Aerial survey of African White-backed Vulture nests on farmland around Waterberg, northern Namibia

Hugh Doulton & Maria Diekmann

Summary

The first microlight survey of African White-backed Vulture nests in Namibia was undertaken on farms near to the Waterberg Plateau, and covered an area of approximately 150 km². New techniques, derived from Murn *et al.'s* (2002) surveys in South Africa, were devised using Global Positioning System (GPS) and Geographical Information System (GIS) technology. One colony was surveyed and nest density was found to be 0.38 nests/km².

Introduction

The total global population of African White-backed Vulture (AWbV; *Gyps africanus*), probably Africa's most abundant vulture, is estimated at 270,000 birds (Mundy *et al.* 1992). South Africa's population of 9000 birds has suffered a decline of about 10% in recent years (Anderson 2000), and is now classified as 'vulnerable'. Latest figures suggest a population of around 10,000 pairs for Namibia, though this figure needs to be assessed as the figure could be too high due to unrecorded losses (see discussion in Simmons *et al.* in press). Namibia's population is classified as 'near-threatened', and is likely to have suffered a similar decline to South Africa's, with the main cause of death being secondary or accidental poisoning (Simmons & Bridgeford 1997).

This is the first ever aerial survey of an AWbV vulture colony in Namibia and, as such, represents an attempt to instigate a long-term monitoring program that can assess fluctuations in AWbV levels. Information on AWbV population fluctuations can be used in conjunction with data on the much rarer Cape Vulture (*Gyps coprotheres*), whose only remaining Namibian colony is based on the cliffs and surrounding area of the Waterberg Plateau Park (Figure 1). There are currently only 22 Cape Vultures remaining in Namibia, a number that has been doubled by an ongoing reintroduction program. The two species feed together in a similar manner, and are therefore subject to similar threats, largely accidental poisoning.

The survey area, determined by farm boundaries, covered roughly 150 km² near to the Waterberg plateau to the east of Otjiwarongo (Figure 1). Area covered was limited by time constraints, but is large enough for the purpose of refining technique so that the survey can be expanded and performed more efficiently in future.

The terrain is generally flat, lying at 1500 m a.s.l., with occasional low hills of not more than 200 m. The vegetation type is 'Thornbush shrubland' (Mendelsohn *et al.* 2002), with the dominant trees being *Acacia mellifera* and *A. erioloba*. Cattle and game farming are the main agricultural pursuits. There is an established vulture feeding station on the farm Uitsig, headquarters of the Rare and Endangered Species Trust (REST), and another at the nearby Waterberg plateau.

The methods used were derived from Murn *et al.* (2002). They surveyed a much larger area in the Kimberley region of South Africa, using a microlight and a marked gauging stick to define and run transects through AWbV colonies.

Aims

- To obtain estimates of nesting distribution and density in the area immediately surrounding THE farm Uitsig, headquarters of the Rare and Endangered Species Trust (20°15'44", 17°03'42").
- To initiate a long-term monitoring program that can identify any fluctuations in AWbV population levels.
- To perfect and calibrate techniques so that the survey can be expanded and performed more efficiently in future.

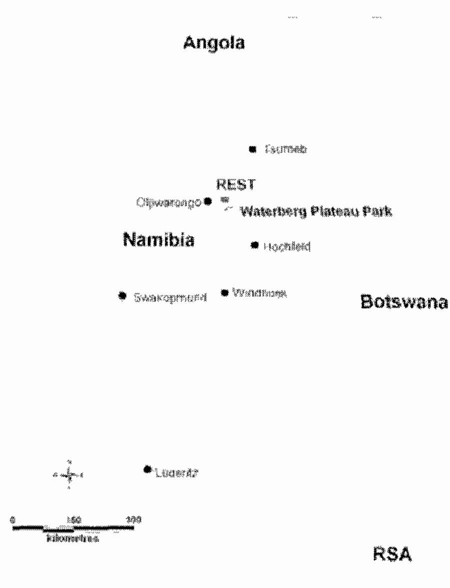

Figure 1. Map of Namibia showing the position of REST (survey location) in relation to the Waterberg Plateau Park.

Methods

Several important innovations to Murn *et al.*'s (2002) method were introduced, and it is therefore useful to detail how the survey was accomplished.

The aerial survey was carried out using a microlight aircraft in a delta-wing and open trike configuration, with the observer sitting directly behind the pilot. The colony closest to the headquarters of REST, from where surveying took place, was selected for the work so that as much flying time as possible could be used for surveying. Flight transects over the colony were established prior to flying, using the GIS package 'ArcView', version 3.2. The approximate boundaries of the colony were already known from nest sightings on the ground, transects were established so that the survey area expanded on these boundaries in case of outlying nests. The GPS points marking the end of each transect were programmed into the pilot's GPS unit, which was attached to the microlight. The pilot then flew directly from one end of the transect to the other. Test flights were flown to determine a suitable viewing distance, and transects were spaced at 250 m intervals, with nests counted on just one side of the microlight and a ground speed maintained, as far as possible, at 90 km/h. In addition, height above ground was fixed at 90 m above ground level (maintained using a barometric 'Skydat' altimeter), which was high enough to avoid disturbance and low enough for effective observation. Transects were flown such that the observer was always looking away from the sun: in the morning, transects were flown with the observer looking north-west and in the afternoon looking south-east.

The pilot was able to scan in front of the microlight (obscured from the observer's view) whilst the observer scanned out to the side. The observer recorded the position of nests along the transect line using the 'man-overboard' function on a GPS unit, which allows a one-press recording of current position. The estimated distance away from the microlight was obtained by using a marked gauging stick fixed at 60 cm below eye level, and extending either side of the microlight perpendicular to the flight path. All useful information was recorded through a microphone onto a mini-disc dictaphone; the recorded information could then be transcribed after the flights. Nests were recorded as active if vultures were incubating, if there was an egg in the nest with an adult in attendance, or if a nestling was present (Postupalsky 1973).

The survey was carried out over a week at the start of August 2004. AWbVs lay from late-April to the end of May in Namibia and by August chicks are old enough to survive alone for brief periods if parents are disturbed, but not old enough to fledge. Surveys in July and August thus represent a best compromise between surveying when a high proportion of birds are attendant at nest and young have not fledged, and avoiding chick death through desertion. Unfortunately the microlight broke down with two full days of the survey remaining and we were unable to find a replacement at such short notice. We were therefore left with one edge of the colony unsurveyed, though we were still able to obtain useful nest density and distribution data.

Results

A total of 31 active AWbV nests were spotted within the colony, one of which contained two chicks (a rare event) rather than an incubating adult. Nesting density at 0.38 nests/km² was calculated by dividing the area framed by the outermost nests of the colony (see Figure 2), 82 km², by the number of nests. The survey was too small to produce a population estimate for the area.

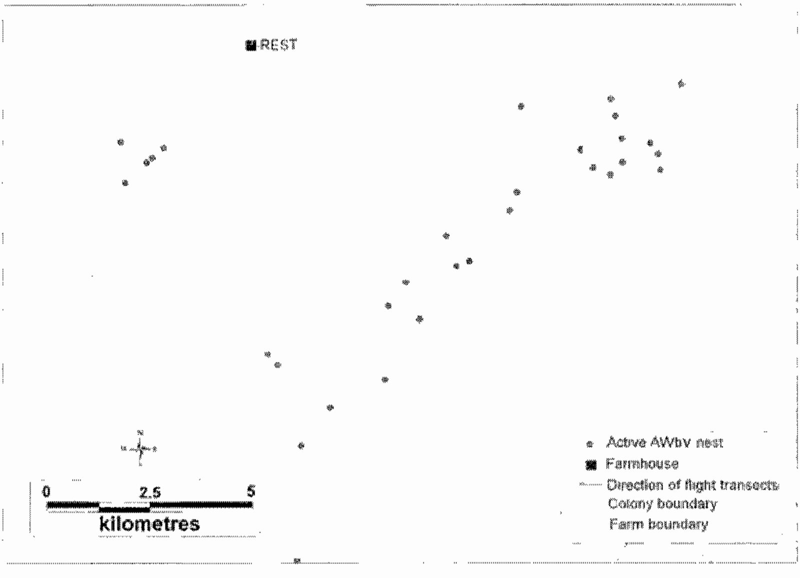

Figure 2. Surveyed colony showing position of active AWbV nests and colony size.

Discussion

Survey technique

We agree with Murn *et al.* (2002) that a microlight is essential for such surveys: when the wind was from directly behind, it increased the flying speed and made it much harder to scan the required area, thus a significantly faster fixed-wing aircraft would make reliable observation impossible.

It took two short flights for both the observer and pilot to get used to spotting nests. However, once the technique had been calibrated by flying past nests already observed from the ground, both observer and pilot felt that incubating adults were easy to spot, and thus the number of missed nests would be small. Only one nest containing chicks was spotted during the survey and none containing eggs, all the others contained incubating adults. Inactive nests were not recorded. It is recommended that, if at all possible, future surveyors should first familiarize themselves with the appearance of nests containing only chicks and eggs, as it was felt that these features are harder to spot from the air than adults incubating, and that some of these active nests could have been missed.

There was only one case of an incubating adult being disturbed during the whole of the survey. Indeed it was felt that if vultures were disturbed into flight, this could reliably be taken as a sign that they were simply roosting. Birds in trees, but not on nests, invariably took to the wing when the microlight approached. The only disturbance of an incubating adult occurred when the microlight accidentally flew over a nest at 40 m, but even heights as low as 60 m seemed not to cause interference.

The main difference in technique from Murn *et al.*'s (2002) survey was that the gauging stick was not needed to determine transect width. Thus neither turbulence from thermals nor crabbing caused by crosswinds disrupted transect width. Crabbing often made spotting easier, although both made estimating the distance to the nests, using the gauging stick, less accurate. That having been said, flying was restricted to approximately 06h30 to 09h30 and 15h00 to 17h30, owing to high turbulence from thermals and winds in the middle of the day.

Using GPS and GIS technology significantly increased the accuracy and ease of surveying, as well as reducing the impact of adverse weather conditions. Transect positioning was not dependent upon visual landmarks, and transect width was not reliant on human estimates based on the gauging stick. Position of vulture nests could also be accurately recorded using the observer's GPS.

In addition, the map page on the GPS was useful for two reasons. Firstly, it enabled the pilot to determine if the microlight was drifting off course and to readjust accordingly. Secondly, the possibility of double-counts could be accurately assessed after the flights by looking at a combination of transect accuracy and nest positions on the track log, and the estimated distances of nests from the microlight.

Nesting densities

The estimated nest density of 0.38 nests/km^2 is towards the lower end of the figures for those colonies surveyed by Murn *et al.* (2002) in South Africa (densities ranged from 0.32 to 0.61 nests/km^2). Such estimates are significantly lower than those produced for linear-type colonies, which have been reported as high as 1.7 nests/km^2 (Monadjem 2001). There are no previous estimates to compare with in Namibia, as this is the first survey of its kind in the country.

Figure 2 shows that there is one small group of five nests that are separated from the others. Neither pilot nor observer could come up with any reason for this, as there appeared to be many suitable nest trees in between the two groups. Older and larger trees seemed to be preferred for nesting (H. Doulton & M. Diekmann pers. obs.).

Recommendations

The use of microlights for surveying was invaluable: the dense bush precluded ground surveys. It was also felt that the methods used were accurate, and that error from missed nests was minimal. It is therefore recommended that microlight surveys using GPS and GIS technology are used on a larger scale in future years to produce population estimates. Ground surveys of the type performed by Murn *et al.* (2002) would be useful in establishing the position of colonies prior to aerial surveying, as well as in calibrating the aerial results.

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Authors' addresses: Hugh Doulton, University of Oxford, Merton College, Merton Street, Oxford OX1 4JD, United Kingdom. Permanent address: Park Gate House, Weston Road, Bletchingdon, Oxon OX5 3DH. E-mail address: hughdoulton@hotmail.com

Maria Diekmann, Director, the Rare and Endangered Species Trust, PO Box 178, Otjiwarongo, Namibia. E-mail address: rest@iway.na