



Ostrich

Journal of African Ornithology

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/tost20>

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To cite this article: Mawdo Jallow, Momodou L Dibba, Fagimba Camara, David R Barber, Keith L Bildstein & Lindy J Thompson (2022) Road counts reveal The Gambia's West Coast region still has the densest population of Hooded Vultures *Necrosyrtes monachus* in Africa, *Ostrich*, 93:4, 248-256, DOI: [10.2989/00306525.2022.2143922](https://doi.org/10.2989/00306525.2022.2143922)

To link to this article: <https://doi.org/10.2989/00306525.2022.2143922>



Published online: 15 Dec 2022.



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Road counts reveal The Gambia’s West Coast region still has the densest population of Hooded Vultures *Necrosyrtes monachus* in Africa

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Road surveys are a useful tool for comparing vulture population trends. Here we present data from road surveys to count Hooded Vultures *Necrosyrtes monachus* in The Gambia in 2017 and 2021. In the first nationwide road survey in November 2017 (during this species’ breeding period), we counted 7.3 Hooded Vultures per km. In The Gambia’s West Coast, we counted 33.3 Hooded Vultures per km in November 2017 (during this species’ breeding period) and 27.4 Hooded Vultures per km in May 2021 (during the non-breeding period). In the rest of the country (i.e. in The Gambia’s North Bank, Central, Upper and Lower River regions), we counted 3.3 Hooded Vultures per km in November 2017 and 2.1 Hooded Vultures per km in November 2021, which may represent cause for concern. These figures for The Gambia’s West Coast region far exceed the results of road surveys conducted in the same area in 2005, 2013, and 2015. The number of Hooded Vultures recorded per km in the West Coast region increased from 2005 to 2017, but dipped slightly into May 2021, when we would have expected to see an increase, as the 2021 survey was carried out in the non-breeding period. In the non-breeding period vultures would not be confined to nests and populations should be at their highest, due to recently fledged juveniles entering the population. Overall, the densities of Hooded Vultures counted in The Gambia from 2005 to 2021 indicate that population densities are higher in The Gambia than in any other country where road surveys have taken place. The densities were orders of magnitude higher than those in eastern and southern Africa. However, given the decline in numbers between 2017 and 2021, we should not be complacent about the stability of this population.

Des dénombrements routiers révèlent que la région de la côte ouest de la Gambie (West Coast) arbore toujours la plus grande population de vautour charognards *Necrosyrtes monachus* d’Afrique.

Les dénombrements routiers constituent un outil utile afin d’évaluer les tendances de populations de vautours. Nous présentons ici les résultats de dénombrements routiers visant les vautours charognards *Necrosyrtes monachus* effectués en Gambie en 2017 et 2021. Dans le premier dénombrement routier national tenu en novembre 2017 (pendant la période de reproduction pour cette espèce), nous avons compté 7.3 vautours charognards par km. Dans la région de la côte ouest (West Coast) de la Gambie, nous avons compté 33.3 vautours charognards par km en novembre 2017 (pendant la période de reproduction), et 27.4 vautours charognards par km en mai 2021 (en dehors de la période de reproduction). Dans le reste du pays (i.e. les régions North Bank, Central, Upper et Lower River), nous avons compté 3.3 vautours charognards par km en novembre 2017, et seulement 2.1 vautours charognards par km, dans la même zone, en novembre 2021, ce qui pourrait représenter une source de préoccupation. Les résultats obtenus dans la région de la côte ouest dépassent largement les valeurs obtenues lors des dénombrements routiers dans la même région en 2005, 2013, et 2015. Le nombre de vautours charognards observés par km dans la région de la côte ouest ont augmenté successivement de 2005 à 2017, pour ensuite diminuer légèrement jusqu’au mois de mai 2021 alors que nous aurions attendu une augmentation, car les dénombrements de 2021 ont été effectués en dehors de la période de reproduction, lorsque les vautours ne sont pas confinés au nid, et que les populations devraient être à leur plus haute abondance à cause de l’influx des jeunes de l’année dans la population. En général, les abondances de vautours charognards mesurées en Gambie de 2005 à 2021 indiquent que la densité de population est plus haute en Gambie que dans tout autre pays où des dénombrements routiers ont eu lieu, et même des ordres de grandeurs supérieurs à tout autre pays d’Afrique de l’Est et du Sud. Néanmoins, étant donné le déclin d’abondance entre 2017 et 2021, nous ne pouvons pas être complaisants en ce qui a trait de la stabilité de cette population.

Keywords: Hooded Vulture, *Necrosyrtes monachus*, road counts, road surveys, West Africa

Introduction

Hooded Vultures *Necrosyrtes monachus* have a wide distribution in sub-Saharan Africa, stretching from southern Mauritania and Senegal eastwards through Niger and Chad to Sudan, South Sudan, northern Uganda, Eritrea, Ethiopia and western Somalia. The distribution also extends southwards (not in densely forested areas or continuous desert) to northern Namibia, Botswana, Zimbabwe, Mozambique, north-eastern South Africa, and Eswatini (Ferguson-Lees and Christie 2001). Despite their extremely widespread distribution (Thompson et al. 2021) in West and East Africa, numbers of Hooded Vultures have declined by 83% over three generations (Ogada et al. 2016). As a result, Hooded Vultures are currently classed as Critically Endangered on the IUCN Red List of Threatened Species (BirdLife International 2022b).

In Dakar, Senegal, the number of Hooded Vultures counted at urban roost sites in 2016 was compared with the numbers estimated in 1969 and 1971, which revealed a decline of 85%, from 3 000 individuals to just 400 (Mullié et al. 2017). Mullié et al. (2017) suggested that this decline could be due to rapid urbanisation, resulting in the loss of nesting, roosting and foraging habitat. They also suggested that it could be attributed to unintentional poisoning of vultures when feral dogs are targeted.

Another threat to Hooded Vultures, particularly in southern (McKean et al. 2018; Mashele et al. 2021) and West Africa (Boakye et al. 2019), is intentional killing to obtain body parts for use in African traditional medicine (interchangeably referred to as belief-based use, fetish, *muthi*, *wudu*, and *juju*). In Burkina Faso, disturbance of Hooded Vulture nests by people (with the aim of collecting for traditional medicine) resulted in the failure of 20% of breeding attempts (Daboné et al. 2019). Arguably the most devastating threat to Hooded Vultures, in terms of numbers of individuals killed, is intentional poisoning for traditional medicine (Henriques et al. 2018; Henriques et al. 2020; Daboné et al. 2022). Guinea-Bissau is thought to hold the largest population of Hooded Vultures in the species' range (Henriques et al. 2018), but from September 2019 to March 2020 the country lost over 2 000 Hooded Vultures (almost 5% of its population) in a spate of intentional poisoning events related to the illicit trade in vulture parts for traditional medicine (Henriques et al. 2020). Similarly, in Burkina Faso, Hooded Vultures comprised 96% of the 577 dead vultures resulting from 15 cases of intentional poisoning (Daboné et al. 2022). In Nigeria too, the persecution of Hooded Vultures for use in traditional medicine has likely contributed to a massive local decline in the Hooded Vulture population (Adeola 1992; Sodeinde and Soewu 1999; Saidu and Buij 2018; Nosazeogie et al. 2018). Finally, a comprehensive study carried out in 12 countries across West and Central Africa found that offtake for the traditional medicine trade is contributing significantly to vulture declines (Buij et al. 2016).

Despite these significant losses to Hooded Vulture populations in West Africa, some studies give cause for hope. Barlow and Fulford (2013) declared that Hooded Vultures were comparatively abundant in coastal Gambia, following their findings (through road counts conducted

along a 10 km stretch of tarred road over 162 days from June to December 2005) of an average of 2.91 Hooded Vultures per km. However, Ogada and Buij (2011, p105) stated 'There is insufficient information to establish a population trend' in reference to Hooded Vultures in The Gambia. Subsequently, Barlow (2012) reported the establishment of a national Hooded Vulture survey in The Gambia, with initial observations showing an abundance of birds. In 2013 and 2015, road surveys conducted in the West Coast region of The Gambia revealed 12.0 and 17.5 individuals per km respectively, reportedly the highest density of Hooded Vultures in the species' range (Jallow et al. 2016). However, a lack of recent road survey data in West Africa was again highlighted (in February 2022) in a BirdLife International discussion forum in response to the proposed downlisting of the Hooded Vulture's conservation status from Critically Endangered to Endangered (BirdLife International 2022a). In March 2022, the decision was made by BirdLife International's Red List Team to maintain the species' status as Critically Endangered. Nevertheless, there remains a need to build on the baseline data provided by Barlow and Fulford (2013) and Jallow et al. (2016) to determine population trends for Hooded Vultures in The Gambia. Interestingly, we could find no published records of Hooded Vultures breeding in The Gambia in the scientific literature (Borrow and Demey 2013; Jallow 2021b), although we have observed their nests in the Abuko Nature Reserve located in the West Coast (F Camara, ML Dibba and KL Bildstein, pers. obs., Figure 1). We therefore aimed to repeat the counts of Hooded Vultures conducted by Jallow et al. (2016) as part of a continuing government-approved monitoring project in The Gambia, with the objective of describing a population trend for this species.

Methods

Timing of surveys and of Hooded Vulture breeding

In the West Coast region of The Gambia, road surveys were conducted over three days in 2021, from 19 to 21 May. The rest of the country (i.e. North Bank, Central, Upper, and Lower River regions) was surveyed from 23 to 29 November 2017 and from 10 to 14 November 2021, while the West Coast was surveyed from 29 November to 1 December 2017 (Table 1).

In The Gambia, the Hooded Vulture's breeding period lasts from November to April (Thompson et al. 2020). This breeding period coincides with the dry season (which lasts from October to June in The Gambia) (Barlow et al. 1997, Thompson et al. 2020), which is similar to other countries in West Africa (Mackworth-Praed and Grant 1981; Dowsett-Lemaire and Dowsett 2014; Daboné et al. 2016) and elsewhere (van Someren 1956; Dowsett-Lemaire and Dowsett 2006; Roche 2006; Dowsett et al. 2008; Thompson et al. 2017). We therefore conducted surveys during both the breeding and non-breeding periods.

Road survey methods

Road surveys are regarded as an efficient method for counting medium-sized to large soaring raptors over



Figure 1: A Hooded Vulture *Necrosyrtes monachus* nestling in a nest in Abuko Nature Reserve located in the West Coast region of The Gambia. Photograph: Fagimba Camara

Table 1: Summary of the road surveys we performed in The Gambia in 2017 and 2021

Month	Year	Breeding period	West Coast region ¹	The rest of The Gambia ²
Nov	2017	laying	✓	✓
May	2021	non-breeding	✓	
Nov	2021	laying		✓

¹including Banjul

² 'the rest of The Gambia' includes (i) the Lower River, (ii) the North Bank, (iii) the Central River, and (iv) the Upper River regions.

large areas, to calculate relative abundance and estimate densities (Fuller and Mosher 1987). This method has been widely used to count Hooded Vultures in eastern (Kyonjola et al. 2010; Virani et al. 2011; Pomeroy et al. 2015), western (Barlow and Fulford 2013; Jallow et al. 2016; Henriques et al. 2017) and southern Africa (Garbett et al. 2018). We followed the methods used by Jallow et al. (2016) with counts conducted from a pickup truck travelling at 10–20 km h⁻¹. To reduce observer error between regions, the same team of people conducted the road surveys each day (Fuller and Mosher 1987). During each survey, our team consisted of four or five people (including a driver), equipped with binoculars, GPS, camera, survey data sheets, and stationery. All of our surveys were conducted on days with no rain and with no or little wind, following Jallow et al. (2016). In addition, all surveys began on days when there were no clouds (we recorded cloud cover as 'clear'), although during some (very few) of our surveys the cloud cover changed from 'clear' to 'partly clear'. Consequently, we believe that weather did not cause differences between counts.

We counted all Hooded Vultures seen, whether perched, flying, feeding, or drinking. We stopped only when necessary to count the number of birds in large groups. When we stopped, we only included the birds seen while travelling. We did not scan for additional birds once the vehicle was

Table 2: Lengths of our survey routes in 2017 and 2021

Region of The Gambia	Distance (km)
North Bank	134.5
Central River	241.9
Upper River	185.1
Lower River	123.6
West Coast ¹	105.9
West Coast ²	114.0

¹ the route done in 2017 and 2021

² the routes done in 2013 and 2015 (Jallow et al. 2016)

stationary (Jallow et al. 2016). Most surveys began around 07:30 (at least 50 mins after sunrise) and finished by 12:30, however there was one afternoon road count, which started at 17:24 and ended at 19:06 (at dusk).

The Gambia's dominant habitats include agriculture, savanna, wetlands/floodplains, mangroves, gallery forest and riparian forest, as well as human settlements (CILSS 2016). Lengths of our survey routes are presented in Table 2. These routes passed through a wide variety of habitats, including farmlands, rice paddies, forests, wetlands and woodlands, as well as more densely populated areas, such as abattoirs, dump sites, and settlements (Figure 2, Table A1). In all five regions, the two dominant habitats were agriculture and/or savanna; however, the West Coast is exceptional in that it is the most densely populated, with human densities that are orders of magnitude higher than in other parts of the country (The Gambia Bureau of Statistics 2022). In general, the country has seen dramatic human population growth in recent decades, with the total population estimated at 2.6 million people (United Nations Population Fund 2022a).

Results

Nationwide survey – November 2017

The survey team covered a total of 791 km over nine consecutive days during the nationwide survey in The Gambia in November 2017, with 5 810 Hooded Vultures counted at a country-wide mean of 7.3 Hooded Vultures per km (Table 3).

About ten times as many Hooded Vultures were recorded per kilometre in the West Coast than in the rest of the country (i.e. North Bank, Central, Upper, and Lower River regions, Table 4).

West Coast region surveys – November 2017 and May 2021

The survey team covered a total of 105.9 km in the West Coast region of The Gambia over three consecutive days in May 2021 and counted a total of 2 901 Hooded Vultures, with a mean of 27.4 Hooded Vultures per km. Hooded Vultures were observed feeding mainly on the carcasses of cattle, goats, and sheep. No vultures were seen at the New Yundum abandoned abattoir.

A comparison of the results from road surveys for Hooded Vultures in The Gambia's West Coast region revealed an increase from 2005 to 2017, but numbers dipped slightly from 2017 to 2021 (Table 5).

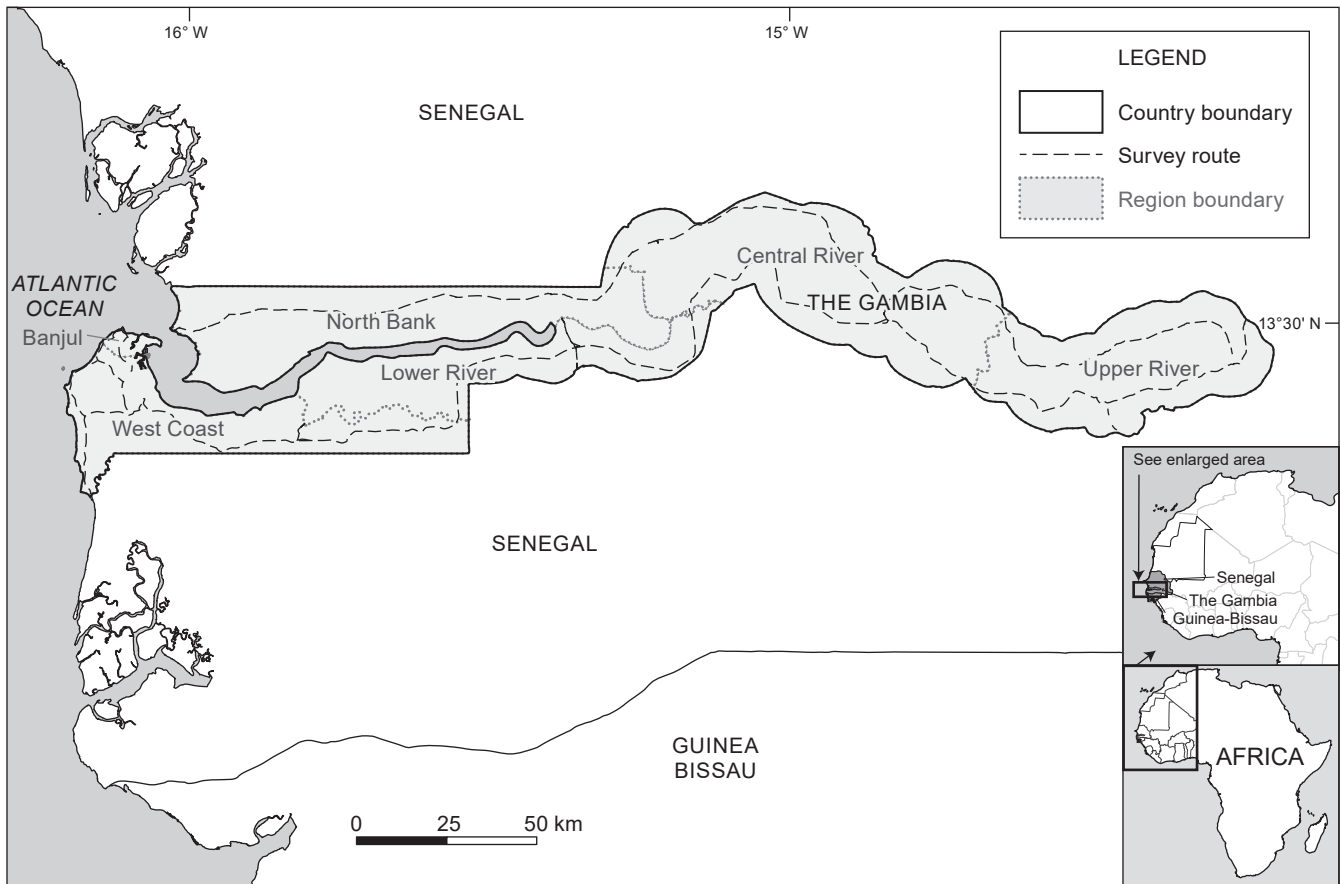


Figure 2: Survey routes used in The Gambia road surveys in 2017 and 2021

Table 3: Number of Hooded Vultures counted per region, during nationwide road surveys in The Gambia in November 2017

Region	Distance (km)	Total count	Hooded Vultures per km
North Bank	134.5	183	1.4
Central River	241.9	718	3.0
Upper River	185.1	1 010	5.5
Lower River	123.6	366	3.0
West Coast	105.9	3 533	33.3
Total	791.0	5 810	

Table 4: Number of Hooded Vultures counted in the West Coast region, compared with the rest of the country (North Bank, Central, Upper and Lower River regions), during nationwide road surveys in The Gambia in November 2017

Region	Total count	Distance (km)	Hooded Vultures per km
West Coast	3 533	105.9	33.3
Rest of the country	2 277	685.1	3.3
Total	5 810	791.0	7.3

Rest of The Gambia survey – November 2021

The survey team covered a total of 685.1 km over five consecutive days during the surveys in the Upper, Lower, and Central River regions and the North Bank region in The Gambia in November 2021. The West Coast region was not included in the survey in November 2021. The team counted a total of 1 453 Hooded Vultures, with a mean (\pm SD) of 2.1 (\pm 0.7) Hooded Vultures per km (Table 6).

Discussion

When comparing our road survey data collected in The Gambia in 2017 and 2021 with previous road survey data from The Gambia and elsewhere, it is clear that The

Gambia still has the highest Hooded Vulture population density in Africa (Table 7). In the first nationwide road survey of The Gambia in November 2017 (during this species’ breeding period), we recorded an average of 7.3 Hooded Vultures per km. Hooded Vultures are generally regarded as one of the most abundant raptors in West Africa (Henriques et al. 2017; Rodrigues et al. 2020), and our results support that statement with densities as high as 33.3 Hooded Vultures per km (in November 2017, in the West Coast region). Overall, the densities of Hooded Vultures counted in The Gambia from 2005 to 2021 indicate that population densities are higher in The Gambia than in any other country where road surveys have taken place, and orders of magnitude higher than in East and southern Africa, where Hooded Vultures are regarded as

Table 5: Number of Hooded Vultures recorded during road surveys in The Gambia's West Coast region, from 2005 to 2021

Year	Hooded Vultures per km	Month(s) of year	Reference
2005	2.9	Jun–Dec	Barlow and Fulford (2013)
2013	12.0	Sep–Oct	Jallow et al. (2016)
2015	17.5	Jul	Jallow et al. (2016)
2017	33.3	Nov	this study
2021	27.4	May	this study

Table 6: Number of Hooded Vultures counted ('Total count') for each respective region during road surveys in the Lower, Central, and Upper River regions, and the North Bank region of The Gambia in November 2021

Region	Distance (km)	Total count	Hooded Vultures per km
North Bank	134.5	139	1.0
Central River	241.9	516	2.1
Upper River	185.1	541	2.9
Lower River	123.6	257	2.1
Total	685.1	1 453	

one of the least abundant raptors (Kyonjola et al. 2010). In East Africa, densities of Hooded Vultures range from 0.003 to 0.05 per km (Virani et al. 2011), while in southern Africa, densities are lower still, at 0.0002 per km (Garbett et al. 2018) (Table 7).

In The Gambia's North Bank, Central, Upper, and Lower River regions, we counted 3.3 Hooded Vultures per km in November 2017, but only 2.1 Hooded Vultures per km, in the same area, in November 2021. Since both surveys were conducted in the same part of the breeding period, with experienced fieldworkers, this decline in the number of Hooded Vultures in the Upper and Lower River regions could represent cause for concern.

In The Gambia's West Coast region, we counted 33.3 Hooded Vultures per km in November 2017 (the breeding period) and 27.4 Hooded Vultures per km in May 2021 (the non-breeding period). These figures far exceed the results of road surveys conducted in the same area in 2005, 2013, and 2015 (Table 5), and so there seems to have been an increase in the number of Hooded Vultures in the West Coast. Nevertheless, in our comparison of the data recorded in November 2017 and May 2021, we would have expected to see more Hooded Vultures in the non-breeding period (May), since the birds would not be restricted to their nests during this period, and the populations should be at their highest due to recently fledged juveniles entering the population, and so, although the counts in the West Coast were both relatively high in 2017 and 2021, we would have expected to see more vultures in the latter survey, contrary to our observations. These results indicate we should not be complacent about this population. Contrary to our expectations, Barlow and Fulford (2013) recorded four times as many Hooded Vultures in December (early breeding period) than in June (non-breeding period) in their road surveys of Hooded Vultures in and around Banjul, in

The Gambia's West Coast region. More research is needed to better understand seasonal changes in the number of Hooded Vultures. Additional data on the age-classes of birds may inform the patterns observed.

Jallow et al. (2016) suggested three reasons for the relatively high numbers of Hooded Vultures observed during their roadside counts in the West Coast region of The Gambia. Firstly, Hooded Vultures are a human commensal species in West Africa (Mundy et al. 1992; Ferguson-Lees and Christie 2001; Ogada and Buij 2011), and this may help them to do well in this heavily populated area of one of Africa's most densely populated countries (Jallow et al. 2016; United Nations Population Fund 2022b). The fact that the human population is increasing so rapidly in the West Coast (The Gambia Bureau of Statistics 2022) may also explain why numbers of Hooded Vultures have increased in this region from 2005 to 2017. For example, according to official census data, the human population in Kanifing (a town in the West Coast region) has increased from 3 021 km⁻² in 1992 to 4 272 km⁻² in 2003, and to 4 992 km⁻² in 2013 (The Gambia Bureau of Statistics 2022). Secondly, Hooded Vultures do not suffer competition from other vulture species, as they are the only vulture species found in this part of The Gambia (Jallow et al. 2016). Thirdly, in The Gambia, Hooded Vultures are not persecuted for traditional medicine or fetish uses (Barlow and Fulford 2013), and so they are comparatively unafraid of people. Consequently, Hooded Vultures often occur in large groups in areas dominated by people in the West Coast region, such as at large municipal dumps, open-air abattoirs, supplementary feeding sites at hotels which provide photographic opportunities for guests, fish-landing sites where they eat fish by-catch (Barlow et al. 2022), and on roadsides, where they feed close to people on food scraps, road killed animals, and blood and rumen contents that are dumped specifically for vultures at villages (Barlow 2012; Jallow et al. 2016; Thompson et al. 2020; Barlow 2021).

Threats to Hooded Vultures of The Gambia may include the felling of trees, a shortage of food, inadequate awareness campaigns on vultures, and, in rural areas, food shortages, because there are few or no abattoirs, and even where there are abattoirs, slaughtering does not occur daily, and there are no established dump sites, unlike in urban areas (M Jallow and ML Dibba, pers. obs.). Until recently, killing for use in rituals was not deemed to be a threat to Hooded Vultures in The Gambia (Barlow and Fulford 2013), and no particular tribes in The Gambia are currently known for killing Hooded Vultures (ML Dibba, pers. obs.). However, in October 2020, a mass-killing of 30–40 Hooded Vultures occurred at Gunjur Abattoir. The heads were removed from most of these birds, most likely for use in rituals. A local resident at the scene told us the birds were most likely poisoned (ML Dibba and F Camara, pers. obs.). Furthermore, band felling of tall trees at the New Yundum Abattoir site, and a lack of food and suitable habitat at the Sambuya site, have likely caused a reduction in numbers of Hooded Vultures, as the birds have shifted to other urban areas (Jallow 2021a). We suspect that the food availability and suitable habitat have a significant influence on the presence of Hooded Vultures in urban areas (Rondeau et al. 2008).

Table 7: A comparison of Hooded Vulture densities (individuals per km of road surveyed) reported in various studies. The Gambia, particularly its West Coast region, has by far the highest density of Hooded Vultures in Africa

Country	Region	Year	Density (HV/km)	Reference
The Gambia	West Coast	2005	2.9	Barlow and Fulford 2013
The Gambia	West Coast	2013	12.0	Jallow et al. 2016
The Gambia	West Coast	2015	17.5	Jallow et al. 2016
The Gambia	West Coast	2017	33.3	this study
The Gambia	West Coast	2021	27.4	this study
The Gambia	nationwide	2017	7.3	this study
The Gambia	North Bank & Central, Upper and Lower River	2017	3.3	this study
The Gambia	North Bank & Central, Upper and Lower River	2021	2.1	this study
Guinea-Bissau	Guinea-Bissau	2016	2.52	Henriques et al. 2017
Benin	Northern Benin		0.1	BirdLife International 2022a
Guinea	towns	2006	1.337	Rondeau et al. 2008
Guinea	central (La Moyenne Guinée)	2006	0.615	Rondeau et al. 2008
Guinea	coastal (La Guinée Maritime)	2006	0.777	Rondeau et al. 2008
Chad and Niger	central Chad & eastern Niger	2010–2013	0.007	Wacher et al. 2013
Kenya	in grazed area	2003–2005	0.018	Virani et al. 2011
Kenya	in buffer area	2003–2005	0.003	Virani et al. 2011
Kenya	in Masai Mara National Reserve	2003–2005	0.05	Virani et al. 2011
Uganda	the whole country	2008–2013	< 0.01	Pomeroy et al. 2015
Tanzania	north & central	2010	0.0050	Kyonjola et al. 2010
Nigeria	northern Nigeria	2018	0.004	Ringim et al. 2022
Botswana	northern Botswana	2015–2016	0.0002	Garbett et al. 2018
Botswana	northern Botswana	1991–1995	0.0005	Garbett et al. 2018

Limitations

Pomeroy et al. (2015) highlighted that due to Hooded Vultures' close association with human habitations (and therefore with road networks), road surveys may produce inflated population density estimates. However, road surveys are still arguably the most effective way of monitoring temporal trends in Hooded Vulture populations. Due to the location of Hooded Vulture nests within the canopies of densely foliated trees (Roche 2006), rather than on top of canopies, they are often not visible from an aircraft, and so aerial surveys are not appropriate for this species. For this reason, and because nest surveys require such a large investment of time and fuel, we believe that road surveys remain the best way of gauging trends in Hooded Vulture populations.

Unfortunately, we could not present accurate data for the behaviour of the birds we counted, because it was difficult to tell how many birds were flying, feeding, standing etc. when there were large numbers (hundreds) of birds together. We suggest large groups could be photographed in future, to enable the behaviours to be distinguished later.

Recommendations

There is a need for further research to confirm the breeding period of Hooded Vultures in The Gambia. In addition, researchers should try to record the age-classes of birds, whenever possible, when conducting road surveys, although we recognise the challenges of doing so from a moving vehicle with minimal time to view a bird, when birds are flying high, with poor lighting, and with large groups of birds (Kyonjola et al. 2010). Finally, the timing of road surveys within an area or country should be standardised across

years, so that the data will be more comparable between years, removing the possible effect of breeding period. This could also extend to whether surveys are conducted on weekdays or not, as Barlow and Fulford (2013) found significantly more Hooded Vultures recorded over weekends than on weekdays.

Conclusion

Road counts indicate that population densities of Hooded Vultures are higher in The Gambia than in any other country where road surveys have taken place. However, in other areas of West Africa, Hooded Vulture populations are declining at an alarming rate (Mullié et al. 2017), to the extent that local extirpations are being recorded (Nosazeogie et al. 2018). In southern Africa too, road surveys revealed a 79% decline in the number of Hooded Vultures (Garbett et al. 2018). Therefore, despite the comparatively high densities of Hooded Vultures in The Gambia, and in the West Coast region in particular, conservation measures should be put in place soon to protect this population.

We encourage the implementation of awareness activities (through community radio programmes or meetings) in local communities, particularly to sensitise children and butchers on how to identify vultures, and the roles that vultures play in their daily life and wellbeing (Ottinger et al. 2021; van den Heever et al. 2021), as well as the risks to people and to wildlife of ritualistic poisoning of vultures at abattoirs (Jallow 2021a, 2021b). In addition to the continuation of nationwide road surveys throughout The Gambia, we recommend regular Hooded Vulture counts at selected abattoirs (to supplement road survey

data), a study on the breeding ecology (for which we have little published information in this country), a study on the factors affecting roost site selection, and the reactivation of ringing and tracking activities, to observe their movements and breeding in the region, to highlight the areas most in need of protection (Jallow 2021b).

Acknowledgements — We are deeply grateful to our driver, Amadou Darboe, and to Binta Sambou, for assistance with data collection during the road surveys. We thank Dr Laurie Goodrich for facilitating this collaboration. Dr Laurie Goodrich, Dr Dimitar Demerdzhiev, and one anonymous reviewer provided valuable comments that greatly improved the quality of this manuscript. John P Davies kindly provided us with access to his reference library and Dr Jean-François Therrien translated our Abstract into French. We thank the Hawk Mountain Sanctuary Association for generous funding to conduct these road surveys in The Gambia. Funding for this research was provided to David Barber by the St. Augustine Alligator Farm Zoological Park. This is Hawk Mountain Conservation Science contribution number 376.

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Table A1: Locations of abattoirs visited during the November 2017 and November 2021 road surveys in The Gambia. 'Yes' and 'no' indicate whether or not a particular abattoir was visited during a road survey

Name	Region*	Coordinates	Nov 2017	Nov 2021
Barra	NB	13°29'10.2" N, 16°32'27.2" W	yes	yes
Kuntair	NB	13°32'08.2" N, 16°13'22.9" W	yes	yes
Farafenni	NB	13°34'30.4" N, 15°35'26.2" W	yes	yes
Kaur	CR (North)	13°41'58.9" N, 15°19'40.3" W	yes	yes
Wassu	CR (North)	13°41'32.5" N, 14°52'52.3" W	yes	yes
Sabi	UR	13°14'20.3" N, 14°11'23.1" W	no	yes
Basse	UR	13°18'20.7" N, 14°12'53.8" W	yes	yes
Bansang	CR (South)	13°26'00.2" N, 14°39'08.0" W	yes	yes
Janjanbureh	CR (South)	13°32'11.6" N, 14°45'38.3" W	yes	yes
Brikama Ba	CR (South)	13°32'03.8" N, 14°55'40.1" W	yes	yes
Sinchu Alagi	CR (South)	13°37'11.3" N, 15°01'59.6" W	yes	yes
Jareng	CR (South)	13°37'21.7" N, 15°11'26.3" W	yes	yes
Bureng	LR	13°23'31.8" N, 15°16'37.2" W	yes	yes
Sare Mawdo	LR	13°26'10.3" N, 15°32'02.9" W	yes	no
Soma	LR	13°26'11.4" N, 15°32'02.9" W	no	yes
Yundum	WC	13°20'34.4" N, 16°40'07.7" W	yes	yes
Abuko	WC	13°23'54.6" N, 16°39'06.2" W	yes	yes
Brikama	WC	13°16'00.6" N, 16°39'11.9" W	yes	yes

*NB = North Bank, CR = Central River, UR = Upper River, LR = Lower River and WC = West Coast.