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Scavenger Vertebrates of Dörtdivan Vulture Restaurant, Turkey

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Highlights

- This is the first assessment of scavenger vertebrates in Turkey.
- This article focuses on the diversity and interactions of scavenger vertebrates.
- A total of eighteen bird and seven mammal species were detected.
- Avian facultative scavengers (aFS) show high biodiversity through fourteen species.

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Abstract

Fairly recently scavenging was thought to be restricted to a few groups of 'classic' and sometimes facultative scavengers and vultures, but what most of the more recent researches has shown is that a much wider range of groups and species are scavenger. There is a need to investigate this diversity and interactions with different communities of avian and mammalian scavengers in Turkey. The diversity of scavenger vertebrate species, their behaviour, and interactions between individuals are investigated. This study was conducted in Dörtdivan Vulture Restaurant, Bolu, Turkey. Twenty five species are recorded (eighteen birds and seven mammal) while feeding on the carcasses. The diversity of vertebrates feeding on the carcass is varied according to the carcass type. Opportunistic non-obligatory scavengers are more dominant than obligatory scavengers in this study. The intraspecific and interspecific competitions are detected between scavengers. This is the first assessment of scavenger vertebrates in Turkey. It could be the useful reference for new assessments in the future.

1. INTRODUCTION

Scavengers supply a critical ecosystem service with the consumption of dead animals and the recycling of nutrients [1]. The useful role of scavenger species in removing animal carcasses is very obvious. All these species (insects such as beetles; birds such as vultures or crows; or mammals) have a crucial ecological role by limiting or avoiding the spread of diseases. At the same time, they provide the recycling of nutrients [2]. Carnivorous animals can be provided by killing their own food or by feeding on a carcass [3]. However, the obligatory scavenging is very rare. Among the existing vertebrates, vultures have an almost entirely carcass-based diet. Gulls, corvids, eagles, and storks are called facultative scavengers or temporary, part-time scavengers. The avian scavengers possess a unique role, due to its ability to cover large areas [4]. Many birds, reptiles, and mammals are opportunistic scavengers [5]. Competition among vertebrates, invertebrates and decomposers may increase when the nutrient is limited [6]. Competition between obligate scavengers and non-obligate scavengers takes place both in altered and unaltered habitats. In such cases, adaptation ability is important for both groups [7].

Dörtdivan Vulture Restaurant (feeding station) was established by Ornitofoto Bird and Wildlife Photographers Association under the United Nations Small Grants Program in 2012 in Turkey. This project aims to establish the necessary infrastructure for the conservation of vultures in Dörtdivan region, which is an important breeding area for threatened cinereous vulture, imperial eagle and other raptors. In this project, it is aimed to increase local awareness on Vultures and other natural values, to establish a continuous and

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safe food supply system for vultures and to increase the number of tourists by creating a common perception of Dörtdivan and natural value.

Two hundred years ago, Egyptian vulture, Bearded vulture and Griffon vulture were among the most common breeding birds in the central and southern Europe. These vultures then disappeared from some European countries (Portugal, France, Italy, Austria, Poland, Slovakia, and Romania). Vultures can be considered a key indicator species. If these scavengers appear in the site, the conditions will be appropriate for many other less demanding species [8]. Griffon vulture (*Gyps fulvus*) and Egyptian vulture (*Neophron percnopterus*) are summer breeding species but Cinereous vulture (*Aegypius monachus)* and Bearded vulture (*Gypaetus barbatus*) are resident species in Turkey [9]. Dörtdivan Vulture Restaurant is one of the places where four species of vultures live in the same environment in Turkey. It is an area where raptors and vultures can fly and roost easily. This area is far from the road and human influence. This area is not fenced to keep out other animals. All animals, thus not only scavengers but also other animals visit the area.

There is a need to investigate the diversity and the interactions with different communities of avian and mammalian scavengers in Turkey. The diversity of scavenger vertebrate species, their behaviour, and interactions between individuals are investigated in Dörtdivan Vulture Restaurant.

2. MATERIAL AND METHODS

This study was conducted in Dörtdivan Vulture Restaurant between 2013 – 2016 (Table 1). The Vulture Restaurant's location is Dörtdivan, Sorkun district (40° 40' N, 32° 2' E). Sorkun district is located in Bolu province in the West Blacksea Region of Turkey. The Vulture restaurant is located in an open area. The dominant vegetation in Sorkun involves rural and agricultural areas at an altitude of 1180 meters. The peripheral vegetation coverageof Sorkun area has Scots pine (*Pinus sylvestris*) and Uludağ fir (*Abies nordmanniana subsp. bornmulleriana*) forest. The climate is characterized by average temperatures of 1.0°C in January and 19.7°C in July.

Table 1. *Field work time table and different carcass types*

Year	Season	Month	Carcass Type
2013	December	Winter	Chicken
2014	May	Spring	Chicken
2014	June (twice)	Summer	Chicken
2014	August	Autumn	Chicken
2014	September	Autumn	Chicken
2014	November	Autumn	Chicken
2015	February	Winter	Chicken
2015	March	Spring	Chicken
2015	April	Spring	Chicken
2015	June	Summer	Cow
2015	September	Autumn	Wild boar
2016	June	Summer	Chicken

Two different types of experimental carcasses were provided. 'Large' (>100 kg) carcasses are adult cow (N: 1) and adult wild boar (*Sus scrofa*) (N:1) Small carcasses are chicken (< 2 - 2.5 kg). Eleven trials with chicken carcasses were carried (N: 11). 500 kg of chicken carcasses were used in every trial (Table 1). Here, regular and healthy food was provided at the vet control. Agreements were made with the poultry farms in the region. Chickens that died from excess food or died during transportation were brought to this restaurant. In addition, animals such as cow that died in the area and wild boar found dead in the forest were also transported here. The lead bullet is hazardous to scavengers according to [10]. Therefore, dead wild boar was checked for lead bullets. Any carcasses were not fixed to the ground. Carcasses were placed randomly between the dawn and twilight.

This research conducted in the Dörtdivan Vulture Restaurant between 2013 – 2016 on scavenger vertebrates. The images were taken here by Yunus Ayhan through using the Nikon D500 camera (600 mm. f/4.0 lens) in the special camouflaged hut. Scavenger vertebrate species that visited chicken, cow, and wild boar carcasses were identified from the images on the camera. The wildlife photographer observed animal behaviour around the area.

The following variables related to scavenger species diversity were determined through photos: 'richness' (the number of scavenger species per carcass) and 'total richness' (total number of scavenger species in all carcasses). The scavengers were grouped as 'obligate scavengers' (OS; i.e. vultures) and 'facultative scavengers' (FS; avian and mammalian carnivores). Facultative scavengers are also divided into 'large facultative scavengers' (LFS; i.e. bear, wolf, and wild dog) and 'meso facultative scavengers' (MFS; all of the smaller carnivores). In addition, the MFS is divided into 'avian facultative scavengers' (aFS) and 'mammalian facultative scavengers' (mFS). Regarding the scavenging efficiency, for each carcass; 'carcass detection time' (time elapsed since the carcass was available until the arrival of the first scavenger), 'carcass consumption time' (time elapsed between when the carcass became available and the completion of its consumption), 'carcass consumption rate' was estimated [11].

3. RESULTS

Twenty five scavenger species (Mammals: 7 (LFS: 4, mFS: 3) Birds: 18 (OS: 4, aFS: 14)) have been recorded in Dörtdivan Vulture Restaurant. According to the IUCN RedList criteria; 2 species are under threat (Eastern imperial eagle (*Aquila heliaca*): VU, Egyptian vulture (*Neophron percnopterus*): EN). Two species are classified as the Near Threatened: NT (Bearded vulture (*Gypaetus barbatus*) and Cinereous vulture (*Aegypius monachus*)) (Table 2). Two ringed raptor species were observed. The Brown bear (*Ursus arctos*) was the quickest at finding the carcass, taking less than a half day on average to make the first scavenging. The Brown bear is the first scavenger species for 4 of 13 carcasses trials. The remaining 9 trials allocated equally among the following 9 species: Cinereous vulture, Common buzzard (*Buteo buteo*), Grey wolf (*Canis lupus*), Hooded crow (*Corvus cornix*), Long-legged Buzzard (*Buteo rufinus*), Raven (*Corvus corax*), Southern White-breasted Hedgehog (*Erinaceus concolor*), White stork (*Ciconia ciconia*), and White-tailed Eagle (*Haliaeetus albicilla*). The Raven is the second scavenger species for 3 of 13 carcasses trials. The Grey wolf is the third scavenger species for 3 of 13 carcasses trials. The other second and third scavenger species are change among species according to the carcass type.

Table 2. *The number of visits of vertebrate scavenger species feeding on three different carcass types, Scavenger status, IUCN status, the number of individuals and daily feeding time*

Class	Order	Family	Species and Scavenger Status	The number of visits	IUCN RedList	The total count of individuals at carcasses	Daily feeding time	Carcass type
Bird	Pelecaniformes	Ardeidae	Grey heron (*Ardea cinerea*) (aFS)	19	LC	3	Daytime	Chicken
Bird	Ciconiiformes	Ciconiidae	White stork (*Ciconia ciconia*) (aFS)	14	LC	4	Daytime	Chicken, Cow
Bird	Accipitriformes	Accipitridae	Bearded vulture (*Gypaetus barbatus*) (OS)	12	**NT**	3	Daytime	Chicken
Bird	Accipitriformes	Accipitridae	Black kite (*Milvus migrans*) (aFS)	10	LC	7	Daytime	Chicken, Cow
Bird	Accipitriformes	Accipitridae	Cinereous vulture (*Aegypius monachus*) (OS)	47	**NT**	40	Daytime	Boar, Chicken, Cow

Bird	Accipitriformes	Accipitridae	Common buzzard (*Buteo buteo*) (aFS)	13	LC	4	Daytime	Chicken, Cow
Bird	Accipitriformes	Accipitridae	Eastern imperial eagle (*Aquila heliaca*) (aFS)	46	**VU**	4	Daytime	Boar, Chicken, Cow
Bird	Accipitriformes	Accipitridae	Egyptian vulture (*Neophron percnopterus*) (OS)	3	**EN**	2	Daytime	Chicken
Bird	Accipitriformes	Accipitridae	Golden eagle (*Aquila chrysaetos*) (aFS)	3	LC	2	Daytime	Chicken, Cow
Bird	Accipitriformes	Accipitridae	Griffon vulture (*Gyps fulvus*) (OS)	12	LC	10	Daytime	Chicken, Cow
Bird	Accipitriformes	Accipitridae	Lesser spotted eagle (*Clanga pomarina*) (aFS)	2	LC	1	Daytime	Chicken
Bird	Accipitriformes	Accipitridae	Long-legged Buzzard (*Buteo rufinus*) (aFS)	23	LC	8	Daytime	Chicken
Bird	Accipitriformes	Accipitridae	White-tailed Eagle (*Haliaeetus albicilla*) (aFS)	20	-	2	Daytime	Chicken
Bird	Bucerotiformes	Upupidae	Eurasian hoopoe (*Upupa epops*) (aFS)	2	LC	2	Daytime	Chicken
Bird	Passeriformes	Corvidae	Eurasian magpie (*Pica pica*) (aFS)	51	LC	20	Daytime	Boar, Chicken, Cow
Bird	Passeriformes	Corvidae	Hooded crow (*Corvus cornix*) (aFS)	19	LC	12	Daytime	Chicken, Cow
Bird	Passeriformes	Corvidae	Raven (*Corvus corax*) (aFS)	85	LC	120	Daytime	Boar, Chicken, Cow
Bird	Passeriformes	Sturnidae	Common starling (*Sturnus vulgaris*) (aFS)	2	LC	30	Daytime	Boar, Chicken
Mammal	Carnivora	Ursidae	Brown bear (*Ursus arctos*) (LFS)	10	LC	10	Night	Boar, Chicken, Cow
Mammal	Carnivora	Felidae	Domestic cat (*Felis catus*) (mFS)	4	-	4	Daytime	Chicken
Mammal	Carnivora	Canidae	Grey wolf (*Canis lupus*) (LFS)	10	LC	8	Daytime and Night	Boar, Chicken, Cow
Mammal	Carnivora	Canidae	Domestic dog (*Canis lupus familiaris*) (Gun dog) (LFS)	1	-	1	Daytime	Boar, Chicken, Cow
Mammal	Carnivora	Canidae	Domestic dog (*C. lupus familiaris*) (Sheepdog) (LFS)	2	-	3	Daytime and Night	Chicken, Cow

Mammal	Carnivora	Canidae	Domestic dog (*C. lupus familiaris*) (Stray dog) (LFS)	10	-	12	Daytime and Night	Boar, Daily feeding time
Mammal	Carnivora	Canidae	Red fox (*Vulpes vulpes*) (mFS)	6	LC	2	Daytime and Night	Chicken
Mammal	Eulipotyphla	Erinaceidae	Southern White-breasted Hedgehog (*Erinaceus concolor*) (mFS)	7	LC	2	Night	Chicken
Mammal	Cetartiodactyla	Suidae	Wild boar (*Sus scrofa*) (LFS)	1	LC	1	Daytime	Chicken

The Raven, Eurasian magpie (*Pica pica*), Cinereous vulture, Eastern imperial eagle, Long-legged Buzzard, White-tailed Eagle, Grey heron and Hooded crow are respectively the most-frequently recorded scavenger species in this study. Cinereous vulture, Griffon vulture (*Gyps fulvus*) and Raven species widely consumed cow and chicken carcasses. The Brown bear, grey wolf, dogs and other mFS and aFS species consumed the cow carcass. LFS, mFS and aFS species widely consumed chicken carcasses. Grey wolf, Raven and Cinereous vulture widely consumed wild boar carcass. It was determined that the wild boar carcass was removed by the brown bear. All chicken carcasses (N: 11) were completely consumed in the field. The carcass consumption rate is 100% for chicken carcasses. Only the skeleton has remained behind the carcass of cow (the carcass consumption rate is nearly 83%).

The Common starling (*Sturnus vulgaris*) and Eurasian hoopoe (*Upupa epops*) fed on maggots that move away from the carcass but White stork fed on both carcasses and maggots. All other scavenger species fed on the only carcass. Grey heron (*Ardea cinerea*) and White stork especially fed on the intestine of chicken carcasses.

The Brown bear, Grey wolf, Golden eagle (*Aquila chrysaetos*), Eastern imperial eagle, and Cinereous vulture showed eating and removing behaviour.

Carcass specific differences were determined in different trials. Min. 3, Ave. 9 Max. 14 scavenger species were determined in different seasons and years. Min. 1, Ave. 1 Max. 3 vulture species were determined in different seasons and years. The total richness is 25 species for chicken, 14 species for bear, and 8 species for wild boar. The highest total species richness was detected at small carcasses (Figure 1). Facultative scavenging is more common than obligates but feeding duration and time of the day vary among species (Table 2).

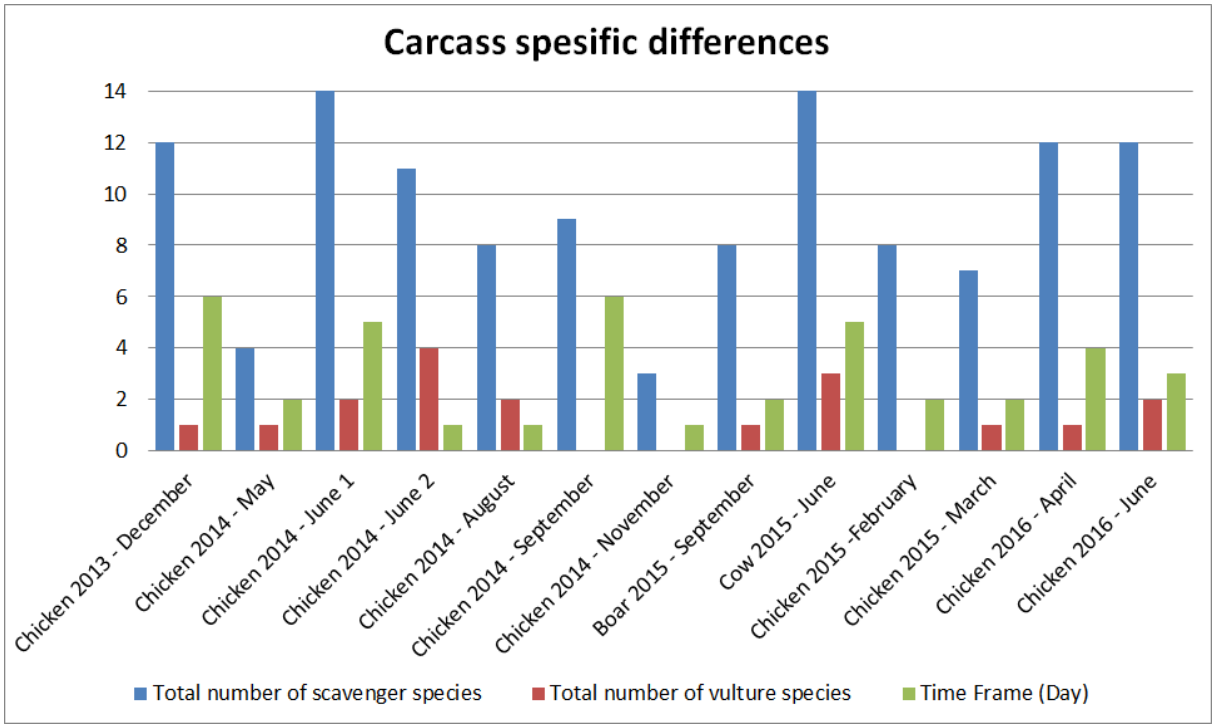

Figure 1. *The richness of scavenger/vulture species per carcass and time frame (number of days the carcass was observed) of trials*

The interspecific competition was determined between Cinereous vulture & Griffon vulture (in summer); Eastern imperial eagle & White-tailed Eagle (in summer); Grey heron & Common buzzard (Figure 3); Grey heron & Long-legged Buzzard (in winter); Grey wolf & Domestic dog (*Canis lupus familiaris*) (every season); Black kite (*Milvus migrans*) & Raven (in summer); White-tailed Eagle and Raven (in summer); Eurasian magpie & White-tailed Eagle (in autumn).

The intraspecific competition was determined at two species; between young and adult Cinereous vulture individuals (in spring); between brown bear individuals of different ages (in spring).

4. DISCUSSION

Terrestrial predators are largely scavengers. Carcasses may have a significant impact on the population of scavengers since they are an alternative food source in periods of low food [12]. Raptors and ravens can benefit farmers by removing animal carcasses. Provision of suitable habitats especially large isolated trees for these birds is necessary to protect the raptors and maximize the ecosystem services they provide [13]. Meso-mammal carnivores and predatory birds were species that visited small carcasses more frequently, while large carcasses were typically visited by large facultative vertebrates. The vultures and the avian facultative scavengers became more frequent as the carcass size increased. In contrast, mammalian meso-carnivores were not present in medium-sized and large carcasses. Consumption efficiency depends on the carcass size. Carcass detection time decreased with carcass size. With regard to carcass consumption efficiency, small carcasses were detected more slowly. They were consumed faster than larger carcasses [11]. As a result of this study, facultative scavengers are more dominant than obligates. All scavenger species more frequently visited small carcasses (chicken), while wild boar carcass were visited by large facultative scavengers, avian facultative scavengers and an obligate scavenger species, and cow carcass were visited by large facultative scavengers, avian facultative scavengers and three obligate scavenger species. The wild boar carcass was removed by a Brown bear individual in two days. Therefore, limited the number of scavenger species was determined on this carcasses. Mammalian meso-carnivores were not present in medium-sized and large carcasses. Consumption efficiency depends on the carcass size.

The average number of scavenger species benefiting from a particular carcass has increased with the carcass size, probably because of the longer temporal presence of larger carcasses and more prominent [11]. The status is a bit different in this study. Because there used 500 kg of chicken carcasses in every 11 trials. Carcass size is small but the quantity is large. Therefore, the longer temporal presence of chicken carcasses is larger than that of cow carcass in this study. However, the frequency of small mammalian scavengers did not increase with the size of the carcass, since large scavengers dominate the consumption of the large carcasses.

The majority of all carcasses (67%) consumed by vertebrate scavengers indicate that these animals also play a similar role in urban ecosystems in their natural environment. In order to understand the role and importance of scavengers, it is necessary to measure the carcass density and size spectra in a range of habitat and scavenger communities [14]. This study focused on the removal of different carcasses types by different scavenger vertebrates in three years. The carcass consumption rate is 100% by vertebrate scavengers in Dörtdivan Vulture Restaurant. It was determined that at different times of the year, as bird's and mammal's life cycles, diversity, and food availabilities change, the level of scavenging by terrestrial scavengers would also change. Raven, cinereous vulture, brown bear and grey wolf are being the dominant and most efficient removers of different carcasses.

The Australian Raven (*Corvus coronoides*) attacked to carcasses more than other scavenger species in Australia. According to this status, this species is a reliable scavenger. However, they can benefit farmers by facilitating the breakdown and removal of carcasses [11]. Vultures can increase the efficiency of consumption by small mammal carnivores, raptors and corvids, through tearing the carcasses [15]. The Raven has the most attacks and feeding activity on carcasses in this study. Cow carcass has a small hole. Because when it died, farmers opened a small hole to prevent swelling. A small hole was opened on the wild boar carcass to remove the lead. For this reason, Raven and Eurasian magpie very easily fed on these carcasses. They did not need any vultures to open the carcass. The hooded crow is different from raven. After Eastern imperial eagle opened chicken carcass, Hooded crow fed. Grey heron (GH) has no suitable beak to open the chicken carcass. Therefore, it always waits for Common buzzard (CB) or Long-legged Buzzard. Buzzard species opens the chicken carcass then it eats the intestines (Figure 2). The Grey heron was attacking to Buzzards just as soon as the carcass is opened every time because it could only feed with internal organs (Figure 3). Because other parts of the chicken carcass were tough (not suitable) for Grey heron individuals.

Figure 2. *GH feed on intestine of carcass*

Figure 3. *GH is attack to CB*

The Red foxes, common ravens and brown bears showed the highest scavenging frequency in south-central Sweden [16]. According to the study in Poland, the most common avian scavengers were Eurasian jay (*Garrulus glandarius*), Raven (*Corvus corax*), Common buzzard (*Buteo buteo*) and the White-tailed Eagle (*Haliaeetus albicilla*) [17]. The Raven, Cinereous vulture, Griffon vulture, Eurasian magpie, Hooded crow, Starling, Long-legged Buzzard, dogs, Brown bear and Grey wolf are the most common vertebrate scavengers in this study.

Scavengers can change their behaviour to find the carcass. The Raven (*Corvus corax*) is a common species that is observed with wolves in winter for exploring carcasses [18]. In the high-density brown bear's region, brown bears arrived in the region earlier than the raven and red fox. However, the brown bear became the last species to discover most of the carcasses. Brown bears are active from March to November and they have never visited the carcasses before the Ravens [16]. Vultures are usually the first vertebrate scavenger to access the carcass [6]. The reach of scavengers to carrion is better in the morning than in the afternoon [19]. The Brown bear usually the first vertebrate scavenger species to access the carcass in Dörtdivan. The second species is Raven. Vultures are not usually the first vertebrate scavenger to visit the carcass in Dörtdivan. Because carcasses were randomly placed between dawn and twilight in this study. Brown bears are active from May to November according to this research. To improve this study more detailed data must be obtained from the area.

High trees are important for the roost of raptor species [13]. High trees are important for roosting and resting of raptor species (Eastern imperial eagle, Hooded crow, White-tailed Eagle (Figure 4), Long-legged Buzzard and Black kite (Figure 5)) here. After the feeding/scavenging behaviour, some birds perch on the top of a tree and rest. So their high-level trees are important for raptors here. Fox showed removing behaviour but the grey wolf and some raptors (Golden eagle and Eastern imperial eagle, Cinereous vulture) showed two different behaviour together; both eating and removing on carcasses. They may have removed these foods for their offspring.

Figure 4. *W. tailed eagle & E. magpie*

Figure 5. *Black kites are roost top of the tree*

Although relatively rich scavenger community with nine active scavenger species in the rural area of Cornwall in the UK, there is only one species (Carrion crows) which is dominant in general carcass removing [20]. Despite a relatively rich scavenger community in vulture restaurant, overall carcass removal changed according to the carcass type here. The raven, Cinereous vulture and Brown bear are dominant at every carcass type. Grey wolf and Brown bear are dominant at wild boar carcass.

The Griffon vulture is almost entirely dependent on human activity (pastoralism) and the presence of large animal carcasses. Cinereous vulture makes the nest on the trees. Many forests where this species breed have been destroyed or will be destroyed in the future [21]. There is a human activity (pastoralism) which is very clear in Sorkun Village and around. Griffon vulture is migrant species here. Cinereous vulture makes a nest on top of the Black pine trees around the area. They form large groups of up to 40 individuals for feeding in the field.

From time to time, ringed or marked birds were recorded in the area. The Griffon vulture, observed on May 10, 2012. This individual was ringed in a nest on the Plavnik Island in the northern Adriatic Sea of Croatia

[22]. An adult Lesser spotted eagle (*Clanga pomarina*) was observed and photographed with the Polish ring (J35) on June 6, 2014 (Figure 6). Two adult Griffon vulture were observed and photographed with Israeli ring(9V1 and X67) on June 7, 2015 in this study (Figure 7). The ringing and resighting data were shared through the Turkish National Ringing Scheme and researchers. Monitoring of scavenger birds with camera traps or cameras is also important in terms of ringed bird feedback.

Figure 6. *The Lesser spotted eagle with ring*

Figure 7. *The Griffon vulture with ring*

The Vulture Restaurant placed around rocks and logs have become the roost place for monitoring. The number of Cinereous Vultures in the field can reach up to 52 individuals simultaneously [23]. Their numbers reached up to 40 individuals in this study. They were observed in every season of the year.

Vultures typically arrived in less than 2 days after carcass placement (and sometimes within 1 day), mammals arrived more than 1 day later on average. The ability of vultures to perceive carrion quickly makes them more efficient cleansers than mammals [24]. Scavengers feed on chicken carcass very easily but they can feed on carcasses of cow and wild boar 2-3 days after the animals die. The carcasses, which were kept for 2-3 days due to transportation difficulties, were used here. Scavengers immediately started to feed on carcasses. Scavenger biodiversity depends on the carcass type, the temperature, time of the day, and the season in this study. 27% of the carcasses were consumed by birds (crows - 19% & magpies - 8%) and 16% of them by foxes. The carcasses were left in the field for 2 to 4 days. The actual carcass removal ratios are thought to be higher because vertebrate scavengers will have longer times to find carcasses in other habitats. [14]. In this experiment, all carcasses were consumed and removed in the field for 1 to 6 days (Figure 1). When chicken carcasses were used, many different scavenger species came around carcasses for feeding. Cow carcass was very heavy and big, so different scavengers fed on for a long time (5 days). Wild boar was adult and it was removed by the brown bear within a day (the bear probably buried the boar carcass under the soil). Cow and chicken carcasses showed the highest scavenger species diversity (14 species) in June in different years. Eight scavenger species were recorded feeding on the wild boar carcass. Due to the rapid decomposition of carcasses, scavenger birds are more common than carnivorous mammals.

The richness of scavengers was found as 25 species on average in this study. This number is higher than other studies; 15 species in The Upper Wabash River Basin (UWB) in North-Central Indiana, USA [25], species in KwaZulu-Natal province of South Africa [11], and 9 species in Cornwall [20].

Adult male bears are known to kill offspring that are not theirs—and sometimes the mother that defends them. Habitat selection is an important component of the survival of the offspring of Brown bears that the

sexual conflict is the most important cause of offspring mortality [25]. The mother bear comes with offspring around carcasses. If there are mature male bears on the field, they keep the pups down. The Mother bear carries food to the offspring. If the environment is safe for the offspring, the mother and the offspring come to the carcass for feeding.

Domestic dogs are frequent visitors of protected areas, but little is known about how they affect wildlife communities. Small mammals, including squirrels and rabbits, reduced. The presence of dogs also affected carnivorous activity. Bobcat detections were low, and red fox detections were high in Colorado [26]. Sheepdogs and Gun dogs come to the site with stray dogs. The stray dogs are dangerous in wildlife. It was seen that they ate juvenile red deer around forests. They eat small birds. There is a competition determined between stray dog and wolf individuals; if the numbers of wolves are low and the numbers of stray dogs are high, wolves do not approach the carcass. When the wolves come as a big group, the dogs are moving away.

The wildlife photographer did not photograph some scavenger species coming to the carcasses because at this time the photographer was trying to get good wildlife shots at this study. Therefore, the use of camera traps, a systematic way of studying scavenger activity, will yield better results in such a study.

The diversity of the scavenger vertebrate species, their behaviour, and interactions between individuals are investigated in this study. This is the first assessment of scavenger vertebrates in Turkey. It could be the useful reference for new assessments in the future. Scavengers have a very important role in the food chain and circle of life. Large carcasses are huge food resources for different scavenger species. The Dörtdivan Vulture restaurant is a feeding station for not only the vultures but also all the scavenger vertebrates in this ecosystem. The scavenger activity demonstrated high species diversity with twenty-five species on the field. The carcasses are removed not only by the vultures but also by other scavenger birds and mammals. Especially avian facultative scavengers (aFS) show high biodiversity with 14 species. The vulture restaurant, especially during the winter and the breeding season, contributes to the survival of the scavenger species. In winter, scavenger biodiversity is generally decreasing. Because mammals hibernate during the winter and migratory birds are in Africa but some scavengers are active and look for food in between December – March. These species are Cinereous vulture, Common buzzard, Domestic cat, Domestic dog, Eurasian magpie, Eastern imperial eagle, Grey heron, Hooded crow, Long-legged Buzzard, Raven, Red fox and White-tailed Eagle. The results of this study show that there is a need for additional experimental researches by using the camera traps to explain the scavenger activity in more detail.

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CONFLICTS OF INTEREST

No conflict of interest was declared by the authors.

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