., 2019). Other areas known to be inhabited by Egyptian Vultures in Turkey include the Middle and Upper Sakarya Basin, Bolkar Mountains, Cappadocia, Sivas, Çorum, and Kars regions (Eken et al., 2006).

The first studies on the Egyptian Vulture in Beypazarı were carried out in 2006 and the population was monitored until 2016. The effect of closing rubbish dumps on the population size and breeding success was investigated. An increase was observed in the population trend, with 69 active nests in 2016 (Şen, 2012, Katzenberger et al., 2019). In

*Corresponding author. Email: safak.arslan@dogadernegi.org

Published online 25 Aug 2022

order to assess the current population trend, we surveyed the Beypazarı area for new Egyptian Vulture nests and assessed their breeding success.

Material and Methods

Study area. Field surveys were carried out at the intersection of three Key Biodiversity Areas (KBA) in the Beypazarı region in Central Anatolia. The area is 98 km west of Ankara, at an average elevation of 700 m above sea level (Figure 1). The study area covers 1,300 km².

Kirmir Valley. Kirmir Valley KBA (371 km²) covers the part of the Kirmir Stream which takes its source from the Işık Mountains in the north of Kızılcahamam, starting from the point where it enters the Pazar Stream and flows into the Sarıyar Dam and the hilly areas around. Kirmir Valley, which has warmer and more humid conditions than its surroundings, has a high plant diversity due to climatic conditions (Eken et al., 2006).

Sarıyar Dam. This KBA (317 km²) includes the Sarıyar Dam built on the Sakarya River in the south of Nallıhan and Beypazarı districts of Ankara and the surrounding hills. Sarıyar Dam, which is one of Turkey's largest dams, was completed in 1956. The area is bordered by Hamam Mountain, which is the eastern end of the Sündiken Mountains in the south, and Kapıkırı Mountains in the north, and these hills are significant in terms of plant diversity (Eken et al., 2006).

Nallıhan Hills. This KBA (826 km²) consists of hills extending in an east-west direction between the Nallıhan-Beypazarı highway and Seben District. Nallıhan Stream forms the western border of the area. The hills in the area are divided by small valleys opened by creeks and streams. Aladağ Stream, one of the east-west tributaries of the Sakarya River, passes through the middle of the area (Eken et al., 2006).

Field surveys. Field surveys took place in 2020. Egyptian Vultures generally arrive in the Beypazarı region in March and depart for their wintering areas in September (Katzenberger et al., 2019). During this season, 37 days of observations were made in four different field surveys in May, June, August, and September. In the first field survey in May, the known nests of Egyptian Vultures were checked and their current occupancy status was determined. In addition, new nesting areas were identified and recorded. The second field study in late June determined whether the detected nest sites were active, and new nests were determined. All active nests were checked again in the third field study in August, and the number of offspring was recorded. In addition, factors threatening the species were investigated in all of these field studies. In this context, interviews were held with shepherds and local people on poisoning and direct persecution. They were asked whether they used poison to protect their livestock and their products and whether there was any hunting activity for the species. In addition, mining activities that opened in the region were followed. Finally, within the scope of fieldwork in September, the use of the nest by any remaining juveniles was investigated.

The coordinates of the nests were obtained using GPS Garmin GPSMAP64s and mapped with the help of ArcMap.

Determination of breeding success. Nests used by adults to raise offspring during the breeding period were considered active nests for that period. The following aspects were used as indicators for determining whether a nest is active (Cortes-Avizanda et al., 2009; Balaban, 2015; Balaban & Yamaç, 2018): (a) observation of adults incubating in the same nest as a result of more than one observation; (b) presence of an egg in the nest; and (c) nest with young.

The fact that the pairs are constantly in and out of the nest, the fact that a pair is carrying nest material or food, or being seen in the nest provides information on whether a nest was actively used. The species-specific yellow-orange facial colouration of Egyptian Vulture individuals was also valuable in evaluating the activities of nests in the burrow. This is very important in cases where it is not possible to see the inside of the nest. However, the yellow colour on their face can be seen even through narrow nest entrances. In order to determine the success of the nest, actively detected nests were monitored during the breeding period. Raising at least one young that fledged from the nest was evaluated as a successful nest. The breeding success was defined by dividing the total number of successful nests by the number of active nests. The fledging success was determined by the number of fledged young divided by the number of successful pairs (Steenhof

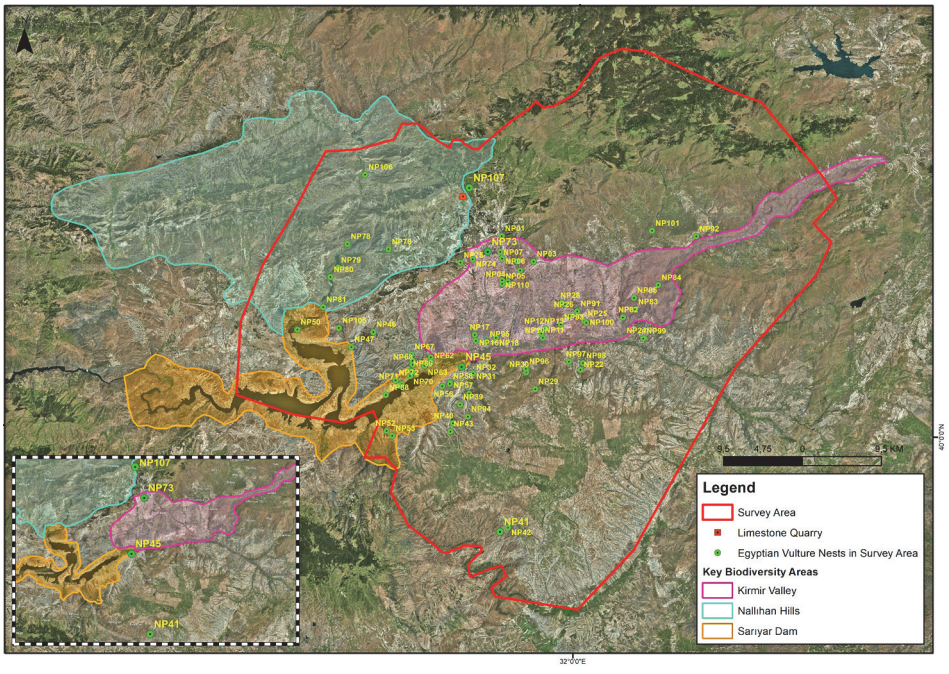

Figure 1. Active nests of the Egyptian Vulture, *Neophron percnopterus* in the Beypazarı area in 2020.

& Newton, 2007). The region's productivity was determined by dividing the total number of fledged young by the potential nesting area (i.e. the area in which Egyptian Vultures regularly stay and breed or attempt to breed). The breeding density was determined by dividing the number of active nests by the surface area of the study area. Breeding propensity was calculated by dividing the number of active nest by the number of the occupied nest sites (Katzenberger et al., 2019).

Results

We found in 2020 a total of 109 nests of the Egyptian Vulture (Figure 2) of which 90 were active and 19 nests were not used for breeding. Although individuals attended these nests at the beginning of the breeding season, no breeding activity was performed. The breeding propensity is thus 82.6%. Thirty of the 109 nests were identified through interviews and cooperation with shepherds. All nests were located in rock cavities and 33 nests were located around livestock yards.

We found that 62 of the 90 active nests contained at least one young. From 53 nests, one young fledged, and from 9 nests, two young fledged. Thus, a total of 71 young fledged in the study area in 2020. This is a breeding success of 0.69 successful pairs per active nest, a fledging success of 1.15 fledglings per active nest, and a productivity of 0.65 fledglings per occupied nest site. We observed three young in an Egyptian Vulture nest in Bağözü village (NP73 in Figure 2) in July. However, only two young were detected in this nest during the later field study conducted in August. It was definite that there were only two young in the nest, as the nest was visible and the individuals were large.

In 2020, the Egyptian Vulture breeding density of the Beypazarı region was 6.92 pairs per 100 km². The distance between the closest active nests was approximately 0.37 km.

Discussion

Egyptian Vulture breeding success in Beypazarı is below the average of many European countries. Breeding success was determined as 0.7-0.9 successful pairs per active nest in Spain, 0.76 in the Eastern Iberian Peninsula and 0.93 in Macedonia (García-Ripollés & López-López, 2006; Cortes-Avizanda et al., 2009; Grubač et al., 2014).

Our study confirmed that the Beypazarı area is an important breeding area in Turkey and shows that the breeding population shows an increasing trend. Between 2006 and 2016, up to 69 active Egyptian Vulture nests were identified per year (Şen, 2012; Katzenberger et al., 2019). The annual average breeding success between 2011 and 2016 was 0.7, 0.9, 0.62, 0.61, 0.76, and 0.73 (successful pair per active nest), respectively. The density of Egyptian Vultures in the study area was at least 6.26 pairs per 100 km² (Katzenberger et al., 2019). We found 6.92 pairs per 100 km² in 2020. The annual breeding success and the fledgling success were similar to previous years. Many suitable breeding and feeding areas in Beypazarı may enable non-breeding young individuals to stay in the region for breeding. In this way, the population may be increasing.

In the Central Sakarya Region, the productivity of a population varied between 0.71 and 1.0 young per pair, while the fledgling rate varied between 1.27 and 1.35 fledged young per successful pair (Balaban & Yamaç, 2018). The Beypazarı region thus has lower productivity and fledging rate.

We noted three types of threats to the Egyptian Vulture population: Electrocution, habitat loss, and usage of veterinary products. Many electric lines are present in the habitat of the Egyptian Vulture and we found two active nests that were surrounded by non-insulated low-voltage power distribution lines with hazardous pole designs. Many of these electrical wires have poorly designed support structures without insulation, and necessary precautions to reduce collision and electrocution have not been taken despite Egyptian Vulture deaths from these causes in the study area. We found an adult Egyptian Vulture that died on an electric pylon where electrocution appeared unlikely (Figure 2). To prevent injuries and deaths caused by electric shocks, poles and lines that pose an electrocution or collision risk should be buried or isolated to reduce the risk. These methods are relevant not only for the Egyptian Vulture but also for other birds. At the same time, when electricity distribution lines do not cause bird electrocution, the reliability of the power supply will increase and electricity providers will benefit from lower maintenance costs (Arkumarev et al., 2018).

In our study area, there is a potential threat to the Egyptian Vulture through habitat loss due to the planned mining of a limestone quarry close to Doğanyurt Village. Four Egyptian Vulture nests are present there and the construction and operation of the quarry will pause a direct threat and stress to the nesting area. The distance between the limestone quarry site and the nearest nest (NP 107) is 1.2 km. Although attempts are undertaken to speed up the opening of the quarry, there is local opposition and the process is currently in court. Although the final size and boundaries of the quarry are not known, old nest entrances, roosting places, and potential nesting sites are situated within the area. Mining activities around the nest are known to directly damage the nests, increase noise and human pressure, and negatively affect reproductive success (Arkumarev et al., 2018).

Figure 2. Electrocution is a threat to the Egyptian Vulture population in the Beypazarı area.

Veterinary medical products are widely used in the study area to cure sheep and goats. These drugs include various antibiotics, teramycin, and nausea injections. The effects of these drugs on Egyptian Vultures are not yet known. The use of poisonous substances to kill livestock predators has not been observed. Additionally, agrochemicals are quite commonly used in the region, and it was learned that four adult Egyptian Vultures were found dead in a carrot field in the east of the study area. It was reported by field owners and local authorities that these birds died from pesticides, although confirmation would be required.

Traditional livestock husbandry in the region continues, but there is an increase in the number of closed system livestock. There are some illegal wells where dead animals are dumped in closed system livestock farms. Farm waste points with dead chicks, fertilizer, etc., which should have been closed but were not, were seen in the study area. These points pose additional risks due to possible poisoning.

We observed that Egyptian Vultures also bring nylon bags and ropes to the nests. It is thought that individuals who could not find sheep and goat wool brought these materials to the nest as nest lining material.

Funding

This work was carried out in the framework of the LIFE project “Egyptian Vulture New LIFE” (LIFE16 NAT/BG/000874, www.LifeNeophron.eu) funded by the European Union and co-funded by the Ornithological Society of the Middle East the Caucasus and Central Asia.

Disclosure Statement

No potential conflict of interest was reported by the authors.

References

Arkumarev, V., Dobrev, V., Stoychev, S., Dobrev, D., Demerdzhiev, D., Nikolov, S. C. (2018). Breeding performance and population trend of the Egyptian Vulture *Neophron percnopterus* in Bulgaria: conservation implications. *Ornis Fennica, 95, 115–127.*

Balaban, S., & Yamaç, E. (2018). Breeding performance and diet of the Egyptian Vulture (*Neophron percnopterus* L.) in Middle and Upper Sakarya Region, Turkey. *North-Western Journal of Zoology, 14,* 91–95.

BirdLife International (2021). Species factsheet: *Neophron percnopterus.* www.birdlife.org. Downloaded on 10 June 2021.

Boyla, K. A., Sinav, L., & Dizdaroğlu D. E. (2019). T*ürkiye Üreyen Kuş Atlası [Atlas of the Breeding Birds of Turkey]*. Istanbul: WWF-Türkiye, Doğal Hayatı Koruma Vakfı.

Burns, F., Eaton, M. A., Burfield, I. J., Klvaňová, A., Šilarová, E., … Gregory, R. D. (2021). Abundance decline in the avifauna of the European Union reveals cross-continental similarities in biodiversity change. *Ecology and Evolution, 11,* 16647–16660.

Cortes-Avizanda, A., Ceballos, O., & Donazar, J. A. (2009). Long term trends in population size and breeding success in the Egyptian Vulture (*Neophron percnopterus*) in Northern Spain. *Journal of Raptor Research*, *43,* 43–49.

Eken, G., Bozdoğan, M., İsfendiyaroğlu, S., Kılıç, D. T., Lise, Y. (2006). *Key biodiversity areas of Turkey.* Ankara: Kitap Yayınevi.

García-Ripollés, C., & López-López, P. (2006). Population size and breeding performance of Egyptian vultures (*Neophron percnopterus*) in Eastern Iberian Peninsula. *Journal of Raptor Research*, *40*, 217–221.

Grubač, B., Velevski, M., & Avukatov, V. (2014). Long-term population decrease and recent breeding performance of the Egyptian Vulture *Neophron percnopterus* in Macedonia. *North-Western Journal of Zoology*, *10*, 25–35.

Kasparek, M. (1992). *Die Vögel der Türkei. Eine Übersicht.* Heidelberg.

Katzenberger, J., Tabur, E., Şen, B., İsfendiyaroğlu, S., … Oppel, S. (2019). No short-term effect of closing a rubbish dump on reproductive parameters of an Egyptian Vulture population in Turkey. *Bird Conservation International*, *29*, 71–82.

Keller, V., Herrando, S., Voříšek, P., Franch, M., Kipson, M., ... & Foppen, R. P. B. (2020). *European breeding bird atlas 2: Distribution, abundance and change*. Barcelona: European Bird Census Council & Lynx Edicions.

Oppel, S., & Margalida, A. (2020). Egyptian Vulture. In: Keller, V., Herrando, S., Voříšek, P., Franch, M., Kipson, M., … & Foppen, R.P.B., *European Breeding Bird Atlas 2: Distribution, Abundance and Change*. Barcelona: European Bird Census Council & Lynx Edicions.

Oppel, S., Buechley, E. R., López-López, P., Phipps, L., Arkumarev, V., … Nikolov, S. C. (2022): Egyptian Vulture *Neophron percnopterus*. Pp. 22–34. In: Panuccio, M., Mellone, U., & Agostini, N. (Eds), *Migration Strategies of Birds of Prey in Western Palearctic*. Boca Raton (Florida): CRC Press.

Steenhof, K., & Newton, I. (2007). Assessing Nesting Success and Productivity. Pp. 181–193. In: Bird, D. M. & Bildstein, K. L. (Eds), *Raptor Research and Management Techniques.* Blaine: Hancock House.

Şen, B. (2012). *Breeding ecology of the Egyptian Vulture (Neophron percnopterus) population in Beypazarı.* Ankara (Middle East Technical University): Ph.D. Thesis.

Şen, B., Tavares, J. P., & Bilgin, C. C. (2017). Nest site selection patterns of a local Egyptian Vulture *Neophron percnopterus* population in Turkey. *Bird Conservation International*, *27*, 568–581.