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Observations on the Griffon Vulture *Gyps fulvus* (Hablizl, 1783) located in Yazılı Kanyon (Isparta)

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Abstract: The aim of this study performed in Yazılı Kanyon (Isparta Province) between October 2007 and July 2008 was to define the number of individual sand mobility of Griffon Vulture (*Gyps fulvus*). We observed 12 individuals in the area during pre-breeding and courtship periods. The number of individuals changed daily and seasonally depending on climatic, geographic and anthropological factors. Only one pair showed breeding activity. The nesting and roosting areas include limestone mountains (800 m) with granite. Feeding activities were observed more often in the breeding season than other times because parents had to find food materials for their chick. But, these activities were decreased significantly after breeding season.

Yazılı Kanyon'daki (Isparta) Kızıl akbaba *Gyps fulvus* (Hablizl, 1783) üzerine gözlemler

Anahtar Kelimeler
Gyps fulvus
Kızıl akbaba
Isparta
Populasyon
Kuşlar
Üreme
Türkiye

Özet: Ekim 2007-Temmuz 2008 tarihleri arasında Yazılı Kanyon'da (Isparta) gerçekleştirilen bu çalışmanın amacı, Kızıl akbaba'nın (*Gyps fulvus*) birey sayısı ve hareketliliğini belirlemektir. Çalışma alanında kur ve üreme öncesi dönemde 12 birey gözledik. Birey sayısı iklim, coğrafik ve antropolojik faktörlere bağlı olarak günlük ve mevsimsel değişimler gösterdi. Sadece bir çift üreme aktivitesi göstermiştir. Yuva ve tüneme alanları (800m) granitli kireç dağlıklar içermektedir. Üreme sezonunda ebeveynler yavrularına besin bulmak zorunda olduğundan diğer zamanlardan daha fazla beslenme aktivitesi gözlenmiştir. Ancak bu aktiviteler üreme sezonundan sonra önemli ölçüde azalmıştır.

1. Introduction

The Griffon vulture (*Gyps fulvus*) is a large bird of prey and belongs to the family Accipitridae. Human beings and vultures have lived together in the world so far. But today, this relationship is negatively changed because of the anthropological effects including over-hunting, chemical substance use in farmlands, habitat degradation, etc. These negative effects have caused drastically diminishing of avian population.

The bird population of Turkey have also been affected by habitat degradation, over-hunting, epidemic disease, genetic problems and anthropological factors. Except for anthropological factors, the other causes may be avoided by different methods. The best way of protecting bird populations is to make biological researches. However, ornithological studies on raptors are not easy as they are thought to be. It is difficult to study, for the species in the habitats (Fuller and Mosher, 1981).

Accipitrids are found in every major habitat type except for Antarctica and most Oceanic Islands. The highest diversity of the species is found in tropical regions (Popüler Bilim Online, 2013).

The Griffon vulture, *Gyps fulvus*, is a colonial cliff nesting raptor inhabiting the Southeastern Europe, North Africa, Middle East and Central Asia (Cramp and Simmons, 1980; Mundy et al., 1992;Donazar, 1993). The species is also resident in Europe although juvenile birds migrate to sub-Saharan Africa (Bernis, 1983; Berthold et al., 1991;Susuic, 2000). The species is categorized as Least Concern (LC) by IUCN (Birdlife International, 2013).

Several studies focused on the distribution, population, feeding habits, and conservation status of the species were performed in the Mediterranean Region (Perco, 1974; Fernandez, 1975; Gardener, 1980; Lehsem, 1985; Donazar, 1987; Bonnet et al., 1990; Donazar and Fernandez, 1990; Terrasse et al., 1994; Camina-Cardenal, 1995; Genero and Perco,

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1997; Yosef and Malka, 1998; Lecuyer, 2000). But studies about the ecology of *Gyps fulvus* in Turkey are not sufficient. So, aim of this study was to determine the number and mobility of Griffon Vulture.

2. Materials and Methods

StudyArea

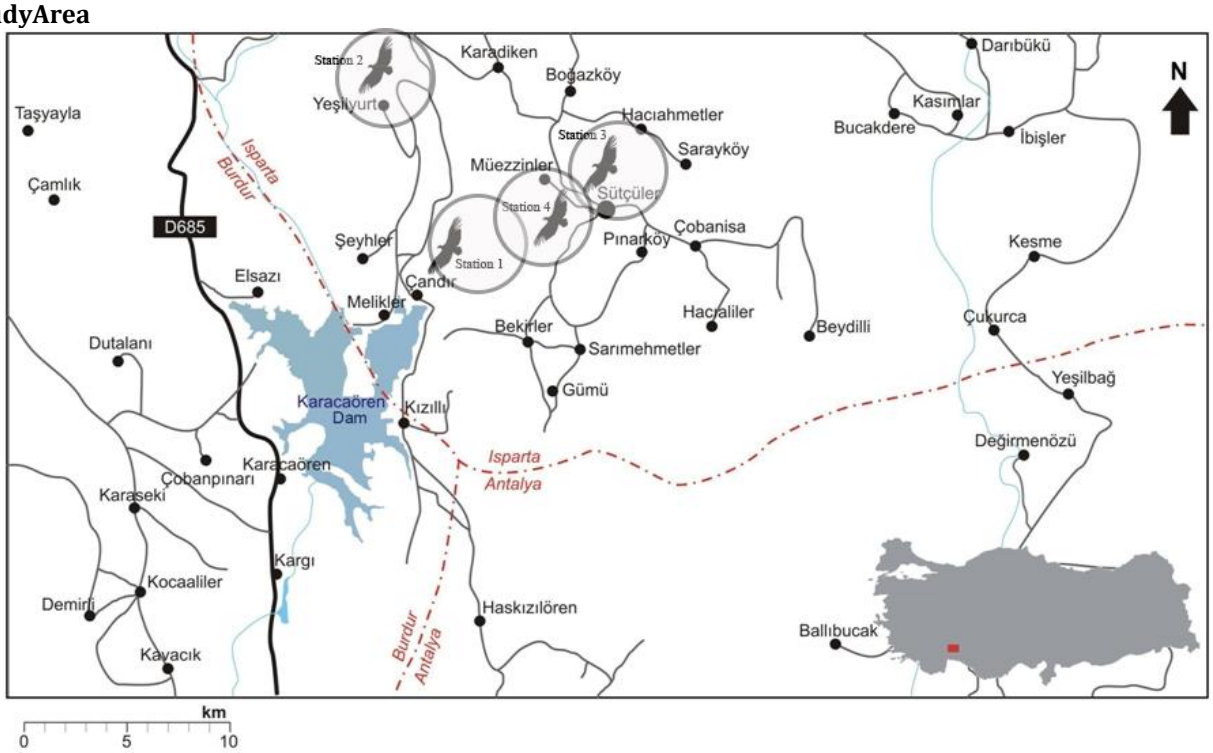

Figure 1. Observation stations in the study area

Sütçüler County (37° 29′ North, 30° 59′ East) located in the south of Isparta is surrounded by Beyşehir, Seydişehir, Eğirdir, Serik and Manavgat counties. It has 1287 km^2 with an altitude changing from 250 m to 2500 m (Isparta İl Gıda Tarım ve Hayvancılık Müdürlüğü, 2013).

In the area, observation and data collection were conducted in four stations; Yazılı Kanyon, Yeşilyurt, Değirmendere and Sütçüler (Figure 1).

Yazılı Kanyon, Natural Park, Station 1 (37° 27′ North, 30° 55′ East), is a canyon which consists of limestone area with steep rocks. This area has been used for social activities (ecotourism) such as camping, climbing and fishing especially during summer season.

Yeşilyurt, Station 2 (37°30′ North 30° 53′ East), has a lot of marble factories, steep rocks and a small village. Station 3 is Değirmendere belonging to Yeşildere village (37° 28′ North 30° 59′ East). The station 4, Sütçüler (37° 27′ North 30° 58′ East), has Yeşildere stream and steep rocks with limestone. This stream combines with Çandır Stream and than flows into Aksu Stream (Antalya) which has Karacaören Hydroelectric Power Stations (HES I and HES II) built on it. The stations' vegetation is mostly Wild olives *Oleaeuropeae,* Oaks *Querqussp* and Pines *Pinus sp.* (Isparta Valiliği, 2013).

Methods

Observations were performed in both breeding period and non-breeding period between October 2007 and July 2008. Telescope (20-60X100), binoculars (10X30), digital photo camera (EOS-1D's Mark II), and camera (NV-GS320) were used to record individual activities. Observations were made from a safe distance (300-600 m, 500-800 m) in order to not disturb the individuals.

Data were collected in day-long observations divided into three periods; morning (06^{00}-11^{00}), midday (11^{00}-15^{00}) and afternoon (15^{00}-19^{00}). All activities of the species were recorded by a stopwatch. We used the method of Xirouchakis (2003) to determine the seasonal individual distribution. Breeding activities of the species were divided into three stages; a) the pre-breeding period b) hatching and chick rearing c) the fledging.

For all analyses, SPSS 12.0 for Windows was used and significance level was regarded as 0.05 in non-parametric tests. The hypothesis was set up with two aspects; 1. There are differences between breeding

and roosting area, 2. There is no difference between two areas. Similarly, Chi Square test was used to determine whether significant differences exist among periods (morning, midday, afternoon) or not. Furthermore, possibilities less than 0.05 ($P<0.05$) were regarded as significant in calculations.

3.Findings

Totally, we determined 12 individuals in 35 observations performed during 2007-2008. In Station 1, feeding activities of individuals were observed more often in the midday during breeding season because both female and male had to find food for their chick. But these activities significantly decreased after breeding season.

We determined that differences in the number of individuals among observations in the Station 1 were insignificant ($P>0.05$), and daily activities of individuals were 26.3 % in morning, 42.1 % in afternoon, and 31.6 % in midday (Table 1).

Table 1. Observation ratios of individuals in Yazılı Kanyon, Yeşilyurt, Değirmendere and Sütçüler

	A		B		C		
	No Count / %	Yes Count / %	No Count / %	Yes Count / %	No Count / %	Yes Count / %	X^2
Yazılı Kanyon	12/48.0%	5/26.3%	8/32.0%	6/31.6%	5/20.0%	8/42.1%	p>0.05
Yeşilyurt	5/26.3%	12/48.0%	8/42.1%	6/24.0%	6/31.6%	7/28.0%	p>0.05
Değirmendere	16/40.0%	1/25.0%	12/30.0%	2/50.0%	12/30.0%	1/25.0%	p>0.05
Sütçüler	16/37.2%	1/100.0%	14/32.6%	0/0%	13/30.2%	0/0%	p>0.05
Periods	A; 06^{00}-11^{00}, B; 11^{00}-15^{00}, C; 15^{00}-19^{00}						

We defined that nesting and roosting areas of population had the limestone substrate (800 m) with granite in this station. The courtship behaviors having swift, parallel flying with one bird above the other or closely next to each other, or following each other in a single line- were more frequent than other stations. The male carried out a sortie about 1 km^2 diameter in the air and then went down to his nest. This behavior was not observed during non-breeding season.

Other animals could not reach the nesting area in Station 2. So, it was suitable for nesting and roosting area to have steep and cliff limestone for the species. We observed that the color of the limestone used for nesting and roosting changed from red-brown to dirty-white because of individuals' feces with uric acid.

Differences among the periods in the Station 2 were regarded as insignificant ($P>0.05$). As shown in Table 1, individual frequency was high in Yeşilyurt in the mornings (48%). In addition, marble factories affected the species because they caused noise pollution and habitat degradation in the breeding area.

We saw feathers including counter feather, filoplumes, and bristles belonging to individuals lived in the nest. Nest materials (a piece of stick of *Olea sp.* and *Pinus sp.*) and limestone changed color in the two nests in Değirmendere (Station 3) which has mountainous areas. Therefore, the station was an important area to roost and breed for the species. Also, significance level was determined higher in the midday (50.0%) than other periods (Table 1).

We observed the aerial display only once, in the morning, during 44 observations. Therefore, the nests might be abandoned because individual number decreased due to noise pollution from the power plant. Moreover, we regarded insignificant differences among the periods ($P>0.05$), as seen in Table 1. The nest remains of the previous individuals show that the area was used for breeding and nesting by the species.

Local people use chemical materials in farmlands to protect the crops from the Wild Boars, *Sus scrofa scrofa*. So, the vultures eat the carcass of these animals poisoned by these chemicals. We observed pig remains in the farmlands near settlements twice.

We observed that the nest located in vertical cliffs (800-900 m) in the Station 1 was used for nesting by only one pair whereas the other individuals used it for roosting. Individuals defended the nest from other species such as Common Raven, *Corvus corax* and Short-toed Eagle, *Circaetus gallicus*. Although 6 individuals displayed courting behavior, we determined that only one pair performed breeding

activities. Adult individuals carried food to their chicks in the nest. The chick pecked the parent's crop when it was hungry and than parents vomited the material to it.

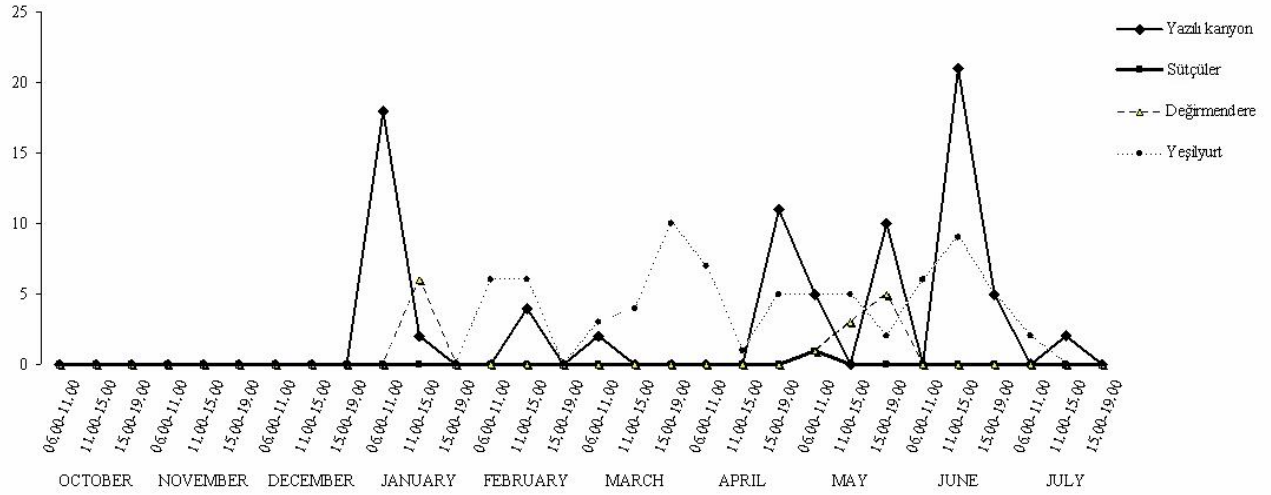

Figure 2. Total number of individuals in the stations according to daily and seasonal activities

In all the stations, the individuals were in roosting places when they couldn't catch the thermal winds. We didn't observe individuals in October, November and December 2007 (Fig 2). Also, we observed that arrival and departure time of the species to the nest was 10 a.m. and 17 p.m. respectively. The individuals were more active in the mornings and evenings. They were also active in midday of the breeding season (March –August 2008). Daily activities performed in midday were related to energy consumption. Yazılı Kanyon (Station 1) had the highest number of individuals.

4.Discussion

We thought that the number of individuals in the stations 2 and 4 diminished because of human disturbance, chemical uses in farmlands and low food quantity. The finding was similar to the data from Thomson et al., (1990),Donozar (1993), Donazar and Feijoo (2002).

Xirouchakis (2003), Xirouchakis and Mylonas (2007) reported that reproduction period is between May-July, but we determined that the period is between the end of March (or the beginning of April) and August. We regarded that this difference was caused by the climatic factors in the area.

Our findings about habitat features and protection behavior of individuals in the Station 1 were the same with Cramp and Simmons (1980), Rabenold (1983), Tella (1991), Donazar (1993), Stolen and Taylor (2003), Wilson and Gessaman (2003).

Bertan and Margalida (1997) stated that some vultures use mammalian bones- especially Wild pig's, *Sus scrofa scrofa*- as a source of calcium. But we observed that they used bones to clean their bills only once.

Sabocanec et al. (2005) determined that individuals died by methomyl poisoning had methomyl (9.3 mg/kg), methomyloxime (6.7 mg/kg) and deltamethrin (6.1 mg/kg) in their stomachs. Similarly, we considered that two individuals might have been poisoned by chemicals and died in the Station 1 and 2.

Gündoğdu (2006) stated that predators of the Wild goat, *Capra aegagrus* were Golden Eagle, *Aquila chrysaetos* and Griffon Vulture, *Gyps fulvus*. We found this interesting because the vultures feed on carrion. We did not meet such a phenomenon in the area.

Erdoğan (1995) stated that active nests and roosting areas of the species were in Sütçüler. However, we defined that individuals did not use the area for breeding. Because of habitat degradation, anthropologic effects, and a lack of food in other areas, they used Station 1 and 2

Our findings about the features of the species were similar with the data of Cramp and Simmons (1979), that the species look around to find food in 50-60 km^2, and of Bose and Sarrazin (2007), that adults were more aggressive than juveniles during feeding.

Although Sütçüler holds an importance for ecotourism, fauna and flora, it doesn't have enough

protection. When the protection will be provided local people will get income every year. Therefore seminars, panels, congresses and information meetings should be organized to train local people about the importance of the species.

The decrease of the biodiversity is causing major concerns worldwide. Much of the crisis is due to human impact in recent centuries. The most influential factor is habitat loss which is caused by human technology and population pressure. Another important factor is direct exploiting. Thus, the combination of these factors has impacts on birds.

As a result, the study area is important to feed, rest and nest for *Gyps fulvus*. If we provide the precautions needed in the area, Griffon vulture can be affected positively.

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