



## Status of Vultures in the Koutous Massif, Niger

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**Abstract:** The resident vulture populations in Niger are poorly studied and the limited knowledge affects the implementation of relevant conservation actions. Satellite tracking data from migrant Egyptian Vultures, combined with on-site field observations, suggested the presence of a resident population of the species in the Koutous Massif in Niger. In 2020, we conducted an extensive survey in the area to estimate the breeding vulture population size and distribution. We found two vulture species breeding: Egyptian Vulture and Rüppell's Vulture. We recorded 11 confirmed and 7 possible breeding territories of Egyptian Vultures and 12 active nests of Rüppell's Vulture in the massif. Our survey documented for the first time a resident Egyptian Vulture population in the country. The presence of other raptor species was recorded and reported as well. Based on these results, we provide recommendations for future monitoring and conservation actions in the area.

**Key words:** Egyptian Vulture, Rüppell's Vulture, breeding, Sahel

### Introduction

Niger is a landlocked country of West Africa located in the transition zone between the Sahelo-Sudanian range and the Sahara Desert. Due to the diversity of its ecosystems, it is home to a wide variety of fauna and flora. Out of the 11 African vulture species, eight can be observed in Niger and six are resident: White-headed Vulture *Trigonoceps occipitalis*, Hooded Vulture *Necrosyrtes monachus*, White-backed Vulture *Gyps africanus*, Rüppell's Vulture *Gyps rueppelli*, Lappet-faced Vulture *Torgos tracheliotos* and Egyptian Vulture *Neophron percnopterus* (BORROW & DEMEY 2014).

In most of the Sahel region, the status of birds, including vultures, is little known, as there is a considerable lack of data on the existing populations and their dynamics (PETERSEN et al. 2007). Most of the scarce published information is outdated, with the most recent publications dating from early 2000s (THIOLLAY 2006). A severe decline in the vulture

populations in West Africa was detected and highlighted in the early 2000s, with a drastic decrease especially in rural areas (RONDEAU et al. 2004). The most notable decline was reported in the Sahel. THIOLLAY (2006) estimated that in Mali, Burkina Faso and Niger, the numbers of large vultures outside protected areas have been reduced by 98% over a period of 30 years. This decline happened in a context of general impoverishment of ecosystems and biodiversity loss (THIOLLAY 2007). Nevertheless, the collapse of large vulture populations in West Africa may have specific causes, such as the illegal killing and trafficking of birds in the region for belief-based use (BOTHÁ et al. 2017).

The focus area of this study is the Koutous Massif. It is located in the heart of the Sahel, in the region of Zinder. Mostly characterised by its ferruginous plateaus, the area is not designated as a protected or critically important area and does not benefit from any legal protection or specific interest. In Niger, most documented ornithological stud-

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ies were carried out in existing protected areas such as the “W” National Park in the southwest of the country and, to a lesser extent, the Air Mountains (PETERSEN 2007). Furthermore, the Koutous Massif was not included in the previous extensive field studies conducted in the country (RONDEAU et al. 2004, THIOLLAY 2006, 2007, PETERSEN 2007).

WACHER et al. (2013) reported the presence of the Egyptian Vulture in the Koutous Massif and suggested breeding. Furthermore, it was documented that during the dry season (the northern winter) the resident population of Egyptian Vultures coexist with Palearctic migrants of the same species (BORROW & DEMEY 2014). Satellite tracking data from Palearctic migrants enabled unprecedented data to be collected on the distribution and habitat use of the species (OPPEL et al. 2015, KRET et al. 2018) and led to the initiation of a regular monitoring in the area providing fragmentary data also on the presence of other vulture species and their population size (ZABEIROU & POURCHIER 2019). Despite this, no detailed and coherent data is yet available. Therefore, the state of Nigerien vulture populations remains unclear and requires further studies. Given the status of vulture populations in Africa and the current lack of resources and capacities to undertake comprehensive monitoring, it is necessary to prioritize actions in certain areas (BUIJ et al. 2016, ARKUMAREV et al. 2019). To fill partially these gaps in knowledge, in 2020 we conducted a thorough field survey in the Koutous Massif that aimed to (1) estimate the population size of the vulture species resident in the area and (2) collect information on vulture distribution and breeding phenology.

## Materials and Methods

### Study area

Niger is a continental country of West Africa. The study took place in the Koutous Massif, in the region of Zinder located in the southern half of the country, in the Sahel (MAMADOU et al. 2020). The study covered the entire massif, which spreads over an area of about 1200 km<sup>2</sup> (Fig. 1).

Located 140 km away from the closest major city Zinder, the Koutous Massif is relatively isolated and only surrounded by small rural villages. Nomads are also present in the region and most people are living of subsistence farming and livestock breeding: cow, sheep, goats and less frequently camels (personal observations).

The Koutous Massif is mostly characterised by its ferruginous plateaus rising up to 800 m, interrupting the dunes and the sandy plains sprinkled with

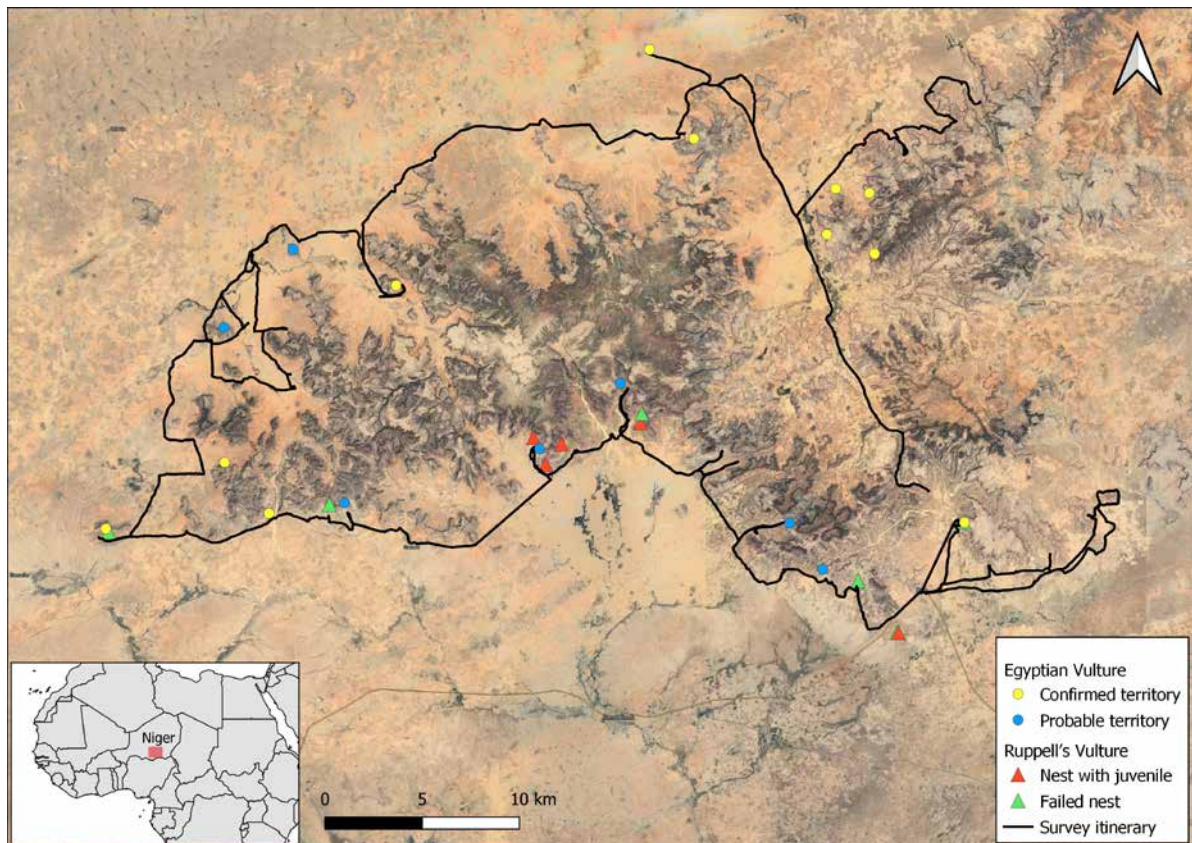
acacia. The average annual overall (day and night time) temperature varies between 25 and 30 °C. Water sources are very limited as the area is characterised by a long dry season of eight to nine months and a short rainy season of three to four months. The cumulative annual rainfall is about 300 mm, concentrated in the period from June to September (MAMADOU et al. 2020). Outside of the rainy season, the Harmattan is predominant, from the end of November to mid-March, characterized by a dry and dusty wind blowing from the Sahara and creating desert-like conditions, from a low humidity to the occurrence of dust and sandstorms which frequently impede the visibility in this period (POURCHIER & BARRIOS 2022). No permanent water points are located within the Koutous Massif as all the ponds are dry by March until the first subsequent rains. The closest documented permanent pool can be found about 40 km south-west from the closest cliffs.

### Survey protocol

Two field trips were conducted between February and June 2020 in order to record occupancy and to evaluate the breeding success. The first field survey was conducted by a single team for 12 field days from the 15<sup>th</sup> of February to the 1<sup>st</sup> of March 2020. The second field survey was conducted by a single team in the first half of June to record the breeding success of the Egyptian Vulture pairs. We surveyed suitable vulture breeding habitat in the study area. Previous data on vulture territories was available from field studies conducted by the Sahara Conservation Fund since 2015 (ZABEIROU & POURCHIER 2019). A combination of methods was used to record vulture presence or locating nest sites. These included:

- surveys near suitable breeding habitat or previously occupied breeding territories with 4 x 4 vehicle on dirt roads at low speed and at least two experienced observers;
- observations from viewpoints to examine suitable breeding habitat;
- walks along suitable breeding cliffs looking for vultures or signs of their presence (e.g., faecal accumulations, nesting materials, etc.) (Fig. 1).
- A local guide assisted with navigation and provided knowledge about the area when needed. The absence of roads and the difficult access impeded surveying very remote parts of the study area.

Territories were classified either as confirmed or possible. They were categorized as confirmed if a pair was observed displaying territorial behaviour



**Fig. 1.** Distribution of the breeding territories of the Egyptian Vulture and the Rüppell's Vulture in the Koutous Massif, Niger

or if an active nest was found. Territories were considered as possible if a single adult was observed near a nest, if an abandoned nest was found or if distinctive fresh faecal accumulations (i.e. “white-washes”) were observed. While monitoring the nests (and when possible), we recorded if eggs had been laid or chicks had hatched and provided an estimation of their age. Observations were done with telescopes (x60) and binoculars (8x42 and 10x42). The GPS locations of the observed vultures and vulture nests were recorded using the app SmartBirds Pro (POPGEORGIEV et al. 2015) and photographs of the breeding cliffs and nests were taken when possible. Spatial data were mapped and processed using QGIS software (QGIS DEVELOPMENT TEAM 2016).

## Results

We recorded the presence of two vulture species breeding in the Koutous Massif – Egyptian Vulture and Rüppell's Vulture.

### Egyptian Vulture *Neophron percnopterus*

We found 11 confirmed and seven possible breeding territories of Egyptian vultures (Fig. 1). In seven territories, the pairs were already incubating while

in three others territorial behaviour was observed. In one territory, an adult was observed bringing nesting material to the nest but the second adult was not observed. However, the nest was located in a deep cavity, and it is possible that the other bird was already incubating inside. Seven territories were classified as possible as we observed either single adult individuals or fresh typical Egyptian Vulture's whitewashes on cliff crevices suitable for breeding. However, these potential breeding niches were too deep, and we could not inspect for presence of vultures or nesting material inside.

Nine nests out of the 11 confirmed breeding territories were visited in June, as the exact location of the other two nests had not been identified. Single chicks were recorded in three nests and the presence of second chicks seemed unlikely. Five nests were empty and, in one nest, the adults were observed at the breeding cliff but the cavity was so deep that the presence of a chick could not be confirmed (Table 1).

### Rüppell's Vulture *Gyps rueppellii*

We found 12 active nests of Rüppell's vultures located on nine breeding cliffs (Fig 1). Six juveniles were observed in as many nests (Table 2). Based on the size of the chicks, we could estimate that they

**Table 1.** Itemized list of the confirmed territories of Egyptian Vulture observed in February and June 2020 in the Koutous Massif, Niger

No	Field survey in February			Field survey in June	
	Breeding status	Nest location	Number of adult Egyptian Vultures observed	Number of chicks observed	Comments
1	Incubating	Found	3	1	Two adults observed close by flying and perching on the cliff
2	Incubating	Found	1	0	Nest empty
3	Incubating	Found	2	0	Two adults and one subadult in the nest
4	Territorial flight	Not found	2	0	Not visited
5	Incubating	Found	2	1	
6	Incubating	Found	1	0	Nest empty
7	Incubating	Found	1	0	Nest empty
8	Incubating	Found	1	0	Nest empty
9	Building nest	Found	2	1	
10	Territorial flight	Not found	2		Not visited
11	Building nest	Found	1	0	Two adults observed standing close by the nest and flying

had hatched in early February. No chicks were observed in the other six nests but adult individuals were observed perching nearby. The fresh nesting material indicated that these pairs either did not initiate breeding this year or failed during incubation or early chick-rearing period. The largest group of Rüppell’s vultures observed consisted of seven individuals that were roosting on a cliff, 2 km southwest of the village of Kellé.

**Other raptor species**

During the field surveys, we also recorded 68 individuals of 11 other raptor species in the Koutous Massif (Table 3). Some of these species are residents while others are Palaearctic migrants wintering in the area. The most common breeding species other than the two vulture species was Lanner Falcon (*Falco biarmicus*), of which we found 15 occupied territories.

**Discussion**

Vultures are declining globally and it is of vital importance to improve knowledge about their distribution in some key areas for conservation (ARKUMAREV et al. 2019). The resident vulture populations throughout Africa are not well studied in terms of their size and trend. Vulture populations in Niger are not an exception (ARKUMAREV et al. 2019). The Egyptian Vulture was reported as a common breeder in the Air Massif in the 1970s and 1980s (THIOLLAY 1977, NEWBY et al. 1987) but more recent surveys suggest that its population is now severely depleted

**Table 2.** Itemized list of active nests of Rüppell’s Vulture observed in February 2020 in the Koutous Massif, Niger

No	Breeding status	Comments
1	No breeding/failed	Nest used this year
2	Chick rearing	Chick about 10-15 days old
3	Chick rearing	Chick about 20 days old
4	No breeding/failed	Nest used this year but empty
5	Chick rearing	Chick <20 days old
6	Chick rearing	Chick <20 days old
7	Chick rearing	Chick <20 days old
8	No breeding/failed	One adult in the nest, six roosting
9	Chick rearing	Chick <20 days old
10	No breeding/failed	Nest used this year
11	No breeding/failed	Nest probably not used
12	No breeding/failed	Nest built this breeding season

**Table 3.** Other raptor species observed during the vulture field survey in February 2020 the Koutous Massif, Niger

Species	Number
Bateleur <i>Terathopius ecaudatus</i>	1
Black-shouldered Kite <i>Elanus axillaris</i>	2
Booted Eagle <i>Hieraaetus pennatus</i>	1
Common Kestrel <i>Falco tinnunculus</i>	3
Dark Chanting-goshawk <i>Melierax metabates</i>	6
Lanner Falcon <i>Falco biarmicus</i>	26
Montagu’s Harrier <i>Circus pygargus</i>	1
Pallid Harrier <i>Circus macrourus</i>	7
Pharaoh Eagle-owl <i>Bubo ascalaphus</i>	14
Short-toed Snake-eagle <i>Circaetus gallicus</i>	6
Swallow-tailed Kite <i>Elanoides forficatus</i>	1

in the whole country (RONDEAU & THIOLLAY 2004, THIOLLAY 2006). WACHER et al. (2013) recorded the species in the Sahelian region of Niger with a cluster of regular encounters in the Termit Massif and Koutous Massif. The year-round presence of adults and occasional presence of immatures suggested a resident population but breeding had not been confirmed. The Rüppell's Vulture presence and breeding in the massif however had never been documented and, until recently, the species was described as *rare* by local inhabitants (personal observations). In most of the range, Rüppell's vultures usually nest on cliffs (MUNDY et al. 1992) but, in Niger, they nest on trees as well (RONDEAU et al. 2006, ZABEIROU 2019). Out of the four Rüppell's Vulture populations documented in Niger (the three others being in the W National Park, the Gadabeggi Biosphere Reserve and in the Termit Tin Toumma National Natural Reserve), the Koutous Massif population is the only one nesting on cliffs (POURCHIER & ZABEIROU 2022).

These resident populations have not been thoroughly studied so far and this study contributes to fill this gap and presents the results of the first dedicated study of the local breeding population of the Egyptian Vulture and Rüppell's Vulture in the Koutous Massif Niger, thus providing concrete evidence of their range.

We found 12 Rüppell's Vulture active nests and, therefore, we can estimate a breeding population of at least 24 mature individuals occurring in the area. We consider this figure to be an accurate reflection of the Rüppell's Vulture breeding population in the massif. Based on the age of the observed juveniles in the nests, we could estimate that the laying period for the species in Koutous Massif is in December. Chicks hatch in early February and fledge from the nests in the second half of May. Further surveys are needed to deepen our knowledge on the breeding performance of the species in the Massif.

In total, 18 confirmed or possible breeding territories of Egyptian Vulture were found. We assume that the population of the species was so far under-recorded and is likely to be larger than what we found (possibly, reaching up to 25–30 breeding pairs). The first survey coincided with the incubation period for most pairs. The Egyptian Vulture is an elusive species and detecting its presence is difficult especially during the incubation period. The cliffs in the Koutous Massif are characterized by large number of crevices and deep niches, suitable for breeding but impossible to investigate from a distance. Additionally, the predominant dust at this time of the year significantly reduces the visibility and some very remote parts of the Massif could not

be reached in order to be surveyed. In 64% of the confirmed Egyptian Vulture territories (n=11), the pairs were already incubating in the second half of February while the others were still displaying and building nests. Subsequent monitoring efforts revealed that hatching of the chicks happens in early April and the first fledging is in the second half of June. The recorded breeding phenology is in line with previous records for the species in the region (MUNDY et al. 1992). During the survey, we also recorded 30 subadult and immature Egyptian vultures but it is unsure if these individuals were local residents or Palaearctic migrants wintering in the area (OPPEL et al. 2015, KRET et al. 2018), most probably there were of both categories. At a waterpoint located in the west side of the massif, we recorded at least 35 different individuals from various ages. Apart from this site, we could not detect any other congregation site.

The nests of Rüppell Vulture were all located in the less populated southern side of the massif. On the contrary, the confirmed Egyptian Vulture territories were concentrated in the northeastern part of the massif where there are more villages, with some of them being very close to houses. Egyptian vultures frequently breed close to human settlements as they find food near the villages (MUNDY et al. 1992). Similarly, in neighbouring Chad, the species was reported to prefer breeding at lower elevations near human habitations (GUICHARD 1955). During the survey in numerous occasions, we came across animal carcasses, which were disposed near human settlements and were probably the primal source of food for the vultures. Animals are also slaughtered in dedicated places in villages where vultures can occasionally be seen but usually there is not much left for the vultures and other scavengers as most parts of the animals are consumed or used (personal observations). Rüppell's vultures are more susceptible to human disturbance and prefer to breed further away from human settlements and on higher cliffs but they forage over vast areas looking for carcasses (MUNDY et al. 1992).

Although we observed a number of other raptor species, the entire area is relatively depleted from wildlife. Two iconic species – the North African Ostrich (*Struthio camelus camelus*) and the Scimitar-horned Oryx (*Oryx dammah*), went extinct in the wild at the country level (MAMADOU et al. 2020) and most smaller gazelles have not been observed in the area for years (authors' pers. obs.). Besides small mammals, reptiles and birds, only jackals are regularly seen in the area (personal observations). Therefore, the primal source of food for the vulture popu-

lation in the Koutous Massif is livestock. Most of the local people are pastoralists and raise livestock, mainly sheep and goats but also cattle, donkeys and camels. They highly depend on environmental and climatic conditions and a poor rainy season leads to high livestock mortality. Livestock carcasses are usually left *in situ*, providing a certain amount of food for vultures.

Improving our knowledges on the species as well as understanding their threats is key to implement conservation actions. Recent surveys conducted in the regions of Maradi and Zinder showed that illegal killing for belief-based use should be considered as the main threat for vultures in Niger (KRET et al. 2018, POURCHIER 2019). All vultures are protected in Niger according to the law N°98-07 of 29 April 1998 establishing the hunting and wildlife protection regime (République du Niger 1998). However, vulture parts and carcasses were found on sale at traditional healer stands in diverse markets and an adult Egyptian Vulture was retrieved from poachers in the Koutous Massif in 2021 (OPPEL et al. 2021, POURCHIER & BARRIOS 2022). It was evidenced that a whole network is operating, with hunters being in contact with healers and clients to sell their preys, quite often even abroad. Nigeria, a bordering country where these practices are widespread, was identified as playing an important role in the increase of this demand (BUIJ et al. 2016). Additionally, vultures may fall victims of unintentional poisoning due to the use of strychnine by officials to control the carnivore populations (ANGELOV 2023). Therefore, the indirect poisoning of vultures in the country, as in most of the African continent, should be included in the conservation agenda (BOTHA et al. 2017).

Because of the complexity of the main threats and their cultural anchoring in the community (STARA et al. 2022), the success of the vulture conservation in Niger relies on the implementation of complementary activities involving a various range of stakeholders, from hunters to local communities and leaders, expected to have an impact both on the short and long term.

Raising awareness and promoting plant-based alternatives of vulture body parts (SOYOYE & OLADIRAN 2022) for belief-based use are of vital importance. Joint work with neighbouring countries, notably Chad and Nigeria, is of great importance in combating the illegal killing and trade of vultures in the region.

Additional studies and dedicated resources are necessary to obtain more data on vulture occurrence, population size and trends to adequately plan and implement conservation programmes. Conducting

intensive monitoring could provide unprecedented information on their status and reproduction while the GPS tracking of vultures could be an efficient tool to study the ecology, distribution and survival of vultures and to fill the gaps in the knowledge of this threatened guild in the entire region.

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