

Observations of large raptors in northeast Sudan

Jeremy P. Bird and Tim M. Blackburn

Abstract

During a targeted shorebird survey of wetlands along Sudan's Red Sea Coast in January 2010 we took the opportunity to gather limited baseline information on large raptors within an understudied region. One 430 km transect was completed while driving from Atbara to Port Sudan on 19 January. Thirty Egyptian Vultures *Neophron percnopterus* were recorded at a mean of 7 birds per 100 km over 6.15 hours, and eight unidentified large vultures were seen. From subsequent *ad hoc* records gathered during 20 additional vehicle hours covering 450 km of coastline, we identified populations of Lappet-faced Vulture *Torgos tracheliotos* and Hooded Vulture *Necrosyrtes monachus* and migrant Steppe Eagle *Aquila nipalensis*.

Introduction

Large-bodied predatory and scavenging birds of prey typically occur at low density, are long-lived, and reproduce slowly, traits that render them susceptible to rapid population declines. Unprecedented rates of decline have been well-documented for vulture populations in southern Asia (e.g. Cuthbert *et al.* 2006, Gilbert *et al.* 2002, Green *et al.* 2004), but rapid declines have also been reported in raptor populations in Southeast Asia (Pain *et al.* 2003), West Africa (Thiollay 2006a, 2006b), East Africa (Virani *et al.* 2011), southern Africa (Herremans & Herremans-Tonnoeyr 2000) and North America (Cade 2007). Between 2006 and 2009 BirdLife International held online discussions to collate and assess current published, unpublished and anecdotal information on the global status of a number of large African raptors resulting in the uplisting of six species to higher categories of threat on the IUCN Red List (BirdLife International 2009). Furthermore a comprehensive assessment of sub-regional bird of prey populations has shown many globally Least Concern species to have unfavourable conservation status within Africa (Githiru *et al.* 2008).

A survey in Burkina Faso, Mali, and Niger during the dry season of 2004–2005 identified a notable decline in raptor abundance with increasing distance from protected areas (Thiollay 2007a). This was especially so for large raptors, with 12 species being recorded in protected areas, significantly fewer in peripheral areas, and none in cultivated areas. Dry season counts carried out in 1969–1973 and repeated in 2003–2004 found that 11 large eagle species had declined over the period by 86–98% outside protected areas, with six large vulture species also suffering dramatic declines (Thiollay 2006a,

2007b). Indeed, some that were relatively common outside protected areas in the early survey had almost entirely disappeared by 2004 (Thiollay 2006b). There have also been alarming negative trends in populations of migratory large raptors that winter in northeast Africa (BSPB 2010, Yosef 2003).

Unlike vulture population declines in southern Asia which have been attributed to high rates of incidental mortality owing to the widespread use of an anti-inflammatory veterinary drug Diclofenac to treat livestock (Oaks *et al.* 2004), raptor declines elsewhere are not thought to have been precipitated by one threatening process in isolation. The collapse of raptor populations in unprotected areas across West Africa, is thought to be a response to rapid human population expansion and consequent habitat degradation (e.g. overgrazing, agricultural intensification, pollution) over the past 30 years (Thiollay 2006c, 2007a, 2007b). The near-extinction of wild ungulates, a major food-resource for scavenging vultures, owing to over-hunting, an increase in livestock populations, increased disturbance and the poisoning or contamination of carcasses (Pain *et al.* 2003, Thiollay 2006a, 2006b, 2007b) is thought to have contributed to the collapse of vulture populations in parts of Africa and Southeast Asia. Recent survey work identified electrocution on powerlines, shooting and incidental poisoning as threats all likely to be contributing to increased adult mortality amongst Egyptian Vultures *Neophron percnopterus* in Ethiopia (BSPB 2010). Electrocution was also identified as a threat to Sudan's coastal raptor populations with 55 dead Egyptian Vultures found by Nikolaus in 1983 and five in 2006 under powerlines serving Port Sudan (Angelov & Hashim 2010).

In order to understand global population trends and threats to large raptors in Africa it remains important to gather baseline distribution and density data, of the type collected by Thiollay, from elsewhere in the continent. During January 2010 we visited northern Sudan as part of an international effort to search for the Critically Endangered Slender-billed Curlew *Numenius tenuirostris*. This involved return travel from Khartoum to the Red Sea Coast and a ten-day survey, focused principally at coastal wetlands.

Ornithologically, despite a list of over 930 species (Fishpool & Evans 2001), Sudan has been poorly explored. Previous survey attention in the Nubian Desert of northern Sudan, the Red Sea Hills and along the coastal plain has been moderate. Most records were collated by Nikolaus (1987) in an atlas detailing species status in Sudan, and later by Fishpool & Evans (2001), who identified the Red Sea Coast as an important region for Sahara-Sindian biome species. Despite limited survey effort to date, there is already anecdotal evidence of declines in the population of Rüppell's Vulture *Gyps rueppellii*, White-backed Vulture *G. africanus*, and Egyptian Vulture (Nikolaus 1987, Nikolaus 2003), though the latter was reportedly stable in the Red Sea State (Nikolaus 1987). While surveying coastal sites we gathered incidental data and observations on abundance and potential threats for a number of target species, including large raptors. These results are intended to provide a baseline from which

population trends in Sudan's raptors can be established, and to encourage the collection of valuable data in a poorly inventoried region by illustrating how information can be collected in a relatively straightforward way.

Methods

Study area

The Republic of Sudan was, at the time of our survey (NB: South Sudan has since seceded as a separate country, but we here refer to Sudan as it was when we visited), the largest country in Africa (2505813 km²) with a population of c. 41 million people. Because of its size, and the fact that it spans latitudes from 03° 31' to 22° 00'N, different parts of the country experience very different climates. Northern Sudan has a desert climate with negligible rainfall and high mean daily temperatures, from 20°C in winter to 35°C in summer. The Red Sea coastal plain receives winter rainfall along a coastline of approximately 750 km, inclusive of bays and inlets. The country lies within the desert and semi-desert sub-zones and, although numerous streams drain from the Red Sea Hills, no perennial water flows in the lower reaches of the coastal plain and into the Red Sea. Only after torrential rains, which occur mainly in November and December, does freshwater occasionally flow into the Red Sea (Fishpool & Evans 2001). This survey took place in the Red Sea State of northeast Sudan from 18–28 January 2010 during the cooler part of dry season. The region lies at the southeast extremity of the Sahara-Sindian biome where it borders the Sahel. The coast supports small areas of mangrove, and at higher elevations in the Red Sea Hills *Euphorbiaceae* grow.

Bird counts

Thiollay (2006b) employed long-distance road transects repeated over a long time-series (30 years) to assess population trends in large raptors. We adapted this method to collect a coarse baseline dataset on raptor abundance within the study region. Raptors were searched for by two observers, in a 4WD vehicle, on 19 January 2010 while driving 430 km from Atbara to Port Sudan (see Fig. 1) between 09:00 and 15:15 in clear weather conditions. Every individual seen perched or flying at any distance on both sides was counted even during stops, except for Black Kite *Milvus migrans* which was found to be common around urban centres. A mean abundance index was expressed for target species as the number of birds per 100 km over the full transect (following Thiollay 2006b). 19 January provided the sole opportunity for a long-distance transect during our visit. However, we also recorded raptors on an *ad hoc* basis while driving sections of the coastline and during surveys at coastal sites (Fig. 1). In addition to the 430 km driven during 6.15 hours on 19 January, a 450 km stretch of coastline was driven between 21 and 26 January inclusive, with some sections driven more than once. The average amount of time spent opportunistically recording raptors from the vehicle during this time was approximately four hours per day, totaling 20 hours during the

week. This time did not lend itself to performing long-distance transects as the drive was generally stop-start and focused on coastal wetlands.



Figure 1. Survey points and major roads followed during driven transects in the Red Sea State, Sudan. The driven transect on 19 January 2010 began east of Atbara and followed the main road to just east of Sinkat.

Results

Egyptian Vulture *Neophron percnopterus*: Endangered

This species is resident in the Nubian Desert, replacing Hooded Vultures in more arid regions (Nikolaus 1987). The population is also supplemented by migrant individuals from Europe whose numbers are decreasing (BSPB 2010), and overall the population in Sudan is declining (Nikolaus 1987, Nikolaus 2006). Thirty individuals recorded during 6.15 hours of driving on 19 January 2010 giving a mean abundance baseline of 7 birds per 100 km. Many of these individuals were recorded around human settlements. Egyptian Vulture was recorded daily during the remainder of the trip, seen commonly around human habitation east of Atbara.

Lappet-faced Vulture *Torgos tracheliotos*: Vulnerable

This species is resident in extreme arid regions of the Nubian Desert and the Arabian Peninsula. Counts of 21 and 24 were made at a carcass on 21 January and 23 January at 21° 33.392'N, 36° 55.435'E. Birds were arriving at the carcass from the Red Sea Hills.

Hooded Vulture *Necrosyrtes monachus*: Endangered

The Red Sea State is the northern extremity of this species' range in Sudan; it is replaced to the north in more arid regions by Egyptian Vulture (Nikolaus 1987). This species was recorded once within Suakin Archipelago Important Bird Area (IBA) at a coastal mangrove on 26 January at 18° 59.413'N, 37° 23.692'E.

Unidentified large vultures

Eight individual large vultures were recorded during the driving transect on 19 January that could not be identified to species level. One individual seen at 18° 19.601'N; 36° 28.449'E was thought to be Lappet-faced Vulture. In addition, two large vultures seen distantly north of Port Sudan on 18 January remained unidentified, but at least one individual showed characteristics most consistent with White-headed Vulture *Trigonoceps occipitalis*. However, according to Nikolaus (1987) this is well north of the species' range in Sudan. Confirmation of the species' status in the region is needed.

Pallid Harrier *Circus macrourus*: Near Threatened

A non-breeding visitor recorded from November to April, this species is described as common in the north of Sudan (Nikolaus 1987). One adult male was seen hunting over saltmarsh within Dunganeb IBA on 22 January 2010 at 21° 10.761'N, 37° 5.838'E. A probable female was also seen briefly from the car on the main road between Khartoum and Atbara, just south of the latter.

Western Marsh Harrier *Circus aeruginosus*: Least Concern

A non-breeding visitor recorded from August to May, this species is described as fairly common but prefers marshy habitats so is likely to be rare in the study area. One individual was recorded in coastal mangrove on 26 January 2010 at 18° 59.413'N, 37° 23.692'E.

Bonelli's Eagle *Aquila fasciatus*: Least Concern

An individual raptor seen briefly from the car in mountainous terrain near Sinkat on 19 January resembled this species, and could not be identified to a species known to inhabit this region. At the time of the visit Bonelli's Eagle had not been recorded from Sudan but an electrocuted bird was found during a survey in the Red Sea Coast Province later in 2010 (Angelov & Hashim 2011). Pre-dating this, a population of Bonelli's Eagle was recently discovered in the Horn of Africa (Redman *et al.* 2009; J.M. Thiollay *in litt.* 2011).

Steppe Eagle *Aquila nipalensis*: Least Concern

This species is a Palearctic migrant occurring at low densities during the

winter months but very commonly in the Red Sea Hills and along the coast during spring passage (Nikolaus 1987). Population monitoring at Eilat (Yosef 2003) has recorded significant declines in the number of passage Steppe Eagles, but Meyburg *et al.* (2003) offer a plausible explanation for these declines (which are not supported by anecdotal information from the breeding and wintering grounds), owing to an increase in the number of birds wintering in the Arabian Peninsula and a shift in migration patterns. Two individuals were recorded at a carcass with Lappet-faced and Egyptian Vultures on 21 January 2010 at 21° 33.392'N, 36° 55.435'E. One individual was recorded on the 23 January by the roadside north of Port Sudan and a further individual was seen near Sinkat on 27 January 2010.

Common Buzzard *Buteo buteo*: Least Concern

This species is described as uncommon except on spring passage (Nikolaus 1987) and some birds overwinter in the Horn of Africa (Redman *et al.* 2009). One individual of race *vulpinus* was recorded in the Red Sea Hills c. 5 km west of Erkowit on 28 January 2010.

Lanner Falcon *Falco biarmicus*: Least Concern

The commonest large falcon in the region, it is resident along the coast (Nikolaus 1987, Redman *et al.* 2009). One individual was seen on 20 January 2010.

Discussion

Thiollay (2006b) points out that in parts of Africa that experience a comparative lack of resident ornithologists "information, when available, often comes from biased impressions of visiting ornithologists who have no experience of past species abundances and who tend to focus on rich spots not representative of more widespread areas." We take this on board and try to present a balanced view of the limited data that were accrued on the back of targeted surveys for shorebirds along the Red Sea Coast. Our information adds little to the growing body of evidence helping to assess the true conservation status of raptors in Africa, but in a region as under-watched (particularly since the 1980s; Thiollay 2006b) as Sudan there is still valuable baseline data presented for Egyptian Vulture and Lappet-faced Vulture. Both species retain sizeable populations in the Red Sea State, although we cannot comment on the historical size of vulture populations in the region.

Rüppell's Vulture, White-backed Vulture and Eurasian Griffon Vulture have all been recorded along the Red Sea Coast in the past, but at lower density than they occurred historically in the Sahel. These three species may have accounted for some of the unidentified vultures observed during the driving transect conducted on 19 January 2010.

Anecdotal evidence based on discussions with local people and staff from the Wildlife Administration suggests that some perceived or potential threats to raptors elsewhere in Africa may have no or negligible impact on populations

in northeast Sudan. Animal husbandry techniques apparently help to provide a food source for vultures and there was no reported persecution. Human population density is low, suggesting that incidental mortality owing to poison baits left to catch agricultural pests is unlikely to be as significant a problem as evidence suggests elsewhere in Africa; no large agricultural areas were observed along the coast. A visit to the Red Sea Coast by the Bulgarian Society for the Protection of Birds and the Sudanese Wildlife Society subsequent to this survey in 2010 found 17 dead Egyptian Vultures, but also Lappet-faced Vultures, Steppe Eagles and a Bonelli's Eagle all electrocuted by one major powerline that supplied electricity to Port Sudan (Angelov & Hashim 2010). This work highlights that electrocution continues to be a threat to migrant raptors along the coast. The extent to which it is influencing population trends and also whether electrocution is a problem for Sudan's resident populations is unclear. Dead raptors were not searched for beneath powerlines during this study, and the authors have no experience of comparative pylon densities and the mortality they can induce. Still, it is evident that there are very few human population centers in the Red Sea State away from the coastline. It therefore seems likely that resident populations of Egyptian Vulture in the Nubian Desert experience lower rates of mortality by electrocution than migrant coastal populations but this impression needs qualifying: teasing out the complexities of population fluxes and annual movements in Sudan will require dedicated research in the future. As a first priority continued baseline monitoring will help to establish population trends and perhaps seasonal movements.

In addition to vultures, we observed Steppe Eagle on several occasions. These wintering individuals are likely to represent a continuation of populations wintering to the south in the Horn of Africa. Movements and population trends of this species remain very poorly understood (Bird & Symes 2009). Population declines have been postulated from numbers recorded from migration watch-points in Israel which presumably account for Sudan's migrant birds. An aim for future work could be to monitor spring passage at Erkowit in the Red Sea Hills, and along the coast. Use of satellite tags may help to elucidate birds' movements and clarify whether this population moves extensively in winter. This species should be one focus of any future investigations into incidental mortality amongst raptors from electrocution.

In sum, our *ad hoc* records and the single transect data cannot provide a robust measure of the status of large raptors in northeast Sudan. However, they do provide a crude baseline that can be built on—the route between Khartoum and Port Sudan is driven regularly and offers an excellent chance to build up a substantial dataset to evaluate population trends over time. Black Kite populations warrant inclusion in future counts of raptor abundance, as well as clarification of the relative abundance of different subspecies in the region. In more targeted surveys than ours was able to be, it is important to include commoner species even around human habitation (J. M. Thiollay *in litt*).

2011). There is a precedent for such species experiencing population declines indicative of more widespread patterns. The recent confirmation of the first record of Bonelli's Eagle (Angelov & Hashim 2011) hints at the potential for further discoveries in the area and highlights the need for additional work dedicated towards large raptors in Sudan.

Acknowledgements

The authors would like to thank the RSPB for providing the impetus to do this survey and the financial support to see that it happened. We thank the Sudanese authorities, in particular the Wildlife Administration in Khartoum, Port Sudan and Sinkat, for allowing this work to go ahead. Most especially, the authors are indebted to Abubakr M. Abd-Alhaleem, Naser Y. Ghabbush and Ibrahim M. Hashim and the very kind and patient staff of the Sudanese Wildlife Society for providing logistic support and guiding the authors through a maze of bureaucracy. Finally we thank Munir Virani and Jean Marc Thiollay for their reviews of this manuscript; their comments helped to improve the paper considerably.

References

- Angelov, I. & Hashim, I. 2010. *A death trap for Egyptian Vultures in Africa*. Downloaded from <http://www.africanraptors.org> on 5/8/2011.
- Angelov, I. & Hashim, I. 2011. First record of Bonelli's Eagle *Aquila fasciatus* in Sudan. *Scopus* 31: 40-43.
- Pain, D.J., Cunningham, A.A., Donald, P.F., Duckworth, J.W., Houston, D.C., Katzner, T., Parry-Jones, J., Poole, C., Prakash, V., Round, P., & Timmins, R. 2003. Causes and effects of temporospatial declines of *Gyps* vultures in Asia. *Conservation Biology* 17: 661-671.
- Bird, J.P. & Symes, A.J. 2009. Birds to watch: Reviewing the conservation status of three Asian *Aquila* eagles. *Birding Asia* 12: 112.
- BirdLife International 2009. *BirdLife International: Globally Threatened Bird Forums*. Downloaded from www.birdlifeforums.org on 2/3/10.
- BirdLife International 2010. IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 2/3/2010.
- BSPB 2010. The Egyptian Vulture – What's going on in Afrika? Bulgarian Society for the Protection of Birds. Downloaded from <http://www.bspb.org> on 2/3/2010.
- Cade, T.J. 2007. Exposure of California Condors to lead from spent ammunition. *Journal of Wildlife Management* 71: 2125–2133.
- Cuthbert, R., Green, R.E., Ranade, S., Saravanan, S., Pain, D.J., Prakash, V. & Cunningham, A.A. 2006. Rapid population declines of Egyptian vulture (*Neophron percnopterus*) and Red-headed vulture (*Sarcogyps calvus*) in India. *Animal Conservation* 9: 349–354.
- Gilbert, M., Virani, M.Z., Watson, R.T., Oaks, J.L., Benson, P.C., Khan, A.A., Ahmed, S., Chaudhry, J., Arshad, M., Mahmood, S. & Shah, Q.A. 2002. Breeding and mortality of oriental white-backed vulture *Gyps bengalensis* in Punjab Province, Pakistan. *Bird Conservation International* 12: 311–326.
- Githiru, M., Mwangi, J.W., Virani, M.Z., and Ndag'ang'a, P.K. (Eds) 2008. Draft sub-regional Black List for sub-Saharan Africa Birds of Prey. National Museums of

- Kenya, Nairobi.
- Green, R.E., Newton, I., Shultz, S., Cunningham, A.A., Gilbert, M., Pain, D.J. & Prakash, V. 2004. Diclofenac poisoning as a cause of vulture population declines across the Indian subcontinent. *Journal of Applied Ecology* 41: 793–800.
- Herremans, M. & Herremans-Tonnoeyr, D. 2000. Land use and the conservation status of raptors in Botswana. *Biological Conservation* 94: 31–41.
- Meyburg, B.U., Paillat, P. & Meyburg, C. 2003. Migration Routes of Steppe Eagles between Asia and Africa: a study by means of satellite telemetry. *The Condor* 105: 219–227.
- Nikolaus, G. 1987. Distribution atlas of Sudan's birds with notes on habitat and status. *Bonner Zoologische Monographien* 25.
- Nikolaus, G. 2006. Commentary: where have all the African vultures gone? *Vulture News* 55: 65–67.
- Oaks, J.L., Gilbert, M., Virani, M., Watson, R.T., Meteyer, C.U., Rideout, B.A., Shivaprasad, H.L., Ahmed, S., Chaudhry, M.J.I., Arshad, M., Mahmood, S., Ali, A. and Khan, A.A. 2004. Diclofenac residues as the cause of population decline of vultures in Pakistan. *Nature* 427: 630–633.
- Thiollay, J.M. 2006a. The decline of raptors in West Africa: long-term assessment and the role of protected areas. *Ibis* 148: 240–254.
- Thiollay, J.M. 2006b. Severe decline of large birds in the Northern Sahel of West Africa: a long-term assessment. *Bird Conservation International* 16: 353–365.
- Thiollay, J.M. 2006c. Large bird declines with increasing human pressure in savanna woodlands (Burkina Faso). *Biodiversity and Conservation* 15: 2085–2108.
- Thiollay, J.M. 2007a. Raptor declines in West Africa: comparisons between protected, buffer and cultivated areas. *Oryx* 41(3): 322–329.
- Thiollay, J.M. 2007b. Raptor population decline in West Africa. *Ostrich* 78: 405–413.
- Virani, M.Z., Kendall, C., Njoroge, P., & Thomsett, S. 2011. Major declines in the abundance of vultures and other scavenging raptors in and around the Masai Mara ecosystem, Kenya. *Biological Conservation* doi:10.1016/j.biocon.2010.10.02.
- Yosef, R. 2003. *Raptor visible-migration monitoring, banding and conservation at Eilat on the westernmost Asiatic flyway*. Asian Raptor Research and Conservation Network. 3rd Symposium on Asian Raptors, Kenting, Taiwan, 2003.

Jeremy P. Bird

36 Thoday Street, Cambridge CB1 3AS, UK. Email: jezbird@gmail.com

Tim M. Blackburn

Institute of Zoology, Zoological Society of London, Outer Circle, Regent's Park, London NW1 4RY, UK; and Distinguished Scientist Fellowship Program, King Saud University, P.O. Box 2455, Riyadh 1145, Saudi Arabia.

Scopus 31: 19–27, November 2011

Received February 2011