VULTURE NEWS

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THESIS ABSTRACT

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Front cover: An adult female White-headed Vulture *Trigonoceps occipitalis* with in a dramatic dive. The pure white head and white secondaries evidence the bird’s age and sex. Based on the flushed pink face, the bird is clearly excited, and is likely heading towards food or a group of other vultures.

Back cover: Portrait of an adult Hooded Vulture *Necrosyrtes monachus*
ARTICLES

Assessment of the occurrence and threats to Hooded Vultures *Necrosyrtes monachus* in western Kenyan towns

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Summary

The Hooded Vulture *Necrosyrtes monachus* is endemic to Africa and has recently been uplisted to Endangered on the IUCN Red List. Populations of Hooded Vulture in Kenya have declined significantly in recent decades and urban populations exist primarily in western Kenya towns where they typically forage at slaughterhouses and dumpsites. We surveyed seven western Kenyan towns and one neighbouring Ugandan market centre to assess the occurrence and threats to this species using opportunistic observations and interviews with employees at slaughterhouses and dumpsite facilities. We observed 23 Hooded Vultures, 20 in Bungoma Town and 3 in Busia-Uganda. Scavenging vultures were only observed at open-air slaughterhouses or dumpsites. We conducted 34 interviews at 14 facilities of which 23 interviews from six facilities were determined to be of good quality and used for subsequent analyses. At four of the facilities employees confirmed that Hooded Vulture numbers had declined and two respondents indicated declines had occurred from the year 2000 onwards. Possible reasons for declines mentioned by respondents were the introduction of closed-system of slaughterhouses, poisoning of stray dogs, cutting of roost trees, and increased competition for food. There was little evidence of exploitation of the birds for witchcraft or for food.

http://dx.doi.org/10.4314/vulnew.v65i1.1
Introduction

The Hooded Vulture is an African endemic that was recently uplisted to Endangered on the IUCN Red List (Birdlife International 2013). The uplisting was due to its rapid decline throughout most of its range and reports suggest its decline has been caused by overhunting, persecution and indiscriminate poisoning, as well as improvements in slaughterhouse hygiene and rubbish disposal where the species previously fed (Ogada & Buij 2011).

Hooded Vultures occupy a wide range of habitats including arid country, towns, grassland, cultivation and coastal areas (Mundy et al. 1992). It is a species with urban populations that live in close association with humans very common in West and parts of East Africa, while populations in Tanzania and further south are primarily found in savannahs far from human disturbance (Mundy et al. 1992). Wright (1960) described the Hooded Vulture as the commonest vulture within the Nairobi, Tsavo and Serengeti National Parks. In Kenya the species was previously widespread in most national parks, game reserves and in many towns (Zimmerman et al. 1996).

Recent evidence suggests that the species has declined substantially in Kenya and Uganda (Ssemmanda & Pomeroy 2010; Ogada & Buij 2011; Virani et al. 2011). In Kenya although it is still present in most national parks and game reserves, and around pastoral settlements in the north, the only urban populations are in western Kenya, along the lower Tana River, and presumably still in Moyale town despite no recent ornithological surveys (Zimmerman et al. 1996; S. Thomsett, pers. comm.; D. Ogada, unpub. data). A recent study by Virani et al. (2011) reported Hooded Vulture declines of 62% in and around the Masai Mara National Reserve from 1976 to 2005. Similarly, annual raptor road surveys since 2010 have only recorded three Hooded Vultures over 7200 kms (Ogada et al. 2010, D. Ogada, unpub. data). However, a recent expedition to northern Kenya recorded pairs of Hooded Vultures at most small settlements that were slaughtering camels around the Chalbi Desert (F. Reid pers. comm.).

This study assessed the occurrence of Hooded Vultures in western Kenyan towns, specifically at slaughterhouses and dumpsites. The study also sought to determine the reasons for the decline in Hooded
Vultures in western Kenya by interviewing local people about possible cases of poisoning, or exploitation of Hooded Vultures for food or use in witchcraft.

**Methods**

**Study area**

The study was undertaken from 23-31 May 2012 during the rainy season in western Kenyan towns and market centres (Table 1). We included the Ugandan side of Busia town because residents on the Kenyan side suggested that we may find more Hooded Vultures on the Ugandan side. We visited a total of eight towns and market centres and at each location we surveyed one or more of the relevant facilities where Hooded Vultures would be expected, including slaughterhouses, butcheries, hospital dumpsites, and sewage ponds (Table 1).

**Data collection**

Fieldwork was conducted by MO and TI and consisted of opportunistic observations of Hooded Vultures at facilities where the birds were historically known, and interviews with facility personnel and at market places.

All observations of Hooded Vultures were recorded including number of individuals, age class, and behavioural aspects including flying, perching, foraging and interactions with other species. Age classes were either adult or juvenile. Juvenile birds were distinguished from adults based upon the dark brown feathers on the back of the head and lack of red facial pigmentation (Zimmerman *et al.* 1996). To avoid double counting birds, we recorded the maximum number of vultures seen at any one time per site. For example, if we observed two birds at the slaughterhouse and three at the hospital dumpsite in Bungoma we recorded a total of five vultures for Bungoma. Because the towns were small, movement of vultures between sites in a single town would likely have been noticed. For multiple day observations, we considered the highest number of birds seen and counted at each site on a single day. Evident threats to Hooded Vultures that were not addressed during interviews were also recorded. Interviewers approached personnel at slaughterhouses, butcheries, hospitals and sewage works, and introduced themselves before explaining the survey and its purpose.
Table 1. Locations and respective facilities visited for surveys of Hooded Vultures in western Kenyan towns.

<table>
<thead>
<tr>
<th>Town/market centre</th>
<th>GPS location</th>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busia-Kenya</td>
<td>28' 18.8&quot; N 3404' 54.6&quot; E</td>
<td>Municipal council slaughterhouse</td>
</tr>
<tr>
<td>Busia-Uganda</td>
<td>28' 18.8&quot; N 3404'54.6&quot; E</td>
<td>Lufura slaughterhouse</td>
</tr>
<tr>
<td>Malaba</td>
<td>37' 00.6&quot; N 3420' 38.5&quot; E</td>
<td>Municipal council slaughterhouse, sewage ponds, dumpsite</td>
</tr>
<tr>
<td>Awata/Kocholi a</td>
<td>Same as Malaba</td>
<td>Slaughterhouse</td>
</tr>
<tr>
<td>Bungoma</td>
<td>33' 39.9&quot; N 3433' 50.7&quot; E</td>
<td>Municipal council slaughterhouse, district hospital, sewage ponds</td>
</tr>
<tr>
<td>Webuye</td>
<td>35' 13.4&quot; N 3446' 41.1&quot; E</td>
<td>Municipal council slaughterhouse</td>
</tr>
<tr>
<td>Kitale</td>
<td>Not recorded</td>
<td>Municipal council slaughterhouse</td>
</tr>
<tr>
<td>Kakamega</td>
<td>16' 49.0&quot; N 3445' 24.2&quot; E</td>
<td>Golf Hotel, town slaughterhouse, district hospital</td>
</tr>
</tbody>
</table>

We conducted 1–4 surveys per facility and rated the quality of the surveys at each facility as either good or poor depending on the amount and quality of information obtained. Examples of responses that were rated as ‘good’ included those where the interviewees demonstrated their knowledge of the bird through accurate description of its appearance, behaviour and occurrence. Poor responses were those where interviewees obviously did not know the bird, or knew little of its occurrence at the site. We approached personnel at the facilities and conducted an open-ended question-and-answer-type survey, subsequently
referred to as the ‘facilities’ survey (Appendix 1). Interviews were conducted in Kiswahili and/or Kiluhya. Most interviews were answered by one respondent. However, when there was an interested audience that was willing to share information one representative provided responses for the group. If there was disagreement amongst the group, a final response was given after group discussion and consent. Facility personnel were asked to identify Hooded Vultures after being shown images of a Marabou Stork and a Hooded Vulture. They were also asked where the birds were found at the facility. If they were unable to correctly identify the bird or indicate where it could be found the interview concluded.

Information on the possible exploitation of Hooded Vultures for food and/or as a fetish was solicited using a separate survey form, subsequently referred to as the ‘fetish’ survey (Appendix 2). We targeted the elderly (50+ years) because they were perceived to be more frank and knowledgeable on the traditional practice of witchcraft and fetishes. The elderly take pride in traditions while many young people (< 40 years old) are mostly indifferent to traditional practices because of the widespread adoption of western cultural practices after the post-colonial period. A few initial surveys were administered at market places in Busia and Bungoma towns, but the respondents informed us that they were not aware of the use of the birds in witchcraft. Subsequently the survey was administered at the same facilities (slaughterhouse, butchery, hospital, and sewage works) as the facility survey since these places may be the harvesting areas for the birds if they were being used for witchcraft. There is unlikely to be any conflict of interest in conducting the fetish surveys at the facilities because it is unlikely that facilities personnel are substantially benefitting from any potential trade in vulture fetishes. We were also unable to administer the fetish survey at the markets because most markets only operated on a set day of the week and often this did not coincide with our visits.

Results

We completed a total of 34 interviews, comprising 23 facilities surveys and 11 fetish surveys. Facility surveys were conducted at 14 facilities in seven towns in western Kenya and one town in eastern Uganda. At six facilities we obtained
good quality information that generally included long-term knowledge of Hooded Vultures at the facility, suspected causes of the birds’ disappearance, and general observations about the birds (Table 2). At eight facilities we obtained poor quality information either because the facilities were non-operational, not conducive to supporting Hooded Vultures, or those being interviewed had no or little knowledge of the birds (Table 2). We restrict our further analyses to the facilities that generated good quality information based upon 14 interviews.

All of the slaughterhouses visited (n = 5) were of a modern-type in that animals were slaughtered inside a closed facility, as opposed to in the open air. The most notable difference between slaughterhouses was whether the disposal of effluent was open-air (n = 3) or in closed underground storage tanks (n = 2). We only observed 23 Hooded Vultures at two slaughterhouses where effluent was disposed on open ground and at one open-air dumpsite (Table 2).

At four of the six facilities there were reports of large declines in the number of Hooded Vultures observed with two respondents noting that the declines occurred as recently as the early 2000s (Table 2). Before then, Hooded Vultures were frequent and regular, but most respondents noted that currently Hooded Vultures were only present at their facilities during the dry season (Table 2).

Evidence for direct competition for food was noted between Hooded Vultures and Marabou Storks, Pied Crows, dogs and humans (Table 2). Further evidence of indirect competition for food with humans was also noted (Table 2).

Possible reasons stated for the decline in Hooded Vulture numbers included the change from open-air slaughterhouses, poisoning of dogs, and felling of trees that the vultures use for roosting (Table 2).

We did not detect or witness trading of any sort in the Hooded Vulture or the bird’s parts during the survey. Only one out of the 11 administered fetish questionnaires suggested exploiting vultures’ parts for undisclosed reasons. According to the respondent in Busia Town-Uganda there were irregular times when word would go around that vultures were required. An undisclosed, but large amount, would then be paid for successfully obtaining vultures/parts.

In addition, two respondents at Kocholia and Bungoma, respectively
informed us that the birds were hated and regarded as filthy, indicating a very negative perception.

**Discussion**

Hooded Vultures were known by at least one respondent in all the eight surveyed locations. The species is further known by vernacular names amongst the various communities in Western Kenya including, *Atarukot* in Teso and *Engosya* in Luhya. This supports the fact that the species occurred throughout the surveyed range. Hooded Vultures were however only observed at two out of the eight surveyed locations (Busia-Uganda and Bungoma). However, these results should be interpreted with caution as most people interviewed acknowledged that the birds were more abundant in the dry season. Many of the respondents directed us to other locations in western Kenya and Uganda where they believed the Hooded Vultures could be seen. However, upon visiting many of the locations mentioned in Kenya including the Golf Hotel in Kakamega town and Busia Municipal slaughterhouse in Busia-Kenya, we typically did not find any Hooded Vultures. While this may be attributable to our visit during the rainy season and to the weekly rather than daily activity of most individual facilities, it may also be indicative of what we suspect to be recent declines of this species within the region. Hooded Vultures were only found at slaughterhouses and dumpsites where waste was disposed on open ground. It is not surprising that as modern closed slaughterhouses with underground waste disposal are erected there may be negative effects on urban Hooded Vulture populations, especially since urban Hooded Vultures are more numerous at slaughterhouses than at dumpsites due to their preference for foraging on animal tissues and other soft parts (Pomeroy 1975, Mundy 1976). As slaughterhouses are modernized, animal waste available to Hooded Vultures is much reduced, if not eliminated altogether.

Competition between Hooded Vultures and other species was observed at the two sites where the species was encountered. At Lufura slaughterhouse Hooded Vultures were chased by Marabou Storks and mobbed by Pied Crows as they scavenged. According to Pomeroy (1975) competition between six species of scavenging birds in Kampala was rare, but amongst ground-feeding species, Marabou
Storks were dominant over Hooded Vultures, which in turn were dominant over Pied Crows. Perhaps due to their low numbers (n = 3) the Hooded Vultures we observed were dominated by Pied Crows. In addition to competition from other avian scavengers, Hooded Vultures in our study were likely negatively affected by direct and indirect competition from human scavengers. In Busia-Uganda young boys collected a discarded cow foetus and chased the vultures away. An increase in competition between Hooded Vultures and other scavengers in Kampala, namely Marabou Storks and humans has also been mentioned (D. Pomeroy, pers. comm.). Of all the urban scavengers, Hooded Vultures are the only obligate scavengers and therefore they may be disproportionally affected by increasing competition from facultative scavengers such as Marabou Storks, Pied Crows, Black Kites and humans.

In addition to food supply, the presence of roosting trees and secure compounds may play a role in attracting Hooded Vultures. Bungoma District Hospital had numerous mature trees within its compound, forming an extensive closed canopy in some places. A guest house in Bungoma had tall eucalyptus trees in which a pair of vultures roosted. The felling of roost trees has been noted as a possible reason for the decline of Hooded Vultures in Kampala (Ssemmanda & Pomeroy 2010). The hospital dumpsite was remotely located and fenced off, which likely secured birds from human interference. Although urban Hooded Vultures in West Africa co-exist in close proximity to people, urban populations in Kenya are more wary and we never saw the birds within 5 m of people.

Incidental poisoning of Hooded Vultures was mentioned at three of the six facilities with good quality information. However, it is unclear to what extent this may have affected vulture populations as there was no information on the possible number of birds poisoned. At all the facilities where poisoning had occurred the intended target was stray and/or rabid dogs. The poisoning of dogs is a widespread problem in Africa, but little information is formally reported (Abebe 2013, D. Pomeroy, pers. comm., J. Wolstencroft, pers. comm). It is largely through personal contacts and raptor list-servs that this information is disseminated and therefore it is likely underestimated (D. Ogada, pers. obs.).
We uncovered little evidence that there is widespread use of Hooded Vultures for witchcraft or for consumption as food, as is reported in West Africa (Akagu & Adeleke 2012, Gbogbo & Awotwe-Pratt, 2008, Rondeau & Thiollay 2004, Nikolaus 2001). Generally the birds were despised because of negative attitudes towards them such as looking unclean and ugly.

Broadly, this study found negative attitudes and ignorance as a threat and a potential driver of decimation of this species of concern. Although well-known by locals in the range, many people interviewed were not concerned or aware of the plight of the birds. For instance, responses from Busia revealed that many could not recall when they last saw large flocks of the species; many respondents could also hardly remember how many birds still came to their locale or facility. One respondent at Lufura slaughterhouse convinced us to return the next day where we would see up to 200 birds at the slaughterhouse, being a slaughter day, but we saw only three birds. Many respondents also cited Kakamega Town and the Golf Hotel as a stronghold for the Hooded Vulture, but none were observed or reported by the hotel’s long-serving employees. While this is also indicative that information obtained through interviews can be unreliable, the sites mentioned have a long history amongst the Kenyan ornithological community of supporting Hooded Vultures (Ogada & Buij 2011, D. Fisher unpub. data). Therefore, we suspect the information obtained is more likely a result of the decline of Hooded Vultures at these sites, which concurs with limited historical data from the western Kenya region (D. Fisher unpub. data).

It is therefore a worrying trend that locals are not conscious of the threats to this biodiversity component living in their midst. A majority of respondents acknowledged that the species’ numbers had declined but struggled to recall when they last saw the species and how many there were. Besides, no respondent had encountered a dead Hooded Vulture. This is an indication of how latent and yet devastating the threats are to this species with the potential final effect being extinction of the local populations of this species.

**Recommendations**

- The areas suggested by respondents as likely strongholds of Hooded Vultures should be surveyed
to assess the status of the species at these sites. These include Machabus, Kimilili and Adungosi. Consideration should also be given to remote sites still practising the open slaughterhouse system.

- The sites surveyed during this study which were pointed out by respondents as prolific for the species, but where vultures were not observed, should be closely monitored and re-surveyed to establish the actual status of the Hooded Vulture at the sites. These include Kakamega District Hospital and the Golf Hotel.

- Opportunities should be

looked into to modify the closed system of abattoirs so that the design continues to facilitate the existence of important scavengers including Hooded Vultures.

- A conservation awareness campaign should be conducted in the species’ human settlement range to educate locals on the Hooded Vulture, their role, and plight.

- A follow-up survey should be conducted in the western Kenyan towns during the dry season to ascertain the actual status of the species during this time when respondents revealed the species is most abundant in the region.

Acknowledgments

The authors thank The Birdfair/RSPB Research Fund for Endangered Birds for supporting this research. We also thank those who participated in our interviews.

References


Table 2. Results of 14 facility surveys and opportunistic observations of Hooded Vultures in seven towns in western Kenya and one town in eastern Uganda.

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of facility</th>
<th>Quality of survey</th>
<th>Number of HVs observed</th>
<th>Animal waste visible</th>
<th>Status of HV</th>
<th>Evidence of competition</th>
<th>Evidence of decline</th>
<th>Possible reasons for decline</th>
<th>Evidence of seasonality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busia-Kenia</td>
<td>Slaughter house</td>
<td>Good</td>
<td>0</td>
<td>No</td>
<td>Closed</td>
<td>n/a</td>
<td>HV numbers reported not to have declined</td>
<td>n/a</td>
<td>n/a</td>
<td>More common in dry season</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HVs mobbed by Pied Crows and chased by Marabou Storks.</td>
<td>Reported that up to 300 HVs used to visit slaughterhouse but in recent times only 2-4 would come. No one could recall when the declines began</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Busia-Uganda</td>
<td>Lufura slaughter house</td>
<td>Good</td>
<td>3</td>
<td>Yes</td>
<td>Open ground</td>
<td>HV observed foraging on digestive contents of dead livestock that was scattered on open ground.</td>
<td>Unknown, no poisoning of pests at the facility</td>
<td></td>
<td>Not mentioned</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Respondent recommended Iganga Town, Uganda as having many HVs.</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 – continued.

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of facility</th>
<th>Quality of survey</th>
<th>Number of HVs observed</th>
<th>Animal waste visible</th>
<th>Effluent disposal (open/closed)</th>
<th>Status of HV</th>
<th>Evidence of competition</th>
<th>Evidence of decline</th>
<th>Possible reasons for decline</th>
<th>Evidence of seasonality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kocholia and Awata</td>
<td>Slaughter house</td>
<td>Good</td>
<td>0</td>
<td>Yes</td>
<td>Open</td>
<td></td>
<td></td>
<td>HV numbers notably declined during 2000s. One responded recalled seeing last large flocks in 2004. Used to see flocks of 50-60 HVs when slaughter house was still open air type.</td>
<td>All respondents said HVs were more common and would feed on meat remains when slaughter house was open-air type. No poisoning of pests at Kocholia, but at Awata there used to be accidental poisoning by Furadan targeted at rabid dogs as carcasses were not disposed of</td>
<td>More common in dry season</td>
<td>Reported that 40-50 birds were seen in 2011 at Kakamega Hospital. HVs were more likely to be found at Machabus, Lukolis and Adungosi, Uganda</td>
</tr>
</tbody>
</table>


<table>
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<tr>
<th>Location</th>
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<th>Quality of survey</th>
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<th>Status of HV</th>
<th>Evidence of competition</th>
<th>Evidence of decline</th>
<th>Possible reasons for decline</th>
<th>Evidence of seasonality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bungoma</td>
<td>Slaughter house</td>
<td>Good</td>
<td>5</td>
<td>Yes</td>
<td>Open</td>
<td>Two long-term employees (30+ yrs) reported that HVs used to visit in late morning, but at present only 5-6 birds would come</td>
<td>As HVs declined, Marabou Stork numbers increased</td>
<td>Used to see as many as 30 HVs at the site</td>
<td>Occasionally poisoned dogs using Strychnine and then reportedly buried the carcasses. Many trees had been felled around the site and this may have contributed to their decline</td>
<td>More common in dry season</td>
<td>Respondent directed us to Bungoma District Hospital, sewage works and Kitale Town to find HVs</td>
</tr>
<tr>
<td>Bungoma</td>
<td>Hospital dumpsite</td>
<td>Good</td>
<td>15</td>
<td>Feeding on disposed flesh prior to incineration</td>
<td>n/a</td>
<td>Reported as abundant, feeding in early morning and roosting in trees within the compound in the evenings</td>
<td>None mentioned</td>
<td>None mentioned</td>
<td>No reports of vermin poisoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Type of facility</td>
<td>Quality of survey</td>
<td>Number of HVs observed</td>
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<td>Effluent disposal (open/closed)</td>
<td>Status of HV</td>
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<td>Evidence of decline</td>
<td>Possible reasons for decline</td>
<td>Evidence of seasonality</td>
<td>Comments</td>
</tr>
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<td>----------</td>
</tr>
<tr>
<td>Webuye</td>
<td>Slaughter house</td>
<td>Good</td>
<td>0</td>
<td>No</td>
<td>Closed</td>
<td>Reported as no longer observed at site</td>
<td>None mentioned</td>
<td>Over 10 HVs would come at any one time, but from around 2002 they stopped coming</td>
<td>Respondent suspected HVs died away from carcasses that were poisoned by Town Council vets to kill rabid dogs. Dog carcasses found around slaughter house and disposed of in effluent disposal pits</td>
<td>More common in dry season</td>
<td>Respondent directed us to Bungoma, Kimilili and Kitale to find HVs</td>
</tr>
<tr>
<td>Malaba</td>
<td>Slaughter house</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Closed</td>
<td>Unknown by respondents. Respondents knew only of Marabou Storks from the facility</td>
<td>n/a</td>
<td>Marabou Stork numbers had reduced since the facility was upgraded to a closed facility with underground disposal pits</td>
<td>No poisoning of pests at the facility</td>
<td></td>
<td>Respondent said HVs could be seen at Webuye Town slaughterhouse</td>
</tr>
</tbody>
</table>
Table 2 - continued

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of facility</th>
<th>Quality of survey</th>
<th>Number of HVs observed</th>
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<th>Possible reasons for decline</th>
<th>Evidence of seasonality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaba</td>
<td>Sewage works</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>None mentioned</td>
<td>Unknown</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Mis-managed and seemingly non-operational</td>
</tr>
<tr>
<td>Malaba</td>
<td>Dumpsite</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>None mentioned</td>
<td>Unknown</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Non-organic solid waste disposal field</td>
</tr>
<tr>
<td>Bungoma</td>
<td>Sewage works</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>None mentioned</td>
<td>Unknown</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Interviewee did not know of HVs</td>
</tr>
<tr>
<td>Kitale</td>
<td>Slaughter house</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>Reported as having been seen further north of Kitale</td>
<td>None mentioned</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Interviewees did not know of HVs, only knew of Marabou Storks</td>
</tr>
<tr>
<td>Kakamega</td>
<td>Golf Hotel</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>No HVs observed and employees of Golf Hotel denied HVs roosted there</td>
<td>None mentioned</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Interviewees did not know of HVs, only knew of Marabou Storks</td>
</tr>
<tr>
<td>Kakamega</td>
<td>Slaughter house</td>
<td>Poor</td>
<td>0</td>
<td>No</td>
<td>Animal waste visible</td>
<td>Closed</td>
<td>None mentioned</td>
<td>Unknown</td>
<td>Unknown, not aware of any poisoning activities</td>
<td>None</td>
<td>Directed to Golf Hotel to find HVs</td>
</tr>
</tbody>
</table>
Appendix 1

Hooded Vulture questionnaire: facilities

Male/Female: Age:
How long have you worked here?
Do you know this bird (show picture)?
Have you ever seen it around here?
If no, do you know where I can find it?
If yes, what was it doing? (in general, over the times it was observed)
If eating, do you know what (be as precise as possible) it was eating? (in general, over the times it was observed)
Do you still see it here? If not, when was the last time you saw it?
How many birds have you seen at once?
How many birds do you usually see now?
Do you see them every day or during what times of year?
What time do you see them?
Have you ever seen this bird lying dead?
If yes, do you know what happened?
Does the slaughterhouse ever poison animal pests (e.g. rats, dogs or crows)?
If so, do you know what poison they use? And how often?
What animals have been killed by the poison?
What happens to poisoned carcasses, are they buried?
Appendix 2

Hooded Vulture questionnaire: fetish

Male/Female:
Age:
Tribe/community:
What type of animal fetishes do you sell?
Do you sell bird fetishes?
What kinds of birds do you sell?
Do you know this bird (show picture)?
Have you ever known it (or other vulture species) to be used for witchcraft or traditional medicine?
If so, do you sell it now? Why or why not?
What part(s) is used? And what is it used to treat or how is it used?
How much does it cost?
Has the price changed in the last 5 years? Why or why not?
Do you know where the birds were acquired?
Do you know where I can find this bird now?
Is there a demand for vulture parts/bodies? If so, what parts and for what purpose?

*****
Population and breeding success of Red-headed Vulture
*Sarcogyps calvus* and Egyptian Vulture *Neophron percnopterus* in central west Nepal

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Summary

This study on population and breeding success of Red-headed Vulture (*Sarcogyps calvus*) and Egyptian Vulture (*Neophron percnopterus*) was carried out in the middle mountain region of central west Nepal covering Arghakhanchi, Kaski, Palpa, Salyan and Pyuthan districts. A total of 34 days of study were conducted from October 2011 to February 2013 and on each study day observation was conducted between 9h00 to 15h00. We did absolute counts of vulture aggregations in flight in Arghakhanchi, Palpa, Pyuthan and Salyan districts, and on a garbage dump in Kaski district, and used a jack-knife technique to estimate the population size of each vulture species. We estimated a total of 24 Red-headed Vultures and 241 Egyptian Vultures across these five districts. Periodic monitoring of each identified nest was done to determine breeding success and we followed Postupalsky (1974) for the categorisation of nests. Based on active nests as a primary unit, the breeding success of Egyptian Vulture was 62.5% for nine nests identified in breeding year 2012; average nesting cliff/tree height was 27.8 m and that of nests was 14.8 m. In the study we did not find any Red-headed Vulture nests, however fresh juvenile birds were recorded repeatedly in the autumn season. Historical reports indicate Red-headed Vultures and Egyptian Vultures were abundant in Nepal, but have undergone rapid population decline across their ranges in the recent past, which
is likely to continue into the foreseeable future. Recent information from India indicates the rate of population decline is 44% per year for Red-headed Vultures and 35% per year for Egyptian Vultures.

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**Introduction**

The collapse in numbers of three resident species of *Gyps* vulture in South Asia has become one of the most urgent issues in bird conservation, with four of the nine vulture species recorded in Nepal now listed as Critically Endangered and one species as Endangered (Birdlife 2007). Widespread veterinary use of the non-steroidal anti-inflammatory drug (NSAID) diclofenac is now widely accepted as the main reason of dramatic declines in vulture numbers in South Asia (Oaks et al. 2004, Green et al. 2004, Green et al. 2007, Pain et al. 2008), and populations of several vulture species have undergone some of the most rapid declines ever recorded (Prakash et al. 2003, Prakash et al. 2007, Cuthbert et al. 2006, Chaudhary et al. 2012). Studies conducted in Nepal, India and Pakistan show three species of resident *Gyps* vulture (*White-rumped Gyps bengalensis*, *Long-billed Gyps indicus* and Slender-billed Vulture *Gyps tenuirostris*) have undergone >97% population declines (Baral et al. 2004, Prakash et al. 2007). Studies conducted in Pakistan showed the complete loss of a large breeding colony of White-rumped Vulture within a short period of 2001 to 2003 (Gilbert et al. 2006).

Although not known to be susceptible to NSAIDs, populations of Red-headed (*Sarcogyps calvus*) and Egyptian (*Neophron percnopterus*) Vultures in India have also undergone declines by 90% and 68% respectively (Cuthbert et al. 2006). It is now recognised that populations of the above vulture species are declining throughout their ranges, however there are no data on the population trends of Red-headed and Egyptian Vultures in Nepal, where this study was undertaken.

Large-scale surveys of domestic ungulate carcasses (the principal food source of vultures in South Asia) across India indicate that 10-11% of carcasses are contaminated with diclofenac (Cuthbert et al. 2011b). Other causes of mortality include
deliberate and accidental poisoning (Margalida et al. 2008, Hernández & Margalida 2009), as well as human persecution (Subedi 2013). Although the production and use of veterinary diclofenac has been banned in Nepal, Pakistan and India since 2006, illegal use of human diclofenac for livestock is still a problem (Cuthbert et al. 2011a).

The Red-headed Vulture occurs in Nepal, India, Pakistan, Bangladesh, Bhutan, Myanmar, Laos, Vietnam, and Cambodia (Birdlife 2012). It has been extirpated from its historical ranges in China, Thailand, Malaysia and Singapore. Those historical reports indicate it was widespread and generally abundant, but it has undergone a population and range decline in the last half-century (Birdlife 2012). Given its rarity in South-East Asia, it is unlikely that more than a few hundred individuals remain (Birdlife 2012). In Nepal, the Red-headed Vulture is a rare resident bird distributed below 2000 m (Grimmett et al. 2000). It occurs at lower densities than Gyps vultures (Naoroji 2006). Recently this species has been listed as Critically Endangered (Birdlife 2007). The total population in Nepal is estimated to be less than 500 birds (BCN and DNPWC 2011).

The Egyptian Vulture occupies a large range, occurring in Europe, Asia and Africa. This is a resident as well as a migratory species. Northern breeders conduct long-distance intercontinental migrations. The bulk of the resident population occurs in Ethiopia and East Africa, Arabia and the Indian Subcontinent. Migratory birds breed in southern Europe from Spain in the west, through the Mediterranean, the Caucasus and central Asia to Pakistan, northern India and Nepal (Birdlife 2012). The global population estimate is between 21,900 - 30,000 individuals (Birdlife 2012). In Nepal, the Egyptian Vulture is distributed below 915 m throughout the year and up to 2000 m in summer, and the population is estimated to be between 300 to <1000 birds (Grimmett et al. 2000; BCN & DNPWC 2011). It is resident as well as migratory in Nepal, typically nesting on low cliffs and rocky outcrops, foraging in lowland and montane regions over open country. These vultures also scavenge at human settlements and their diet includes carrion, organic waste, insects, young vertebrates and even eggs (Birdlife 2012). It is usually
solitary, but will congregate at feeding sites such as garbage dumps near large towns. Recently this long-lived species has been listed as Endangered following an extremely rapid population decline in the Indian subcontinent (Cuthbert et al. 2006).

**Methodology**

This study was carried out in the middle mountain range of the western and mid-western development region of Nepal in the Arghakhanchi, Kaski, Palpa, Salyan and Pyuthan districts. The study area consists mainly of steep topography with many rocky cliffs. Vegetation is primarily Pine (*Pinus roxburghii*) forest in the high elevation areas along with Needlewood tree (*Schima wallichii*) and Chestnut (*Castanopsis indica*). At lower elevations, the predominant tree species are Sal (*Shorea robusta*) and Silk cotton (*Bombax ceiba*). For effective work in the field, a series of community consultations were done among community groups including forest user groups, the district forest office, and community based organisations and community leaders. The goal of the consultation was to find out basic information about the presence of nesting and roosting habitat of vultures in different sites of the study area.

For the population study, an absolute count of all vultures seen was conducted. The count of the birds was conducted in 2011 (October), 2012 (March, April, May, September, October and December) and 2013 (February). In each day, observation of vultures was carried out between 09h00 to 15h00; a total of 34 days and 204 hours of observation was conducted. Two different observation methods were used during the study. In Arghakhanchi, Palpa, Pyuthan and Salyan districts, observation was conducted from hill tops to count soaring vultures (144 hours), while in Kaski district observation was conducted only at the garbage dump (60 hours). During hill top observations all soaring vultures were counted within the maximum surrounding view. We used Zen-ray ED3 10 x 43 and Nikon 7 x 35 binoculars to identify species and age class (adult and immature). We used Jack-knife techniques (cited in Rodgers (1991)) to estimate the population size. The method requires at least five repeated absolute counts. Therefore, for the validation of the method we conducted a total of nine observations in Arghakhanchi district,
five observations each in Palpa, Pyuthan and Salyan districts and 10 observations in Kaski district. The method uses the difference between the highest count \( n_{\text{max}} \) and the second highest count \( n_{\text{max-1}} \) to calculate \( N \), the estimated total number, where \( N = 2n_{\text{max}} - n_{\text{max-1}} \). No immigration to, or emigration from the area is assumed.

Based on local information and existing knowledge of the study team, careful observations of potential vulture nesting habitat were made. Nesting vultures were thoroughly searched for by scanning potential cliffs and nesting trees in open areas. Nest occupancy was recorded in order to study breeding success of vultures. According to Postupalsky (1974) an active nest is one in which eggs have been laid, an occupied nest is one in which eggs have not been laid but some nest-building activity has taken place. If a nest was observed we made careful examination of it using binoculars for the correct identification of species, number of individuals and status (nesting/roosting/perching). We avoided climbing on possible nesting trees/cliffs to minimise disturbance to the breeding pairs. Also, we kept a sufficient distance between the study team and nesting spot. We recorded relevant data regarding the nesting characteristics such as geographical coordinate, location of nest, approximate height of nesting cliff/tree and nest, activity of parent bird and nestling (if possible). Each nest was monitored monthly to find out the breeding success, and we calculated the percent of successful nests by dividing the number of productive nests by active nests and times by 100.

**RESULTS**

**Population status**

During the study Egyptian Vultures were recorded in all five districts surveyed. Red-headed Vultures were recorded in four districts (except Salyan). Based on the Jack-knife technique, the total estimated population of Red-headed Vultures was 24 and the observed maximum was 19. For Egyptian Vulture, the estimated population was 241 and the observed maximum was 217. The observed and estimated total populations of Red-headed and Egyptian Vulture in the study site in each district has been given in Table
1 and age class (adult and immature) is given in Table 2.

**Table 1:** Maximum observed and estimated population of Red-headed and Egyptian Vultures in five western and mid-western region districts of Nepal

<table>
<thead>
<tr>
<th>District Name</th>
<th>Maximum Observed Population</th>
<th>Estimated Population</th>
<th>Maximum Observed Population</th>
<th>Estimated Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arghakhanchi</td>
<td>4</td>
<td>6</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>Pyuthan</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Salyan</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Palpa</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Kaski</td>
<td>8</td>
<td>9</td>
<td>175</td>
<td>189</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>24</strong></td>
<td><strong>217</strong></td>
<td><strong>241</strong></td>
</tr>
</tbody>
</table>

**Table 2:** Age composition of Red-headed and Egyptian Vultures based on highest count during observations.

<table>
<thead>
<tr>
<th>District Name</th>
<th>Red-headed Vulture</th>
<th>Egyptian Vulture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adult</td>
<td>Immature</td>
</tr>
<tr>
<td>Arghakhanchi</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pyuthan</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Salyan</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Palpa</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Kaski</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>
Breeding success and Nest monitoring

We recorded nine Egyptian Vulture nests in different districts, and those were monitored periodically to determine breeding success. Out of nine nests, eight were active and one nest was occupied. Chicks fledged from five nests. Based on occupied nests as a primary unit the breeding success was 55.5%. Based on active nests as a primary unit, breeding success was 62.5% for the Egyptian Vulture. Out of nine nests recorded, seven were on rocky cliffs, and two were on pine trees. The maximum, minimum and average height of the nesting cliff/tree was 40m, 11m and 27.8m and that of nests was 28m, 8m and 14.8m respectively. Both nests on trees failed. We did not find a Red-headed Vulture nest in the breeding year 2012.

Discussion and conclusion

In this study we estimate the total Red-headed Vulture population in the five districts of Nepal to be 24 individuals. For Egyptian Vulture in this same area, we estimate the population to be 241 individuals. The State of Nepal’s Birds (2010) gives the total population of Red-headed Vultures to be less than 500 and Egyptian Vultures to be less than 1000 birds (BCN & DNPWC 2011). This literature also indicates the highest number of Red-headed Vultures to be in Kaski district of Nepal. In a study conducted by Gautam and Baral (2009) they found that the number of Egyptian Vultures increased from 52 to 75 in the Pokhara area. Our study finds the number is far higher than that study. We suggest that the regular source of food in garbage dumps of this area might attract more vultures from surrounding regions, thereby increasing the count of Egyptian Vultures here. The smaller number of Red-headed Vultures estimated in this study could be due to their highly territorial behaviour. Road transect surveys conducted by Chaudhary et al. (2012) also revealed very low numbers of Red-headed Vultures in lowland areas of the country. In South Asia and a country such as Nepal, where wild ungulates are no longer a primary food source, the Red-headed Vulture is largely dependent on the carrion of domestic livestock (Birdlife 2012). By comparison, Egyptian Vultures take a wide variety of food including garbage (Birdlife
As a result, it might be that Egyptian Vultures have less potential exposure to diclofenac than Red-headed Vultures.

In our study we did not find any nest of the Red-headed Vulture, but we learned that this species was nesting in a pine tree in Chidapani village Arghakanchi district in 2011 and one chick was successfully fledged. Sometime around the year 2000, one nest was observed in Bardia National Park in mid-western Nepal by Dr. Hem Sagar Baral. For Egyptian Vulture, in the breeding year 2012, we found a total of nine nests. Most were on cliffs, and only two nests were in trees. Based on the active nests as a primary breeding unit, success of the Egyptian Vulture was 62.5%, which is slightly higher than the study conducted by Bhusal and Dhakal (2011). They found 50% breeding success out of two nests.

Threats to vultures include human disturbance of nesting habitat (especially of nesting trees). This study found both Egyptian Vulture nests on trees failed. This could be due to a high disturbance rate: (a) branches of nesting trees were cut for firewood; and (b) local people told us that they wanted to chase off the vultures from their fields due to their taboo (superstition that vultures bring bad luck) – so they cut the branches of the trees containing vulture nests. We also found that people started to cut large trees on their private land, and sell the wood in the market due to the access of roads in the village, and a good price for the wood. This has a high impact on tree-nesting raptor species. The production of veterinary diclofenac is already banned in Nepal, Pakistan and India since 2006, but still there is some problem with human diclofenac produced in large vial sizes (30 ml). The large-sized (30 ml) human diclofenac vials are available in pharmacies. Human diclofenac is illegally used in livestock treatment in some places because, compared to vulture-safe meloxicam, diclofenac is cheaper and faster acting in cattle. Also there are other NSAIDs in the veterinary market like nimesulide, ketoprofen, piroxicam, analgin and aceclofenac which are not tested or proven safe for vultures or other scavenger birds. Therefore use of non-tested NSAIDs and the illegal use of human diclofenac is still a big problem for existing vulture populations.
Acknowledgements

This study on globally endangered Red-headed Vultures and Egyptian Vultures was possible due to the joint efforts of many people and organisations. We would like to thank Chester Zoo (UK) for providing the grant to undertake this study and it would be impossible to do this research without them. Idea Wild (USA) and Hawk Mountain Sanctuary (USA) supported different scientific equipment and we appreciate their support. We also thank Carol, Tim Inskipp and Hem Sagar Baral for their encouragement and supporting different books which were very useful to this study. We also thank the District Forest Office Palpa for their valuable information. We thank Hari Poudel, Ranger of District Forest Office Pyuthan, for his useful information, Bishnu Poudel and his wife, for company in the field as well as for the wonderful food and accommodation. Choodamani, Gyaneshowr and community forest user groups of Damachour, Salyan provided field company and information on nesting sites, thanks for their support. Sincere thanks to Hemanta Dhakal and Prahlad Panthi for their wonderful regular company during field work. We thank comments from the reviewers that improved the article.

Key words: Breeding Success, Diclofenac, Egyptian Vulture, Nepal, Population, Red-headed Vulture

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BirdLife International 2012a. Species factsheet: *Neophron percnopterus*. Downloaded from http://www.birdlife.org on 21/01/2012


*****
Comparing different types of patagial tags for use on vultures

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Summary

Raptor research often requires identifying individuals. Researchers place patagial tags on raptors to facilitate such identification. Researchers in southern African use two main types of patagial tags: hard plastic ear tags originally designed for cattle and soft vinyl tags. We deployed both types of tags on vultures in Botswana. Based on our observations, we recommend using soft vinyl tags as they appear to be more aerodynamic and can be read from below when a raptor is soaring, as well as when the bird is perched. Cattle ear tags sometimes flutter when raptors fly and can only be read when the dorsal surface of the wing is visible.

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Introduction

Rapid declines of vulture populations throughout the Old World have generated concern and associated research on a variety of species. Today the IUCN (2013) considers five of the nine species occurring in southern Africa as Endangered, and two as Vulnerable. Even formerly
quite populous species, such as White-backed Vultures (*Gyps africanus*) are now considered Endangered. Other threatened species include the Endangered Cape Vulture (*Gyps coprotheres*), the Endangered Rüppell’s Vulture (*Gyps rueppellii*), the Endangered Egyptian Vulture (*Neophron percnopterus*), the Vulnerable Lappet-faced Vulture (*Torgos tracheliotus*), the Vulnerable White-headed Vulture (*Trigonoceps occipitalis*), and the Endangered Hooded Vulture (*Necrosyrtes monachus*). We began studying vultures in Botswana in 2012 in response to the rapid declines of several species there. Two of us (RR and DK) also have been studying the ecology of Cinereous Vultures (*Aegypius monachus*) for over a decade in Mongolia and South Korea (Reading *et al.* 2005, 2010, Batbayar *et al.* 2008, Kenny *et al.* 2008, 2013). An important component of our (and other) studies of vultures involves applying patagial wing tags on relatively large numbers of birds to help assess movement patterns, establish core and home ranges, and assess population trends.

As part of our work in Botswana, we used two types of patagial wing tags: wing tags designed for California Condors (*Gymnogyps californianus*) (Wallace *et al.* 1980) and plastic cattle ear tags used widely throughout southern Africa (Birds of Prey Working Group 2006, Botha 2007). Here, we compare the two types of wing tags for use in vultures and other large avian species, especially raptors.

**Methods**

We conducted work throughout Botswana, but primarily in the western portion of the country, from 2012 to 2014. Capture sites included just east of Makgadikgadi National Park, Bokamotsu Ranch on the northwest border of the Central Kalahari Game Reserve (CKGR), Tuatona Lodge near Ghanzi, Grasslands Reserve between Ghanzi and the CKGR, Kalahari Rest Camp near Kang, Mpayathutlum Pan in Kalagadi Transfrontier Park, Molose Pan in Khutse Game Reserve, Santawani, and Big Pan and Deception Loop in the Central Kalahari Game Reserve (Figure 1). Although these sites varied considerably ecologically, they all lie within the Kalahari Region of Botswana.
Figure 1. Vulture capture sites in Botswana.
We captured White-backed Vultures (WBVs), White-headed Vultures (WHVs), Lappet-faced Vultures (LFVs), Hooded Vultures (HVs), and Marabou Storks (*Leptoptilos crumeniferus*) on bait (i.e. animal carcasses) using a compressed-air canon net (Netblaster, WCS NetBlaster™, Wildlife Control Supplies, East Granby, CT 06026, USA). We released non-target species (Pied and Cape Crows, *Corvus albus* and *C. capensis*, respectively) immediately.

We extracted, manually restrained, and hooded birds to minimise stress. Once restrained, we collected blood and, from some birds, feather samples, and placed unique identification on each bird. We obtained metal leg bands from Porzana Limited (Unit 1A, The Applestore, Woodhouse Lane, Icklesham, E. Sussex, TN36 4BJ, United Kingdom), purchased plastic cattle ear tags from the Birds of Prey Working Group (2006), and constructed vinyl patagial wing tags (Vinyl: Gallagher Tent & Awning, 809 Plaenert Dr., Madison, Wisconsin 53713, US; paint: black nadzar vinyl ink, Regional Supply Inc., 3571 S. 300 West, Salt Lake City, Utah 84115, USA) following Wallace *et al.* (1980) for California Condors. The vinyl tags had 5 cm characters while characters on the ear tags were 2.5 cm. We used off-the-shelf, blank livestock ear tag components to attach both types of tags; female blank tags with studs for our vinyl tags and just studs for the cattle tags (Allflex®, Nasco, 4825 Stoddard Rd., Modesto, California 95352, USA) (Kenny *et al.* 2008). We used different sizes of vinyl tags for different species (i.e. smaller tags for smaller species). We placed only vinyl wing tags on LFVs, HVs, and WHVs, only cattle ear tags on Marabou Storks, and a mix of cattle ear tags and vinyl tags on WBVs. We had each leg band inscribed with “Botswana vulturestudy@gmail.com” followed by a unique number. For LFVs, HVs, WHVs and some WBVs, we collected morphometric measurements, and for a few birds (*n* = 10 LFVs, 3 WHVs, 2 HVs, and 1 WBV), attached solar-powered GPS/satellite telemetry (PTTs) units. We attached the 45 g (HVs and 1 WHV) or 70 g (LFVs, WHVs, and WBVs) PTTs using Teflon coated straps (Bally Ribbon Mills, Bally, Pennsylvania 19503, USA) and crimped metal ferrules in a modified backpack design (Buehler *et al.* 1995).
that we tested on captive zoo animals at Denver Zoo (Denver, Colorado, USA) first (to test for adverse effects). We cut foam rubber from mouse pads and glued two to three pads on the bottom of the tracking units to raise them above feather level (about 1 cm).

We observed tagged birds after release with binoculars and took photographs to assess legibility and performance of patagial tags.

Results

We applied bilateral patagial tags of both types to 278 White-backed Vultures (n = 114 vinyl tags and 164 cattle ear tags) and vinyl tags to 14 Lappet-faced Vultures, three White-headed Vultures, two Hooded Vultures, and seven Marabou Storks in several areas of Botswana. Upon release, the plastic cattle tags lifted off the surface of the wings as the birds flew away, bouncing off the upper surface of the wing (Figure 2). Alternatively, the more flexible vinyl wing tags appeared more aerodynamic, more closely adhering to the upper and lower wing surface (Figure 3).

We observed our previously tagged birds at several capture sites. Because the plastic cattle tags only appear on the upper surface of the birds’ wings, we could not discern if birds flying above us had wing tags or not. We could easily see wing tags on birds standing on the ground, but had difficulty reading them at distances of more than about 0.5 km. We more easily observed both tags and numbers on birds with vinyl wing tags. Because the vinyl tags appear both above and below the wings and because the tags have larger numbers, we could more easily determine both if a bird had a wing tag and what identification number appeared on that tag. We could only see the cattle tags from the dorsal surface of the vultures’ wings, generally while the birds were on the ground.
Figure 2. Illustration of cattle ear tags on White-backed Vultures (*Gyps africanus*) tagged in Botswana. Note how the tags lift off the wings in flight.
Figure 3. Illustration of wing tags developed for California Condors (*Gymnogyps californianus*) on White-backed Vultures (*Gyps africanus*) (top), Lappet-faced Vultures (*Torgos tracheliotus*) (middle), and White-headed Vultures (*Trigonoceps occipitalis*) (bottom) tagged in Botswana. Note how the tags lie flat on the wings in flight.
Discussion

We found that the vinyl wing tags developed for California condors (Wallace et al. 1980), but widely used for other species as well (e.g. Batbayar et al. 2008, Kenny et al. 2008, Reading et al. 2010), are superior to plastic cattle ear tags used as patagial wing tags (Botha 2007). Maximum visibility and readability is the goal when placing patagial tags on birds. Vinyl tags proved more aerodynamic and easier to read at a distance and while birds were soaring than the plastic cattle tags. Sweeney et al. (1985) report similar problems in viewing cattle tags for Turkey Vultures (Cathartes aura) and Black Vultures (Coragyps atratus) in flight. In addition, Buckley (1998) found that the numbers on cattle ear tags faded over time, rendering them difficult to read. For quick and accurate observations, even with binoculars, patagial tag size and redundancy is critical. Patagial vinyl tags worked well in Asia with Cinereous Vultures, with re-sightings from six countries, although some birds lost a tag off one wing (Batbayar et al. 2008, Kenny et al. 2008). Vinyl tags permit construction of different sized tags for different sized birds. We therefore recommend that researchers studying large birds, particularly raptors in southern Africa and elsewhere, consider using vinyl wing tags and apply them to both wings.

Researchers use patagial tags to mark a wide variety of bird species for individual identification. Some studies have found adverse effects from patagial tags on bird survival (Zuberogoitia et al. 2012), behaviour (Brua 1998), and nesting success (Trefry et al. 2013), but studies on other species (Martin and Major 2010), including New and Old World vultures, found no measureable impacts on these larger birds (Wallace et al. 1980, Sweeny et al. 1985). Botha (2007) discusses a number of concerns initially raised by southern African vulture researchers about the use of patagial tags, but subsequent captive and wild studies concluded those fears to be unfounded.

Acknowledgements

Many people helped make this work possible. We especially thank Ralph Bousfield, James Bradley, Kyle Burks, Thanki David, Tony DeNicola, Vickie DeNicola, Hanri
Ehlers, Laurie Glabreath, Jane Horgan, Mmoloki Keiteretse, Lauren McCain, Mosepeli, Kate Reading, Anton van Schalkwyk, Katie Schoelzel, and the Cheetah Conservation Botswana volunteers for their help. BirdLife Botswana, the Denver Zoological Foundation, Kalahari Conservation and Research, Kanabo Conservation Link, and Raptors Botswana provided financial support. We thank Bokamotsu Ranch, Grasslands Reserve, Kalahari Rest Lodge, Jack’s Camp, and Tautona Lodge for letting us trap vultures on their properties or concessions and the Botswana Department of Wildlife and National Parks for their support of our work.

References


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Devil’s Claw – a natural substitute for diclofenac?

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Diclofenac is an NSAID (non-steroid anti-inflammatory drug), and one that is artificially synthesised. It has both medical (in humans) and veterinary (in animals) uses, for pain-killing, reducing inflammations and fevers and relieving arthritis and rheumatism. Its connection with vultures in the Indian subcontinent, indeed as the cause of their catastrophic decline, was discovered by Lindsay Oaks and colleagues early in 2003 (Oaks et al. 2004). Visceral gout, i.e. the accumulation of uric acid crystals on organs particularly the kidneys, was long recognised as a possible side effect for some humans and now a certain side effect in vultures.

Once discovered, the action was on two fronts, firstly to get diclofenac banned in the Indian subcontinent for veterinary use, and secondly to find a substitute that is just as effective. Quickly this latter choice fell to meloxicam, which was shown to be safe to vultures (Swan et al. 2006) and to other scavenging birds (Cuthbert et al. 2007). Said to be one of the “newer NSAIDs”, meloxicam has similar analgesic, antipyretic and anti-inflammatory properties as diclofenac (Naidoo 2007). However it is “three times as expensive” (Naoroji 2006) as diclofenac, though still considered to be available “at an affordable price” (Swarup et al. 2007). Will it in fact be able to take over from diclofenac in time to allow the vultures in the subcontinent to recover? But see Prakash et al. (2012) for hints already of a possible recovery.

Meanwhile in southern Africa we have an indigenous plant that is already well known for its treatment of rheumatism and arthritis, and as an analgesic for pregnancy and labour
pains (van Wyk *et al.* 1997). This is Devil’s Claw *Harpagophytum procumbens* or Grapple plant. It is used both in traditional healing in southern African societies and in western medicine and, according to CITES (2002), Germany is the main importing country. Whereas the fruit is literally diabolical to look at and feel, it is actually the tubers on the roots that are collected, sliced, dried and powdered. Infusions, tablets and ointments are made from the tubers. “Medicinal plants are something of the future, not of the past!” (van Wyk *et al.* 1997).

In southern Africa there are in fact two species of Devil’s Claw, the one mentioned above and *H. zeyheri* (Ihlenfeldt 1988). Both prefer sandy soils and can be found in Namibia, Botswana, Northern Cape and Limpopo area (South Africa), and south-west (Tuli) and north-west (Victoria Falls) Zimbabwe. It is a low lying herbaceous plant with pretty pink flowers (Fig. 1) that develop into that diabolical fruit. PJM had his first experience with *Harpagophytum* in 2000 at the 11th CoP of CITES in Nairobi, Kenya. Then, Germany had expressed a concern about the sustainable harvest of the plant in Namibia, and indeed proposed that it be put on to Appendix II of the CITES (Anon. 2003). This idea was opposed by Namibia and other range states in southern Africa and a compromise agreed to. Range states were to monitor their harvests and maintain the sustainable use of Devil’s Claw.

Nine glycosides have been isolated from *procumbens* (Chigome *et al.* 2008) at least five of which are said to be pharmacologically active. Our hypothesis is that Devil’s Claw should be as effective in animals (particularly draught animals, e.g. cattle *Bos taurus/indicus* and water buffalo *Bubalus bubalis*) as it is in humans. We note that very recently studies have begun to compare the clinical efficacy of Devil’s Claw with diclofenac on treatment of knee osteoarthritis in humans (www.irct.ir). Perhaps this is because of the known many possible side effects of diclofenac (information paper by Lincoln Pharmaceuticals, Ahmedabad, India).
Figure 1: (A) Specimen of *Harpagophytum zeyheri* in Hwange National Park (Photo: Bart Wursten); (B) & (C) Fruits of the two species of *Harpagophytum*, the long-limbed *procumbens* (B) and the squarer *zeyheri* (C). (Photos: Farai Chikomba)
Clinical use of Devil’s Claw extract, however, has been shown to be safe, and fewer adverse side effects accompany treatment from Devil’s Claw (Chrubasik et al. 1999). Therefore we propose that some kind of preparation from Devil’s Claw (e.g. capsules, tablets, infusion) be used on draught animals in the Indian sub-continent. As yet, “no side effects have been reported” in humans (van Wyk et al. 1997). Verification of the safety of Devil’s Claw extracts for humans has yielded positive results showing few side effects and usually limited to gastro-intestinal upset (Anon. 2008), though the ‘acid test’ of course will be its impact in cattle and buffalo.

Acknowledgements:

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REFERENCES


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Fire damage to an African White-backed Vulture nest tree

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During the course of the 2014 year I have been locating and monitoring African White-backed Vulture nests (Gyps africanus) on Pidwa Wilderness Reserve, Gravelotte, Limpopo, South Africa. This particular nest has been active for the past three years that I know of. The female laid her egg in the middle of May 2014. I was unable to see the contents of the nest, but judging by the females’ cautious movements on the nest, the chick was presumed to have hatched in the beginning of July. At least once every two weeks, I made an effort to observe the nest and the chick’s progress. On October 1st 2014, as part of the veld management, the veld was burnt. The following day I checked up on all the nests in my study population and could no longer see the large Knobthorn tree (Acacia nigrescens) that contained the nest. An adult was seen sitting in a smaller neighbouring tree, and flew off when I approached.

The African White-backed Vulture nest tree, seen from the road.
Upon closer inspection, I discovered that the base of the tree had been burnt through, causing the tree to fall over. The chick was found lying on the floor in the ash, still alive and seemingly unharmed from the fall.

Simoné Marshall-Smith and I decided to try and replace the nest back into the tree; although it would be only 5m off the ground, as opposed to the previous 17m high nest. Using a ladder I climbed up the tree and made a sturdy base for the nest.
Broken branches were used as a strong base structure.

The old nest on the floor was dismantled and used to weave together a new nest. The new nest was a little larger than the chick itself. The chick seemed a little dehydrated, and after the nest was completed, it was given a few drops of water into its beak and allowed to swallow. The chick was placed back onto the nest, where it settled down straight away. The following day a camera trap was placed into an adjacent tree to follow the progress of the chick over the next few months.
The chick, aged 94 days old, once placed back onto the nest.

The following day, the adults were seen again in the neighbouring tree. After three days a camera trap picture reassured us that the adults were feeding the chick once more. The nest is now checked on a regular basis, to make sure all is fine with the chick. Although the chick does not move at all when I am around, the camera trap shows the chick constantly moving around and stretching its wings. At the time of writing the chick is around 127 days old and is beginning to flap more regularly; thankfully the nest is situated in an open system of branches. Had the nest been too enclosed, the chick would not be able to stretch and flap at all. Within the next few weeks it will be time for this African White-backed Vulture to fledge the nest. As the photos show, he is starting to make his move.
The chick, aged 105 days old, boasting a full crop and stretching the wings out.

The chick, aged 127 days old, is starting to lift off.

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Avian scavengers, but not conspecifics, feeding on the carcasses of storm-killed Turkey Vultures on the Falkland Islands

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Introduction

Cannibalism, which the Shorter Oxford English Dictionary defines as “an animal that eats members of its own species” (Trumball & Stevenson 2002), is quite common among birds of prey. However, it is thought to be rare among both Old and New world vultures (Mundy et al. 1992, Clinton-Eitniear & McGehee 1994). Examples of cannibalism from Spain include an ambulatory nestling Griffon Vulture (Gyps fulvus) feeding upon an adult (presumably its dead parent) at a nest (Fernandez & Fernandez-Arroyo 2001); two young Griffon Vultures feeding on the carcass of a conspecific in an area where poisoning had occurred (Camiña et al. 2002); and several Griffon Vultures pecking at, and subsequently killing and eating, a conspecific that was trapped under a rock while feeding on a sheep carcass (Martinez de Lecea 2011). In Africa, Mundy et al. (1992) report Gyps vultures feeding on an African White-backed Vulture (G. africanus) that had been “caught by the wing in an elephant’s carcass and had died, or was killed, at the spot and eaten there by other vultures.” They also mention
a report of Cape Vultures (G. coprotheres) feeding on a conspecific without additional detail. And a parent Bearded Vulture (Gypaetus barbatus), a species known to exhibit siblicide, was observed feeding the remains of a younger chick to its sibling at a nest in northeastern Spain (Margalida 2004).

Examples of cannibalism among New World vultures include several events involving captive King Vultures (Sarcoramphus papa) in zoos, and a possible instance involving free-ranging Lesser Yellow-headed Vultures (Cathartes burrovianus) at a road-kill in Tabasco, Mexico (Clinton-Eitniear & McGehee 1994). Importantly, Snyder and Snyder (2000) report that placing Turkey Vulture Cathartes aura carcasses at a vulture feeding station in Florida, USA, appeared to “strongly inhibit use of these sites” by other vultures. And in coastal Veracruz, Mexico, where a flight of approximately three million Turkey Vultures passes each autumn and a somewhat smaller flight passes each spring, Turkey Vultures that die in the region are not eaten by other Turkey Vultures (Lowery & Dalquest 1951).

Here we report on the feeding behaviour, and lack thereof, of three species of avian scavengers on two apparently storm-killed Turkey Vultures on Saunders Island, in the Falkland Islands, in July-August (austral winter) 2014.

Observations

Observations were made between 30 July and 7 August 2014, on Saunders Island, a 12,500ha island off the north coast of West Falkland in the south Atlantic, approximately 400 km from the South American mainland. The island, which is treeless Patagonia Steppe and has a permanent human population of five, functions as a sheep farm and tourist destination for nature photographers. Four species of penguins and other seabirds breed by the thousands on Saunders, and since 2010 we have been studying the scavenging behaviour of raptors, including Turkey Vultures, feeding at and around a large colony of Gentoo Penguins (Pygoscelis papua) at “The Neck,” in the northwestern part of the island. Our study site, at approximately 51° south, experiences a cool seasonal oceanic climate with largely westerly winds that can be quite strong. Temperatures on the Falklands generally range from maximum highs of 25° C in austral
summer to minimum lows of -11° C in winter, with monthly temperatures averaging 9° C in austral summer and 2° C in austral winter. Snow falls, usually in small amounts, on about 55 days of the year, with most snow melting within 48 hours (Strange 1983).

An unusual snowfall of more than 10 cm fell on 24 and 25 July several days in advance of our visit and it, together with low temperatures that reached -10° C during the nights of 26-27 July delayed our first visit to “The Neck,” which is 16 km over rough terrain from our base camp on the island, by four days. An initial visit on 31 July by one of us (KB) found the carcasses of two Turkey Vultures, one of which was headless, at the site. The bodies, which were about 20 m apart on a 2km-long sandy beach, were mixed in amongst a heavy drift line of kelp and other seaweed, and most likely the birds had died during the recent snow storm at a roost site in a small grove of Monterey cypress (*Cupressus macrocarpa*) 150 m from where the carcasses were found.

Over the course of an hour of population-survey work at mid-day on the 31st, KB recorded 27 mainly juvenile Striated Caracaras (*Phalcoboenus australis*), all of which were standing on the ground. Five adult Turkey Vultures, one of which was standing and four of which were flying, also were observed. None of the standing birds were within 100 m of the two carcasses, but two of the flying Turkey Vultures were spotted passing directly overhead, flying at less than 20 m above the dead birds. KB next visited the study site in early afternoon on 1 August and recorded 22 mainly juvenile Striated Caracaras along with two adult Southern Crested Caracaras (*Caracara plancus*), all of which were standing, as well as four adult Turkey Vultures, all of which were flying low over the site during the course of a one-hour survey. Three of the juvenile caracaras were feeding on one of the Turkey Vulture carcasses, which was headless and lying on its back, and whose body cavity had been broken into (Figure 1). Two of the flying Turkey Vultures passed within 20 m of the carcasses but did not deviate from their flight while passing over the bodies and thereafter continued flying out of sight.
Three of us (MR, MB, & AA) visited the study site on 2-5 August and saw a single Striated Caracara feeding on the first opened carcass on the morning of 3 August. We also saw two juvenile Striated Caracaras and an adult Turkey Vulture feeding on an Imperial Shag (*Leucocarbo atriceps*) we had discovered that day less than 50 m from the closest Turkey Vulture carcass. We also noted that both Turkey Vulture carcasses had been opened and fed upon by 4 August.

KB again surveyed the site at mid-day on 5 August and recorded 27 mainly juvenile Striated Caracaras during a survey of scavengers at the site, all of which were standing, together with one adult male dark-morph Red-backed Hawk (*Buteo polyosoma*) that was feeding on the first carcass that had been broken into (Figure 2). When first encountered the hawk was being harassed by three juvenile Striated Caracaras, one of which briefly hovered less than 0.5 m above the hawk before striking it on
the head with clenched talons and then re-landing 2 m away. After fewer than 2 min of direct observations from a distance of approximately 5 m, the hawk flew off with a gorged crop with two Striated Caracaras in pursuit. After the hawk departed several Striated Caracaras approached the carcass and began feeding upon it. No Turkey Vultures were seen at the site during the 50-min survey.

![Figure 2](image.jpg)

**Figure 2:** The first opened carcass being fed upon by a Red-backed Hawk on 5 August 2014. Note the three Striated Caracaras looking on.

A final brief visit at mid-day on 7 August, shortly before we departed the island, found more than 20 Striated Caracaras standing at the site and four in-flight Turkey Vultures, none of which was within 100 m of either carcass.
Discussion

Taken as a whole, our observations indicate little if any reluctance on the part of Striated Caracaras (an obligate and opportunistically predatory scavenging bird of prey) and at least one adult Red-backed Hawk (a largely facultative scavenger species that is far less common at the site) to feed on one of the two available Turkey Vulture carcasses. On the other hand, at least several Turkey Vultures most likely detected the two carcasses, both unopened and opened, but none was seen feeding upon them, even though at least one adult Turkey Vulture fed upon an Imperial Shag carcass <50 m from the vulture carcasses. Although we were in the area for fewer than six hours on eight days during the course of a 9-day period, the apparent lack of interest on the part of Turkey Vultures to feed on the two vulture carcasses, despite the fact that one of the carcasses had been opened and fed upon by two other species of scavenging birds of prey birds, bolsters previous observations of the Turkey Vultures’ (see references above) reluctance to cannibalize members of their own species. That this occurred in the middle of winter on the Falkland Islands when food availability for scavenging birds of prey appears to be limited and when at least one of the species involved, the Striated Caracara, is known to be food stressed at this time (cf. Rexer-Huber & Bildstein 2013), further supports the notion of a reluctance to cannibalize on the part of Turkey Vultures. The reason for this remains enigmatic.

Acknowledgements

We thank the Pole-Evans family for their outstanding hospitality on Saunders Island and the Falkland Islands Government for issuing the permits necessary for our studies. Funding for our work comes from the Darwin Initiative, Wallace Research Foundation, Jean and Jim Macaleer, and the Acopian Family. This is Hawk Mountain Contribution to conservation science number 250.
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NEWS AND COMMENTS

Two of three wild-hatched condors have fledged, joining the wild flock in Arizona and Utah

16 December 2014 - The Peregrine Fund

Program biologists from The Peregrine Fund and Zion National Park have confirmed that two California condor chicks have left their nests and taken flight in northern Arizona, but hopes of a third chick successfully reaching the fledgling milestone in southern Utah have been dashed by a lack of visual observation. The third chick was Utah’s first wild-hatched condor chick.

Observations of the condor parents visiting the Utah nest cave suggested all was going well during the six months leading up to fledging, but by late November, a month after the predicted fledge date, biologists noted that something was wrong. The Utah chick quit coming out to the cave opening, and soon after, the parents decreased their visitation to the cave. After multiple trips to investigate, biologists concluded that the chick had not survived.

“Although two out of three 2014 condor chicks surviving to fledging remains encouraging, the loss of Utah’s first chick is a hard reminder that critters have a tough go of it in the wild. It’s just a shame that we weren’t able to recover a carcass to examine what might have provided clues as to the cause of death,” said Chris Parish, Condor Program Director for The Peregrine Fund, which manages the wild Arizona-Utah flock.

As for the other two condors now gracing Arizona’s skies, both birds appear to be doing well since fledging. Condors, like other wild animals, are most vulnerable in their first few months. That is why condor parents tend to their young for a year after fledging.

There are now 73 condors in the wild in Arizona and Utah, including the two new fledglings. A total of 25 chicks have hatched in the wild since condors were first introduced in Arizona in 1996.

The recovery effort is a cooperative program by federal, state, and private partners, including The Peregrine Fund, Arizona Game and
Fish Department, U.S. Fish and Wildlife Service, Arizona Strip Field Office of the Bureau of Land Management, Grand Canyon and Zion national parks, Utah Division of Wildlife Resources, and Kaibab and Dixie national forests.

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CALIFORNIA CONDOR RECOVERY PROGRAM

Summarised from the Peregrine Fund e-newsletter of July 2013. As at 30 June 2013, there were 431 California Condors Gymnogyps californianus alive in the USA. This is a stunning increase from the early 1980s when there were thought to be only 22!

In the wild, there are 231 birds distributed as follows:

(i) Three places in California 130 flying (+9 chicks in nests)
(ii) Arizona (Vermilion cliffs) 71 flying (+4 chicks)
(iii) Baja California, Mexico 30 flying (+1 chick)

The captive population now numbers 200, distributed among several zoos as follows:
The Peregrine Fund, Boise 72
Oregon Zoo 42
San Diego Zoo Safari Park 31
Los Angeles Zoo 27
Santa Barbara Zoo 5
San Diego Zoo 3
Chapultepec Zoo, Mexico City 2
In field pens, southern California 3
Temporarily in captivity 15

On 28 September 2013, The Peregrine Fund plans to release more condors at the Vermilion Cliffs National Monument, Arizona. This will be the 18th annual public release of condors.

[extracted by P.J. Mundy]

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IUCN SPECIES SURVIVAL COMMISSION: 
VULTURE SPECIALIST GROUP

Aim
The IUCN SSC Vulture Specialist Group aims to advocate and create greater awareness of the plight of vultures and coordinate effective conservation activities to their benefit.

The Vulture Specialist Group will support and work closely with BirdLife International as the Red List Authority for birds, but with particular reference to the global status of Vultures.

Key activities/Outputs:

Conservation and management
- Identify and communicate information about emerging threats to vultures globally
- Promote the use of appropriate mitigation measures to address threats where possible
- Facilitate the sharing of expertise and knowledge between regions where appropriate
- Support CITES, at national and international level, in vulture-related issues

Research and monitoring
- Conduct and promote scientific research on ecology and habitat use by vultures to support management decisions regarding the conservation of these
- Promote and encourage sustained population monitoring at key sites for vultures using appropriate monitoring methods
- Identify gaps in knowledge and promote applied research into such species, threats or habitats where appropriate
Dissemination and Communication

- Promote and facilitate the exchange of knowledge and expertise with regard to vultures and their conservation
- Use *Vulture News* as the official print journal for the Vulture Specialist Group to disseminate information about vultures and their conservation
- Make available published and unpublished information about vultures on a website
- Ensure that the wider public and interest groups receive regular information and updates on the conservation of vultures

Partnership and Advocacy

- Work with governments, research institutions, conservation organisations and communities to develop and implement effective conservation measures
- Support and promote the conservation of vultures through the International Vulture Awareness Day working with its partner organisations

For more details contact either of the Vulture Specialist Group Co-chairs:

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THESIS ABSTRACT

An Investigation into the Decline of the Bearded Vulture *Gypaetus barbatus* in Southern Africa

Sonja C. Krüger, August 2014

Dissertation presented for the degree of Doctor of Philosophy Percy FitzPatrick Institute of African Ornithology DST-NRF Centre of Excellence Department of Biological Sciences, Faculty of Science University of Cape Town

Supervised by Dr. Arjun Amar and Dr. Robert E. Simmons

The Bearded Vulture *Gypaetus barbatus* is a Critically Endangered species in southern Africa whose entire range in the Southern Hemisphere falls within the Maloti-Drakensberg mountains of South Africa and Lesotho, which forms the area of focus for this research. In this thesis I have attempted to synthesize 15 years of research on the Bearded Vulture population of southern Africa using various approaches to quantify the decline in the species, investigate the mechanisms of this decline and determine the most appropriate management actions necessary to attain the short-term species’ conservation target of a positive population growth rate.

Firstly I assessed the territory occupancy, distribution and density of the population over two time periods to identify population trends. The number of occupied territories decreased by between 32%–51%, the breeding range decreased by 27% and breeding densities decreased by 20% over the past five decades. The birds occupy a breeding range of 28,125 km$^2$ with higher densities recorded in the core of the range than in the peripheral areas. The population is estimated at between 368–408 individuals (109-121 breeding pairs).

Three hypotheses were then examined in an attempt to explain which factors were associated with territories recorded as abandoned; those related to human impact, food availability and climate change. Of the seven covariates examined within the home range of an adult pair using a model selection process using Akaike’s Information Criterion, the strongest support was for the
human impact hypothesis, with abandonment more likely in territories with higher densities of power lines and human settlements. These findings were in accordance with the main causes of mortality.

The movements of all age classes were investigated using data from satellite transmitters affixed to 18 birds to determine exposure to perceived benefits or anthropogenic risks. The overall foraging range of the population was estimated to be 51,767 km$^2$ and non-adults were found to use 65% of this area whereas adults focussed their activities in an area of about 286 km$^2$ around their nests. Non-adults increased the size of their range as they aged, with birds aged between 4-6 years facing the greatest exposure to risk factors.

The genetic risk was examined by sampling two populations in sub-Saharan Africa to ascertain genetic variation, evolutionary placement and connectivity using Mitochondrial DNA fragment analyses. My results showed little to no differentiation between populations in southern Africa and Ethiopia suggesting that translocations of individuals from Ethiopia could be considered for introduction into the local population. The reduced haplotype diversity found in southern Africa suggests that translocations may be necessary to improve genetic diversity.

Lastly I used population viability analysis models to determine the future population trend and identify the primary demographic and environmental constraints on the population. The models predicted a negative growth rate for the population over the next 50 years ($\lambda$=0.99) with a high probability (0.89) of extinction as a result of low survival estimates (particularly for adults; 86%) and reduced productivity (55%). Human activities (69%) and power line collisions (21%) were the primary reasons for the low survival rates with poisoning alone accounting for 90% of the deaths. To achieve a positive growth rate, mortality rates should be reduced by >50%, productivity increased by >25% and the population should be supplemented by at least six individuals annually for the next 20 years.

Several recommendations are listed to address the primary threat of poisoning and continued monitoring of the population is essential to evaluate the success of the implementation of these recommendations. My research demonstrates the importance of focussing on small populations, declining populations and populations at the periphery of the species’ range and my
results confirm that urgent intervention is required to improve the status of the population. My findings also contribute to achieving vulture conservation objectives regionally, continentally and internationally.

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CONFERENCE REPORTS

P.J. Mundy

13th Pan African Ornithological Congress (Arusha, Tanzania), October 2012

In the Programme & Abstracts book there were many presentations on vultures (or that included vultures), and a Round Table Discussion, as follows:

Akagu, R.O., Shiwiua, M., Adeleke, A. & Adole, S. - “Conservation status of Nigeria vultures”. Vultures are now rarely seen in most parts.

Allan, D.G. – “The conservation status of Africa’s vultures”. The distribution, population and threats are considered [not in the abstract].

Asamoah, A., Holbech, L.H. & Owusu, E.H. - “Species specific bird strike risk (SSBSR) at the Kotoka International Airport (KIA)”. In Ghana. The presence of some species, including Hooded Vulture, should be reduced.

Buij, R., Croes, B.M. & Komdeur, J. – “Traditional medicine trade and vulture decline in Cameroon and Nigeria”. Feathers, heads and entire birds, mostly Hooded Vultures, were on sale in Nigeria. In Cameroon nest harvesting and poisoning were on the increase. The term ‘poaching’ is used, and drastic and urgent measures are needed.

Dabengwa, A.N., Smallie, J.J., Diamond, M. & Hoogstad, W.C. – “Predicting high risk power lines in the Magaliesburg [sic] region of South Africa to prevent vulture mortality”. Space use by a ‘collared’ Cape Griffon, mortality and other risk factors were manipulated by GIS. Overall space use and mortality were correlated to altitude.

Davies, R. & Virani, M.Z. – “Introducing a continent-wide monitoring programme for African birds of prey and their habitats”. Observations can
be entered on mobile devices with GPS, when connected to a network or the web, and sent to a central database. An online atlas is expected.

Kendall, C. & Virani, M.Z. – “Conservation implications of vulture movement studies in East Africa”. GSM–GPS telemetry was used on three species which ranged widely. Poisoning was common. All species visited the Masai Mara National Reserve in the dry season.

Kruger, S., Rushworth, I. & Amar, A. – “Are wind-farms a threat to southern Africa’s cliff-nesting vultures?”. Models predicted that both Bearded and Cape Vultures would be extinct in the Maluti-Drakensberg area in 75 years. Measures to mitigate the impact of wind-farms are proposed.

Monadjem, A., Botha, A., Murn, C., Wolter, K. & Neser, W. – “Survival of the African white-backed and Cape vulture in South Africa based on resightings of tagged individuals”. Patagial tags were put on 93 white-backed vultures, and resighted during a five-year period. Adults indicated a 99.9% survival rate!

Murn, C., Potter, L., Ronaldson, G.S., Thompson, C. & Botha, A. - “Population estimates of three vulture species in Kruger National Park, South Africa”. By aerial censuses in two sections. In both areas combined, 303 White-backed Vulture nests, 11 Lappet-faced Vulture, and 20 White-headed Vulture were counted. These results were extrapolated to the whole park.

Ogada, D.L. – “Dropping dead: causes and consequences of vulture population declines”. Populations have all but collapsed in West Africa, and dropped dramatically in North and East Africa. Poisoning and human persecution are common factors. Without vultures there is an increased potential for disease transmission at carcasses.

Ogada, D.L., Torchin, M.E., Kinnaird, M.F. & Ezenwa, V.O. – “Effects of vulture declines on facultative scavengers and potential implications for mammalian disease transmission”. Without vultures attending to carcasses, mammals increased their numbers, the average time spent at carcasses, and number of their contacts. Overall, mean carcass decomposition rate nearly tripled.
Otieno, P., Lalah, J., Virani, M.Z. & Owuor, P.O. – “The threat of pesticides to raptors in Kenya”. Carbofuran residues were examined, and figures from weathered tissues of white-backed vultures are given.

Pfeiffer, M., Venter, J. & Downs, C.T. – “Foraging range, breeding success, and community perceptions of the Cape vulture in the Mkambati Nature Reserve, Eastern Cape Province”. This is the Msikaba colony at 2km from the ocean. Work towards various objectives was expected to start in 2012.

Reson, E.N., Virani, M., Kendall, C., Bowerman, W. & Bridges, W. - “Assessing Maasai attitudes and perceptions towards vultures: a case study of resident Maasai around Maasai Mara National Reserve, Kenya”. A decline of >60% in two decades has occurred. While the Maasai seem to favour vulture conservation, their activities are detrimental to it, due to poisoning of carnivores.

Roxburgh, L. & Mzumara, T. - “Vultures in Malawi: a precipitous decline, and hope for the future?”. Area of occupancy has greatly declined, e.g. three species are absent from Kasungu and Liwonde National Parks. But numbers have increased in Majete where wildlife has been re-introduced.

Virani, M.Z. & Botha, A. - “RTD: vultures and vulture conservation in Africa”. Aims to promote the implementation of the 1st Pan-African Vulture Summit (Kenya, April 2012). The main conservation issues are poisoning, unsustainable harvesting, and energy infrastructure.

(With thanks to Ms. Josphine Mundava, who loaned me the P & A book).

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RECENT LITERATURE AND BOOK REVIEWS

RECENT LITERATURE

P. J. Mundy


This pharaoh’s statue is in the Hermitage Museum in Russia. At its feet are two inscriptions of a vulture with a flagellum. Initially taken to mean Mut, the author now proposes the ideogram to mean Nekhbet.


By means of point records (1990s), QSD records (1980s), and potentially suitable habitat (range predictions modelled for this atlas), eight species of vultures are mapped. The Palm-nut Vulture has considerably extended its range; the Bearded Vulture has no recent sightings; the Egyptian Vulture is uncommon; and Rüppell’s Griffon is rather scarce with an old breeding record in the far NW corner. The Hooded Vulture is the commonest, and is widespread, and the White-backed Vulture is also common though now confined to the game parks (14% of Uganda); both are known to breed. Most recent records for the Lappet-faced and White-headed Vultures are from national parks, and neither has recent breeding records.

This is a thesis at the Universidad Autonoma de Madrid for the academic year 2010-2011. It is entitled – “The ecological and conservation effects of food resource predictability: carcasses and vertebrate communities”. Among other points, the thesis provides guidelines for the management of vulture ‘restaurants’.

(email address: ainara@ebd.csic.es)


An immature (“possibly 2nd year”) African White-backed Vulture was photographed in flight alongside a Eurasian Griffon at Tarifa on 7 September 2008. This is the first accepted sighting in Spain. Another 2nd year immature was found on 25 June 2009, dead after colliding with a wind turbine. The first sighting of the species in the “western Palaearctic” was an adult on 14 October 2006 at the south-west corner of Portugal.

(email: jidies@hotmail.com)


Accurate account of the trials and tribulations of the bird from long back to now, written for children. In colour, with a photograph on every page. Sanford Wilbur was the consultant.


Three cases are reported in the Catalanian Pyrenees. All usurping birds were adults. Usurped pairs had a higher breeding productivity than did the usurping pairs.

(email: antoni.margalida@iee.unibe.ch)


Intended for children to read something about 11 species, including a “fun fact” for each. My copy includes an insert of already coloured diagrams. Each species has a map of Africa and a list of countries where it occurs. Altogether a cute book (though not without its mistakes).

(email: info@hawkmountain.org)


I take this book to be the 2nd (and improved) edition of the *Raptor identification guide* (2002) by the same authors, though it is not stated as such. (Noticed in *Vulture News*, 2003, 49: 74). Nine species are included, first as a group (p. 35), then species by species (pp. 54-71), key points to
distinguish them from confusing species (pp. 218-223), in flight from underneath (paintings) (pp. 274-275), and selected photographs of birds in flight (pp. 286-288, 23 photos). In this last section, incidentally, the “Cape Vulture dirty adult” and “Cape Vulture adult” (p. 287) are a juvenile Cape and an adult White-backed Vulture respectively. These aside, quite a feast of a treatment. The main section has no less than 39 photos, all well printed and in good colour, and better than the darker photos in the 1st edition, and a different set. However this new text is almost identical to that in the previous edition.

(email: info@gameparkspublishing.co.za)


Two ‘new’ behaviours are described. One was of a group of 14 birds (including 12 adults) in a small grassy clearing; “some form of lek”. The second was a dominant adult standing on the legs of a submissive adult that was lying on the ground on its back with wings outstretched. Includes five coloured photographs.

(email: rfporter@talktalk.net)


Has remained stable at 10 pairs (including one or two polyandrous trios), and an estimated 25 birds in all. But breeding parameters have declined, now to only 0.1 young /pair/year.

(email: gypaete.parc@wanadoo.fr)

The Graeco-Roman view that there were only female vultures originates from Egypt. The vulture was the symbol of motherhood and femininity, and came to mean both mother and goddess.

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BOOK REVIEWS

P.J. Mundy


This is a (very) personal account of the condor saga from “early days” to the “aftermath”. That is, from prehistoric times to about 1985. Wilbur became the FWS condor biologist in November 1969 and left the programme abruptly as the result of the “coup” in early March 1980, though already in 1979 he had been re-assigned as the (“undercover”) condor coordinator. So the book is based very much on quotes from his field notes, telephone conversations, government files and accounts of meetings. The quotes are in italics and therefore easy to see within any chapter. These are the ‘evidence’ if you like.

The style imparts a raciness to the story, a blow-by-blow rendition, and an immediacy that gives it a lived-through feel. And of course it was lived through. Interspersed among the quotes are his own texts of actions, thoughts and opinions which link up the quotes into stand-alone chapters. All in all it makes for an absorbing read, and where one can barely put the book down. Nevertheless, at the same time, all these details can be tricky to keep placed in the right order, and I found myself reading certain sections twice or more in an effort to keep everything in line.
Note that the condor saga is full of “socio-political” commentary, and endless days of hearings, so that on occasions the saga seem more like a debacle, or perhaps a circus, with everyone going around in circles amidst much noise! Everybody down to the vicar and his dog are confident (and arrogant?) enough to voice an opinion and call for their preferred action. Carl Koford the scientist and Ian McMillan the rancher are two such, and Wilbur frequently deals with their comments.

Wilbur has shaped his book into 50 chapters, all rather short except for chapter 46 The Takeover (“This is going to be a long chapter”). The dramatis personae, even rogues’ gallery, are very many, and they come and go on each page according to their importance in the journey. Koford, McMillan brothers, John Borneman, Dean Carrier, Ray Erickson, David Marshall, Fred Sibley, Bill Sweeney, and of course John Ogden and Noel Snyder are all numerous mented. Indeed, Wilbur states right at the beginning (p. 11) that he decided to write Condor Tales after being asked to review Noel and Helen Snyder’s The California Condor (his review is in Condor, 2002, 104: 222-226) and being more than “disappointed” by that book.

I thought that three of Wilbur’s highlights in his 12 year period with the big bird were doing the supplementary feeding programme (chapters 27 and 28), getting the recovery plan developed (chs 35-37), and organising the First International Symposium on the Vultures (March 1979 at Santa Barbara) (ch. 43). Several of us from southern Africa attended that great squawk-in, and among many others there I met Carl Koford himself. (See John Ledger’s article in Vulture News, 1979, no.1). It was very interesting to read Wilbur’s thoughts and activities on these and all other programmes with the condor.

Wilbur regrets that the condor programme, through its recovery plan, the first of its kind in the FWS Office of Endangered Species, did not become the “flagship” of that initiative. There was too much of a “war” going on among the protagonists. He finishes by likening the condor programme to the American space programme! – it’s lost the nation’s interest. He thinks that not all condors should have been captured and put in captivity; this is his only viewpoint that I disagreed with, rather thinking that a desperate situation (near-extinction of the California Condor, North America’s largest bird) needed a desperate response, in for a penny in for a pound sort of thing. Wilbur also has some interesting
comments on the issue of lead bullets, fragments in carcasses, and deer as a food source.

This is a good read, and an important book. There are many home truths contained here, and the author in places wears his heart on his sleeve, exposing his own emotions. Get it and give yourself an inside understanding of the saga which is now a success story!

This little book is in horizontal A5 size, and hardback. The front cover has cartoon-style drawings of the four species of European vulture with the “small” Cinereous Vulture (here called Mönchsgeier) and the other three as “friends”. The back cover has photos and very short accounts of the two authors, and a long piece explaining the reason for making such a book. It is a book for children, with a story on Europe’s vultures but based on a young Cinereous.

“The small vulture with the big fear and the many wild friends”. The small Cinereous Vulture is fearful of everything, even of noise. An adult arrives and tells him a long story of travels with the other species, ending up in Egypt (“land of the Pharaohs”) instead of Spain. Interspersed with the story are a page and photos of each of the four species, “What is a Monk / Griffon / Bearded / Pharaoh’s Chicken?”, together with a cartoon-style drawing of the species with its characteristics. Here the Egyptian Vulture is simply “Klein, aber Fein” (small, but fine). I smiled at how sex or reproduction was introduced in ch. 3, after the arrival of a girl Griffon, but certainly not between the young hero and heroine of course!

The drawings, in full colour, are marvellous, stylised but stylish, all done by the senior author. And because both authors are vulture fans then various facts are interwoven into the story. Though I did remain puzzled and curious about the size of the Angst in Cinereous Vultures, the large red lips pinned to the Egyptian Vulture’s head, and the little pictures of our hero and heroine tied to the udder of the dead cow. To balance, there is a full-page drawing of vultures on a dead elephant (p.28) – “Relatives in Africa”. Here there are even oxpeckers on a zebra and impala, and a Marabou Stork! Never mind, it’s a lovely and fun little book. Katja Wolfram tells me that there are translations in process into other European languages including English. I trust that the drawings will remain the same.
(I thank my friend Dr Klaus Leuschner for reading the book to me in translation. He too thought it was lovely, and ideal for his grandchildren).


Smaller than A5, this title is one of a new “animal series”. It has four chapters, about 30 pages of reference material, and a picture on most of the pages it seems, pictures from 1531 to modern times. This is certainly a very unusual book on vultures, aimed at exploring human cultures and vultures, and differences among the vulture clan (both old and new worlds). Many of the photos surprised and intrigued me, such as Prometheus on p. 72; the author includes Kevin Carter’s photo (p. 87) with much discussion of it; and a 1900 postcard of a “Bombay” dakhma. Just as three examples.

The chapter headings are: 1. An unnatural history of scavenging; 2. Vultures circling: eating people; 3. Otherworldly vultures; 4. Vulture futures. These indicate what I mean by unusual. In the last chapter, the author dwells on the diclofenac saga, and Bearded Vultures in the Alps; and finishes on International Vulture Awareness Day. Altogether a very interesting read, and nicely written too. If you are wondering why did God create ugly vultures, here is a book that directs you to an answer – probably. If you are an evolutionist, this is still a fascinating book. I recommend it to all vulture workers and lovers, for their enlightenment – vultures are not just vultures. (Meantime, the vultures on p. 18 are White-backed Vultures, on p. 36 they are Cinereous Vultures, on p. 132 also White-backed Vultures, on p. 138 certainly not “Indian white-backed vulture”, but what is it? (and where is the sun?), and on pp. 146 and 149 they are African Bearded in a text on the Alps).

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The production and printing of this issue of *Vulture News* was sponsored by Sasol.

*Sasol - adding protection to natural life*

Sasol is passionately involved in numerous environmental and conservation projects in South Africa and has integrated the concept and pursuit of sustainable development into its business values.

The group supports endangered species such as wild dogs and vultures and sponsors a series of books on flora and fauna as well as bird-call recordings. It has also invested in community bird watching facilities and wildlife conservation programmes.

At the Sasol Wild Dog Camp at the De Wildt Research Station near Brits in the North-West, the group sponsors the quarantine facilities and shares an interest in the reintroduction of captive-bred wild dogs into national conservation parks.

Sasol also supports several projects for the treatment and rehabilitation of traumatised wild animals and birds, funds school
level environmental education programmes, and is involved in nature conservation at community level, such as the establishment of game conservancies adjacent to the Sasol factories at Secunda and Sasolburg.

Another significant initiative is Sasol Sensory Trail at Delta Park in Johannesburg which was especially conceived to enable people with disabilities to enjoy the environment.