

Part 2

Biology & Conservation of the Vultures of the World

Vulturine Fish Eagle *Gypohierax angolensis*



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The Status of Vultures in Africa during the 1990s

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ABSTRACT

Since the last review on the vultures of Africa (1992), many new observations have been made. For example, more than 2000 Eurasian Griffons crossed the Straits of Gibraltar in autumn 1993; Rüppell's Griffons have been seen in Spain, Portugal, Zimbabwe and South Africa; a Cinereous Vulture (disputed) was seen north of Aswan (Egypt); some first-year Egyptian Vultures do migrate north in spring. Two major atlas projects, in Saudi Arabia (1995) and in southern Africa (1997), have considerably helped to define vultures' distributions. Several initiatives are underway to conserve the birds, particularly in South Africa (for example the reintroduction of the Egyptian Vulture, and liaison with Eskom, the electricity supply company), but also in Kenya with the Bearded Vulture. Poisons remain a major threat for vultures, and incidents of poisoning are still reported in southern Africa. Poisons and loss of habitat are implicated in the very parlous state of all vultures in Morocco. Indeed the whole of Arab Africa is something of a 'black hole' for the birds, and this situation needs urgent attention. Finally, there have been/are at least 21 human conflicts in Africa this decade, ranging from civil unrest to genocide. These must have affected the conservation status of vultures in the continent.

INTRODUCTION

Continental Africa supports, or has supported in the recent past, eleven species of vulture, and it is therefore the most vulture-rich of all the continents. The status and distribution of these birds, including comparative data on their foraging and feeding, and breeding, were recently reviewed in considerable detail (Mundy *et al.* 1992). Several questions and hypotheses were aired in that book, some of which are hopefully in the process of being answered or tested. While vulture-watching in the field remains a fairly popular pursuit, nevertheless it should be said that Africa in many areas remains a dangerous continent for ornithologists. Also its size and complexity mean that no one single person can visit more than a fraction of it, and therefore an understanding of vultures must be gained by proxy from the literature, as well as by using one's own observations and information. Fortunately, however, Africa is quite well covered by bird journals and newsletters.

In fact many interesting observations have been made since 1992. This paper aims to review these observations and the situation for vultures in general in Africa in the decade of the 1990s.

NEW OBSERVATIONS

Cape Griffon *Gyps coprotheres*

Monitoring and studies of this species continue apace. It was again sighted in southern Zambia (at Mazabuka) in May 1997, but no supporting details were listed (Demey 1998), and a juvenile was seen and photographed south of Chirundu in Zimbabwe in August 1993 (Stiles 1994). Parker (1997) confirmed the continued existence of a colony in southern Mozambique, though at the same time stating that the birds foraged mostly in Swaziland. Incredibly, a bird (not aged) was seen in a Cape Town suburb in August 1998 (T. Hardaker, SABirdNet). None of these sightings is shown on the Cape Griffon's map in the recent atlas (Mundy *et al.* 1997). However that map does emphasise the division of the vulture's range into four sub-populations, being (i) northern South Africa, eastern Botswana and southern Zimbabwe, (ii) south-eastern South Africa and Lesotho, (iii) south-western Cape, and (iv) northern Namibia. This fragmentation was already realised (Mundy *et al.* 1992:77; see also Piper 1993:88), but due to the bird's well known long flights (Scott 1991b, Oatley *et al.* 1998) it is not yet perceived as serious in terms of genetic isolation.

After detailed documentation and analysis, Piper (1993) determined that the Cape Griffon has 83 breeding colonies with a total of about 4400 breeding pairs. He estimated that the entire population of the species numbered about 12,000 birds, which made it the second vulture (after the California Condor *Gymnogyps californianus*) to be so censused. From an analysis of 'recoveries', i.e. dead ringed birds (about 600), and resightings (nearly 700), it seems that immatures find 'nursery' areas where they live temporarily, and these areas may shift in locality from year to year.

One 'recovery' was of a nestling ringed in 1975 and found electrocuted in June 1994 only 35 km away (Oatley 1994), for a longevity of nearly 19 years. To date, this is the record for the species. While it has been stated that "few birds have survived for 10 years or longer" (Oatley *et al.* 1998), some of this parlous state of affairs must be due to rings falling off the birds. Piper (1993:406) concluded that "there are no adequate estimates of survival for adult Cape Vultures" as yet, although a better model is at hand (Piper 1995).

Much monitoring of breeding pairs at colonies continues to be effected. These are particularly in the Magaliesberg, at Potberg in the south-western Cape, at the Botswana colonies, and at Wabai Hill in Zimbabwe (see province and country accounts in Boshoff *et al.* 1997). Stability or small increases are often being seen, but also decreases such as in the Eastern Cape.

Several major conservation initiatives are pursued in southern Africa, usually with the Cape Griffon foremost in mind. Supplementary feeding stations, or vulture 'restaurants', are still actively promoted, indeed such a scheme was written into the conservation plan of the Potberg colony. Over a nine-year period, 507 carcasses totalling nearly 18 tonnes in weight were supplied at the Potberg 'restaurant', though it was estimated that this mass comprised only 7%-16% of the colony's food requirements (Scott & Boshoff 1994). This 'restaurant' was shown to improve the survival rates of young griffons (Piper *et al.* in press). General advice on running vulture 'restaurants' has recently been published as a pamphlet (Scott & Anderson [1998]), and also in the farming press (Anderson & Scott 1996).

A second major initiative is the partnership between the South African supplier of electricity (Eskom) and the Endangered Wildlife Trust, in an effort to solve the problems of electrocution and collision (van Rooyen & Piper 1997). The system of mitigations will benefit all species that interact with powerlines, though the Cape Griffon is still a very frequent victim.

Incidents of poisoned and sick vultures, including Cape Griffons (Boshoff 1991, Scott 1994), still occur in the subcontinent, though "at a lower frequency" than earlier (Verdoorn 1997b). Organophosphates and carbamates are often implicated in these occurrences. For example in nine wild birds that showed some degree of paralysis, all had significantly lower cholinesterase levels in whole blood than did a control group (Wysoke *et al.* 1994). In addition blood samples taken from Cape Griffons (both wild nestlings and captive birds) had organochlorine residues, in some of which the levels could have caused eggshell thinning (Van Wyk *et al.* 1993). Since its inception in late 1991, the Poison Working Group of the Endangered Wildlife Trust has vigorously campaigned to reduce the non-target impact of poisons (Verdoorn 1997b).

And lastly, in terms of initiatives that benefit the Cape Griffon, a campaign is underway in South Africa to prevent drownings in circular farm reservoirs (Anderson [1996]).

In outdoor feeding trials of captive adult Cape Griffons, Komen (1992) determined that the average daily food intake was 497 g, and the assimilation efficiency was 86%. A single full crop of food should provide enough energy for three days. A large fat reserve in an adult in good body condition could maintain the bird for at least 20 days. Komen & Brown (1993) put many figures together to calculate that a family of Cape Griffons needed 524 kg meat per annum to survive. Its maximum food requirement of 1,98 kg per day (in the middle third of the nestling period) fell in September and early October, which coincided with peak mortalities of both wild ungulates and domestic livestock.

An alarming phenomenon being reported in recent years is that of the birds feeding or preying upon live domestic animals. Thus in the mid-1980s, Cape Griffons ate a stillborn calf and also some of the rear end of the cow (Pringle 1990). In 1996, birds were seen feeding on several live lambs (Scott 1997).

Rüppell's Griffon *Gyps rueppellii*

The most astounding aspect of this species in recent years is its incredible wanderings - and the fact that vulture watchers were there to see it. First, from 1989 to 1991, an adult atypical Cape Griffon was seen at the Potberg colony near Cape Town (34° 22'S), but its 'scaled' appearance suggested a Rüppell's Griffon (Scott 1991); it copulated with a Cape Griffon. Then in 1990 and 1992, single immature birds were seen at Wabai Hill in Zimbabwe at 20° 04'S (Mundy 1995), and in 1994 a Rüppell's Griffon was first seen at Blouberg at 29° 03'S (Snyman *et al.* 1994). In 1995 three Rüppell's Griffons were seen at Blouberg (Snyman & Snyman 1994), and one was later seen to copulate with a Cape Griffon. In 1997 an adult was seen at 18° 45'S in Zimbabwe (Mundy 1998), and also at the Kransberg colony at 24° 30'S in South Africa (Benson 1997). Meanwhile birds have been sighted in 1990-1992 in Spain at latitudes of about 37° and 39° 30'N (de Juana 1994), and again in 1993 at 36° N (de Juana 1995), and an immature was seen in Portugal in 1994 (Verdoorn 1994) at 38° 41'N. Most of these birds were photographed. A bird that was ringed in the Serengeti National Park was later found "in the middle of the Sudan" (D.C. Houston *in litt.*), a distance of about 1800 km from the place of ringing.

Small range extensions of the species are recorded in Sierra Leone (G.D. Field *in litt.*), northern (Clarke 1985) and southern (Douthwaite & Miskell 1991) Somalia, and in the Selous Game Reserve of southern Tanzania (Stronach 1993). Finally, "scores" of Rüppell's were seen with hundreds of other vultures at the Addis Ababa slaughter house in May 1995 (Allan 1995), behaviour that seems to be unusual in Africa by this species.

Eurasian Griffon *Gyps fulvus*

This species is a migrant into Africa from its breeding grounds in Europe, as well as a breeding bird in low numbers in north-west Africa. The furthest south it has been recorded is at Lake Langano (7° 35'N) in Ethiopia: two adults in late October (Vittery 1983).

It is termed "rare" in northern Niger (Newby *et al.* 1987), in fact only seen in May. An "exhausted" bird was found at the Red Sea coast in Egypt in 1997 (Demey 1998). However, on the other side of Africa, at Cap Blanc in Western Sahara/Mauritania, 50 Eurasian Griffons were seen in August 1995, and 16 in August 1996, mostly "juveniles and subadults" (Layna 1997). These dates suggest that the birds came from North Africa rather than the Iberian peninsula. Meanwhile, at the Straits of Gibraltar (actually east of Tarifa), an astounding 2,160 "mostly juvenile" Eurasian Griffons were observed crossing over to Morocco in only eight days of a 34-day period in mid-October to mid-November 1993 (Griesinger 1996). The birds used flapping flight, and needed up to 25 minutes to cross 15 km of open water. By the time they arrived in Morocco, the flocks were "at an altitude of less than 50 m above sea level"! Nevertheless, this huge number is only about one-third of the annual crop of juveniles in Spain (Griesinger 1996), and we are still left curious as to the whereabouts of 3,000 others.

African Whitebacked Vulture *Pseudogyps africanus*

Some range extensions have been noted for this species. A few are recorded in north-west Sierra Leone (G.D. Field *in litt.*), it is on the checklist for the Selous Game Reserve in southern Tanzania (Stronach 1993), and most surprisingly two young birds were seen in the Karoo region of South Africa at about 32° 30'S (Verdoorn 1995a). This last sighting is hundreds of kilometres south of its usual distribution. Other observations of interest include: "several hundred" at the Addis Ababa slaughter house in May 1995 (Allan 1995); a four-metre long Rock Python *Python sebae* was seen trying to swallow a juvenile vulture but failed (Verster 1992); another python was seen coming out of the water, catching a bird, and successfully swallowing it (W. Mullié pers. comm.); predation by Black-backed Jackals *Canis mesomelas* on vultures at a waterhole in the Kalahari Gemsbok National Park is a "regular occurrence" (Donaldson & Donaldson 1996); about 20 nests in a 'loose' colony on the western side of the Okavango Delta are all in Ebony trees *Diospyros mespiliformis*, which is a broad-leaved non-thorny species (J. Davey pers. comm.).

Poisonings and drownings still occur in southern Africa, and this species is a frequent victim. For example 64 birds were poisoned in one incident (Anderson 1995), and 38 drowned in another (Anderson *et al.* 1997). These vultures are also victims of electrocution (Anderson & Kruger 1995).

Hooded Vulture *Necrosyrtes monachus*

Range extensions for this species include eastern Guinea, where it is considered to be "common", and further south in that country (Halleux 1994). A juvenile was seen in north-west South Africa at about 500 km west of its usual range (Verdoorn *et al.* 1997).

This species, being commensal with humans, is easily attracted to slaughter houses. About 400 were seen at the one at Addis Ababa (Allan 1995), and about 500 at Kumasi in Ghana (pers. obs.). Also, "hundreds" roost in the grounds of the Nile Hotel in Kampala, where it is said "former dictators had countless people murdered and buried" (Butchart 1997a)! In Zimbabwe, Hooded Vultures are increasingly being seen on the highveld due to the increase in small abattoirs and accompanying offal dumps (Mundy 1997).

A longevity record for a vulture comes from this species - a juvenile ringed in May 1974 was recovered dead at a poisoned carcass in September 1995, in its 22nd year of life (Oatley 1996).

Lappetfaced Vulture *Torgos tracheliotos*

Some interesting information has been produced on this large and distinctive species. A few slight range extensions have been noted, particularly in Egypt: one bird at the southern tip of the Sinai peninsula (Kirwan 1993), for example, and a group of five seen in Gebel Elba in 1985 (Meininger 1996). The birds in this group were generally brown in colour, had dark bills, and their heads were pale and without conspicuous lappets, again emphasising the likelihood that these so-called *nubicus* birds are in a 'hybrid zone' (Mundy *et al.* 1992:153). More birds are being seen recently in the Kalahari region of northern South Africa, and indeed 57 were sighted at a 'restaurant' (Maritz 1998b), which is a modern-day record. In the same area, 27 nest sites have been discovered (Verdoorn 1997) when a few years ago few were known. Current estimates of the breeding population in the Kruger National Park are now up to 100 pairs (K. Herholdt pers. comm.), and in the Namib-Naukluft Park are at 72 pairs (P. Bridgeford pers. comm.). In this latter park, an amazing occurrence of two nestlings being reared together in one nest was found in 1991 (Bridgeford *et al.* 1995).

Recently an adult was seen one morning at 05h30 on a dead but still-warm White-tailed Mongoose *Ichneumia albicauda* in Zimbabwe (C. Stockil pers. comm.). In the northern Cape of South Africa in the long drought of the early 1980s, these vultures were several times seen to kill new-born lambs (A. Maritz pers. comm.).

The furthest known journey for a first-year bird was by one seen in southern Zambia at 1107 km from its place of ringing in South Africa (Oatley *et al.* 1998).

The worst poisoning incident of this species occurred in June 1995, adjacent to the Namib-Naukluft Park in west-central Namibia. By using a poison (carbofuran) on a dead donkey, a rancher managed to kill 86 Lappetfaced Vultures and eight Whitebacked Vultures (Simmons 1995). He had accused them of preying on his new-born Dorper lambs.

Cinereous Vulture *Aegypius monachus*

This species is still barely a member of the African avifauna. One bird was sighted north of Aswan in Egypt in December 1993 (Kirwan 1994), but this is considered to be a misidentification of a Lappetfaced Vulture (P.L. Meininger *in litt.*). In any case the Cinereous Vulture is an "extreme rarity" in Egypt (M. and S. Baha El Din *in litt.*). Birds were seen in the winters of 1987-1989 in Algeria (Bellatrèche 1994), but possibly not since (P. Isenmann and A. Moali *in litt.*).

Whiteheaded Vulture *Trigonoceps occipitalis*

This species attracts hardly any attention from observers. Very minor range extensions have been recorded such as in Burkina Faso (Balanca & de Visscher 1997) and in northern South Africa (Verdoorn 1995a). A sighting of "about twenty individuals seen soaring together over the carcass of an elephant on 6 Mar 1995" (Salewski 1997) in northern Ivory Coast is unique, and by far the largest flock seen in recent times; the Okavango Delta in Botswana is credited with a population of "200 pairs" (500 birds), or about one pair per 90 sq. km (Tyler & Bishop 1998). Both these statements seem barely credible to me.

Egyptian Vulture *Neophron percnopterus*

In recent years several sightings of both adult and immature birds have been made in South Africa and Botswana, to such an extent that there is a possibility of a breeding pair in this part of the subcontinent. Breeding is also thought possible in northern Namibia (Simmons & Bridgeford 1997). Elsewhere in Africa, breeding occurred in cliffs near to Lake Chad and in Cameroon (Scholte 1998). In Gambia, an immature was seen in June 1997 (Demey 1998). In December 1994, an estimated 1473 Egyptian Vultures were found roosting along a 75 km length of powerline in Ethiopia (Sigismondi & Politano 1996).

New information has been produced at migration points in the autumn (1) and spring (4), where birds were categorised as adults or immatures/juveniles (Table 1). In eight autumn counts, 1182 adults (75.6%) and 382 immatures (24.4%) were seen, and in five spring counts the numbers were >2124 (94.5%) and 124 (5.5%). These extra data produce the same conclusion as noted by Mundy *et al.* (1992:191), that very few immatures return to Europe in the spring. In a more comprehensive analysis, however, Yosef & Alon (1997) consider that immatures may return to Europe by a different route (Suez) than the one they took to get to Africa (Eilat). For young Egyptian Vultures, then, the questions remain as to what proportion stays or dies in Africa during the European winter and what proportion migrates back north; certainly more return north than originally supposed.

Table 1. Some autumn and spring migrations of Egyptian Vultures into and out of Africa.

<i>Place</i>	<i>Date</i>	<i>Adults</i>	<i>Imms</i>	<i>Ref.</i>
Gibraltar (Morocco)	26 Aug. - 5 Sep. 1995	209	49	(1)
Suez (Egypt)	25 Mar. -31 Mar. 1982	243	3	(3)
Suez	4 Mar. -29 May 1990	321	63	(2)
Eilat (Israel)	15 Feb. -19 May 1994	316	26	(5)
Bab-al-Mandab (Djibouti)	4 Mar. - 7 Mar. 1990	>731	4	(4)

(1) Franchimont & Moumni 1996; (2) Meininger & de Roder 1992;
(3) Ullman 1985; (4) G. & H. Welch *in litt.*; (5) Yosef 1996.

A controversial aspect of the species is whether males and females show any sexual dimorphism in colour. Some years ago a photo of an Egyptian Vulture, taken by the Terrasse brothers, was labelled as an adult female by virtue of its yellow face (Jaubert 1989). It had a large black 'smudge' on its face. The male had been described as having a bright red face. This distinction between the sexes was later repeated by Davey (1994), and in good detail by Guyot & Ligor (1993-94). These

latter authors saw this difference consistently in a dozen pairs - the male's face is orange-yellow and the female's is straw-yellow (and she is slightly larger than him). Unfortunately these authors made no mention of black smudges.

Meanwhile, in Israel, Levy (1990) found that among 13 pairs and one trio the male had a black 'smudge' on his face but the female did not. Some photos support this contention (Cloudsley-Thompson 1981:48), but others do not (Rodriguez 1992:116). More recently, Levy's discovery has been re-affirmed (Levy & Segev 1996) in spite of disagreement from Spanish workers (W.S. Clark *in litt.*). Very tellingly, however, a photo of a copulating pair in Tanzania (Butchart 1997b:43) shows the male with no smudge while the female has a smudge! In addition, the male's face is orange, hers is yellow. Although years ago I had examined skins of Egyptian Vultures in museums, regretfully I did not notice the presence/absence of these facial smudges, but Bill Clark (*in litt.*) determined on 20 specimens that presence or absence occurred in both sexes. Recently, through the courtesy of the Museo Nacional de Ciencias Naturales (Madrid), I examined skins of six adults and one subadult - all had black smudges; four were labelled as "females", three as sex unknown.

In summary, then, while slight sexual dimorphism does occur between the sexes - in intensity of facial colour, and in size - this is not linked to the presence or absence of black smudges on the face.

Bearded Vulture *Gypaetus barbatus*

Rather little has been noted in the last few years for this denizen of high mountains. In terms of altitude, however, an ossuary is known on Mount Kilimanjaro at 3800 m (Grimshaw 1995b), and a bird was seen there in 1998 at about 5000 m (J. Dale pers. comm.). In South Africa a search was done in July 1994, in the Drakensberg, which estimated 220 nesting pairs and 240-odd juveniles (Verdoorn 1995b), in fact a slight increase over an earlier estimate (Brown 1992). In the same area, at a vulture 'restaurant' at Nottingham Road in KwaZulu-Natal, 12 Bearded Vultures were seen together with 96 Cape Griffons (M. Glenney pers. comm.); unfortunately the date could not be remembered. These results may indicate an improved farmer awareness of scavengers. However, five birds are known to have been killed by poison collars and coyote getters in South Africa (Boshoff 1991, Colahan 1991). New food items for the species are giant rats (*Cricetomys gambianus* ?) and once a puppy dog (A.B. York *in litt.*), both on Mount Elgon in Kenya; and again in Kenya a large monitor lizard *Varanus* sp. (Brown 1963).

In the Balé mountains of Ethiopia, a nest was found at an altitude of 3950 m, which in March had two fully grown and feathered youngsters in it (Barrau *et al.* 1997). This is the first observation of a brood of two. By back-dating, the clutch (normally of two eggs in this species) was laid in October.

The two characteristics for which Bearded Vultures are famous are, first, using red soils as a cosmetic to stain their otherwise white body and head plumage, and second, in their bone-breaking and bone-swallowing habits. Recent work has proved that the rufous colour of the bird's plumage comes from the external deposit of iron oxide which sticks to the ends of the feathers (Brown & Bruton 1991). Also, it seems that the iron oxide is combined with a fine clay component (Houston *et al.* 1993). Recent work again has shown that Bearded Vultures have a digestive efficiency of 50% of a bone meal, with most being digested within 24 hours (Houston & Copesey 1994). The species is an atypical vulture in not having a crop. Its stomach cannot grind the bones, but does have a very high density of acid secreting cells.

Useful demographic data were obtained in the South African/Lesotho study (Brown 1997). Thus the annual survival rate of adults was 94%, and a bird once attaining adulthood had a further life expectancy of 21.4 years. Meanwhile the survival of young birds to sub-adulthood (at four years of age) was only 13%. These figures could probably well apply to healthy populations of other vulture species. Interestingly, the proportion of young birds sighted in an area increased as the density of adult birds decreased.

Palmnut Vulture *Gypohierax angolensis*

Some range extensions have been noted in north-east Central African Republic (Bretagnolle 1993), in the forests of the Sangha region in CAR and Congo (M. Fay and A. Turkalo pers. comm.),

in southern Tanzania (Stronach 1993), in eastern Zimbabwe (Hustler & Irwin 1995, Jana 1995) where a new breeding record may have occurred (Tree 1998), and particularly in South Africa. Here vagrants have been seen in the eastern Transvaal (K. Herholdt pers. comm.), in the western Transvaal (Oberprieler 1998), and in the south-western Cape (McCall 1994, Robertson 1995). By contrast, the vulture was not seen along a 400 km length of coast in southern Mozambique (Parker 1995), due probably to severe habitat change.

Whereas the species is not generally gregarious (e.g. Butchart 1995), 18 birds (including five immatures) were once seen at a colony of River Martins *Pseudochelidon eurystomina* in Gabon (Alexander-Marrack 1994). It was suspected that the vultures were preying on nestlings of the martin. There have also been sightings of the bird scavenging on dead ungulates (Butchart 1997b, Medland 1993, Levy 1995, A. Turkalo *in litt.*), carrying food items in its talons (Harris *et al.* 1994), and even flying about on moonlit nights (Chittenden & Myburgh 1996).

Recently, detailed observations have been made at nests at Mtunzini in South Africa (Harris *et al.* 1994, Chittenden & Myburgh 1996), where there are now perhaps four breeding pairs. When in breeding condition, the upperwing coverts of the adults become rusty-brown; white coverts replace them in the non-breeding season. Slight differences were noted between partners: a female in one pair had a bright yellow eye, a reddish face, and a broad white edge to the tail, whereas the male had an amber eye, a pinkish face, and a narrow white edge to the tail (W. Goodwin pers. comm.). The incubation period for the egg was about 47 days, and both partners incubated. The period for nestlings was 90 days, and both parents fed the nestling. These nests were in palm trees, but one in Sierra Leone was "in a cleft of a cliff" (G.D. Field *in litt.*).

It is now said to be scarce in Liberia due to being shot for fun by hunters (Gore 1994).

General

Seeing six species of vulture at one carcass is very unusual. Such gatherings have been seen recently in Kenya in August (Levy 1995) and in Tanzania in July (Butchart 1997b). On both occasions the Palmnut Vulture was an attendant, which is itself most unusual. This African vulture assemblage has been subjected to functional analysis on skull and beak dimensions (Hertel 1994, 1995). Three feeding types were recognised - rippers, gulpers and scrappers - and three size classes.

Many phylogenetic analyses on the diurnal birds of prey (including vultures) have been done in recent years. They tell different stories! Various characters or elements have been used: morphometrics (Kemp & Crowe 1993), syrinx (Griffiths 1994), osteology (Holdaway 1994), chromosomes (Bed'Hom 1996), diverse including behaviour (Kemp & Crowe 1990), DNA hybridization (Sibley & Ahlquist 1990), genome DNA (Keyser *et al.* 1996), and mitochondrial cytochrome b (Avisé *et al.* 1994, Siebold & Helbig 1995, Wink 1998). The most detailed of these studies as regards African vultures is that by Siebold & Helbig (1995). They stated, among other comments, that the Bearded and Egyptian Vultures are "much more primitive", there is a core group of vultures (subfamily Aegypiinae), and it was unclear to which genus the Hooded Vulture belongs.

INITIATIVES

Two major atlas projects, both of regional coverage, have appeared recently, with both defining bird distributions in hitherto new ways. That for the Arabian peninsula (Jennings 1995), strictly speaking outside Africa, nevertheless raises interesting points on the vultures in north-east Africa across the Red Sea. Four species live in Arabia. The Bearded Vulture and (probably) the Lappet-faced Vulture occur on both sides of the Red Sea (part of the Rift Valley) but as different subspecies. There is considerable doubt as to whether the Rüppell's Griffon ever actually occurred in Arabia. Both the Eurasian Griffon and Egyptian Vulture are "widespread resident[s]"; the former is an uncommon bird in north-east Africa, the latter is a common migrant, but it is not known if Arabian vultures themselves migrate to Africa. At the opposite end of the continent, nine species of vulture were sighted in southern Africa during the atlas period (Harrison *et al.* 1997). Breeding localities were not mapped, but months of breeding are shown in graphs. These are not entirely satisfactory due to the

vultures' long breeding cycle. Both atlases are sterling efforts by the local bird-watching communities, but they suffer from having no data on numbers and ages. The southern African atlas dealt with the issue of numbers to some extent by employing a "reporting rate", so that the maps show areas of frequent reporting (=high density ?). Atlas projects are in operation elsewhere in Africa.

Vultures migrate into and out of Africa at four main 'gates' - Straits of Gibraltar, Sicily/Cap Bon, Suez and Eilat, and Bab-al-Mandab - and it is regrettable that comprehensive counts in both seasons, the northern autumn and spring, for all points have not yet been attempted. Admittedly it is much easier said than done! But interest in migrating raptors is still at hand, for example in Spain (Griesinger 1996, 1998) and Morocco (Franchimont & Moumni 1996), at the straits of Messina (Giordano *et al.* 1998), and at Eilat (Yosef & Alon 1997). I look forward to the year when raptor biologists are able to link up and "conduct coordinated surveys at all major migratory flyways around the Mediterranean basin and in the Middle East" (Yosef & Alon 1997).

To my knowledge, in subSaharan Africa, the only countries where vulture-focused initiatives or conservation actions are in progress, are Kenya and South Africa (and neighbouring Botswana and Zimbabwe). In Kenya the Bearded Vulture has long disappeared from Hell's Gate (Thomsett 1993a), last seen in 1984 with an isolated sighting in 1987 (Henderson 1997), and also from Mount Kenya since 1990 (S. Thomsett *in litt.*). It is planned (and permitted) to take six second-hatchlings, i.e. 'Abel' chicks, from the Balé mountains in Ethiopia, where the species is common. Unfortunately, poisoning of carnivores and vultures is considered to be common in Kenya, and has led to marked reductions in the vulture populations. This was recently emphasised again by the poisoning of Egyptian Vultures around Hell's Gate National Park "by Masai cattle herders" (Anon. 1998). Also within this park, the breeding Rüppell's Griffons have declined "very significantly" (Thomsett 1993b). Road surveys in early 1990 both in the Nairobi National Park and settled areas outside showed that vultures were much more common inside the park than outside it (Sorley & Andersen 1994).

Meanwhile in South Africa and Zimbabwe the environment for vultures is very much more friendly now than it was one or two decades ago. This happy state of affairs can be attributed to the activities of the Vulture Study Group, Raptor Conservation Group, and Poison Working Group (all under the auspices of the Endangered Wildlife Trust) and their colleagues in the nature conservation departments, and to the positive response shown by the land owners, Eskom, pesticide companies, and others. Several initiatives have already been mentioned under the Cape Griffon above. In addition efforts have been underway for some years on bringing back the Egyptian Vulture to South Africa (Verdoorn 1998), although somewhat overtaken by appearances of wild birds. Interest and actions regarding vultures in southern Africa as a whole were described at length at the 1997 Kimberley workshop (Boshoff *et al.* 1997).

While vultures can in theory find a safe haven inside national parks and game reserves, they will of course also fly to 'unprotected' areas outside. Here is the true field of vulture conservationists, in trying to change people's attitudes from negative to positive, so that the birds (and much else under their wing beats) can survive and flourish in the greater environment. Notable examples in South Africa are the farming communities around the Potberg colony (H.A. Scott pers. comm.) and in the Kalahari (Maritz 1998a). In Zimbabwe, the removal of some monopolies in the new liberalised economy has allowed many local abattoirs to appear - with advantages to vultures.

The South African experience points to three 'simple' messages:

- (i) Land owners have consciences but these have to be awakened or enlightened as to the specific plight of vultures (and 'problem' animals generally) by active conservationists. Without the latter, the former is unlikely to happen.
- (ii) The conservationists must have the data at their finger-tips, i.e. research results and monitoring are the essential starting points.
- (iii) Debate, cooperation and compromise are likely to be more productive than confrontation. The EWT, for example, enters into "conservation partnerships" with key sectors.

THREATENED POPULATIONS

Where there are no bird watchers, there is no information. On this basis the current status of vultures in many countries of Africa is not known. Partly this is due to the fact that in the 1990s Africa is suffering yet another turbulent period. In these few years there have been at least 21 conflicts, from civil unrest (South Africa) to genocide (Burundi and Rwanda); some are still ongoing. Eritrea has been formed as a new country from Ethiopia; Somaliland is similarly trying to break away from Somalia; southern Sudan may achieve the same one day from the Khartoum regime; and Western Sahara is still dominated by Morocco. Bird watching and vulture study in such areas in Africa can be difficult to the point of dangerous, to say the least.

North (Arab) Africa is a region of great concern to vulture/raptor conservationists. In Morocco the Cinereous and Lappetfaced Vultures are extinct, and the Eurasian Griffon and Bearded Vulture could soon follow them (Franchimont & Sayad 1993). The vultures have been described as "really endangered" (Haddane 1996), they have suffered a "dramatic decline" (P. Bergier *in litt.*), and the situation "est plus qu'alarmante" (J. Franchimont and A. El Ghazi *in litt.*)! Indeed, it is thought that the Eurasian Griffon ceased to breed altogether after 1987 (P. Bergier *in litt.*). The annual reports of the Groupe d'Ornithologie du Maroc Central, published in *Porphyrio*, list few sightings of the three main species. Poisons against carnivores is likely to be the major cause, but also disturbance from increased human populations. Given the large numbers of Eurasian Griffons and Egyptian Vultures that cross to Morocco from Spain (and France and Portugal), then possibly these birds too are at serious risk of being poisoned, presuming that they do feed along their migration route. This must surely be of interest to the Bonn Convention?

Off the west coast of Morocco and Western Sahara, the Canary Islands offer no better home to the Egyptian Vulture, it seems. In this archipelago the species is sedentary, but is in decline (Blanco & Gonzalez 1992).

The situation is better in Algeria, but there are no known details as to threats (P. Isenmann *in litt.*). Indeed, in the Kabylie region in the north, three species are surviving well, even increasing; these are the Eurasian Griffon and Egyptian and Bearded Vultures (Moali & Gaci 1992). Of the other two species on record for Algeria, there are no recent sightings of the Lappetfaced Vulture but a few of the Cinereous a decade ago (P. Isenmann *in litt.*).

I have no recent information for Tunisia, but Levy (1996) quotes D. Boukhalfa to the effect that "Egyptian Vultures are very common in Tunisia during the migration seasons." But what about the local breeding birds?

What little news there is from Libya is alarming. A report from J. Svehlik in the mid-1980s stated that "everything that moves is shot at" (Meyburg 1986), and in a 30-month period he saw no vultures.

In Egypt, declines are thought to have occurred in Egyptian, Lappetfaced and Bearded Vultures during the last 10-15 years (M. and S. Baha El Din *in litt.*). There are no recent sightings of the Rüppell's Griffon and Cinereous Vulture, and perhaps they should not be expected. A sighting of the latter north of Aswan is considered to have been more likely a Lappetfaced Vulture (P.L. Meininger *in litt.*). Interestingly, M. Baha El Din remarks that Lappetfaced Vultures follow the camel trains that come through the desert from Sudan, and feed on any carcasses.

In summary then, the story varies among the countries of the Maghreb but overall the populations of vultures are in rather a bad way, being vulnerable in places to poisons, shooting, disturbance, effects of deforestation and over-grazing. They are most at risk in Morocco. This is doubly unfortunate because it is likely to affect the migrant populations from western Europe. Some positive conservation effort for vultures is desperately needed in Morocco and probably throughout the Maghreb, including the Canary Islands.

CONCLUSIONS

The document produced in southern Africa (Boshoff *et al.* 1997) is a 'position statement' on the vultures of that region. So far it is a unique document in Africa, and possibly in the world. It could be

produced because of the historical and on-going connections among the countries of the subcontinent. This is the factor lacking elsewhere in Africa. Perhaps the South should reverse the North-South aid flow and initiate projects in the rest of Africa! Vulture numbers, breeding sites, food supply, utilisation and disturbance by humans, are aspects of interest everywhere and all could be easily studied with a minimum of equipment - and a dash of bravery. I therefore look forward to the activities of the new generation of vulture-conservationists in the 21st century, in monitoring, documenting, and improving the status of vultures in Africa.

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REFERENCES

- ALEXANDER-MARRACK, P. 1994. Notes on a breeding colony of the African River Martin *Pseudochelidon eurystomina* in Gabon. *Malimbus* 16: 1-9.
- ALLAN, D. 1995. Raptor rapture in Ethiopia. *Bird Numbers* 4: 28-31.
- ANDERSON, M.D. 1995. Mortality of African Whitebacked Vultures in the North- West Province, South Africa. *Vulture News* 33: 10-13.
- ANDERSON, M.D. [1996]. *Birds of prey and farm reservoirs*. [pamphlet]. Janssen Animal Health, Johannesburg.
- ANDERSON, M.D. & KRUGER, R. 1995. Powerline electrocution of eighteen African Whitebacked Vultures. *Vulture News* 32: 16-18.
- ANDERSON, M.D., MARITZ, A.W.A. & OOSTHUYSEN, E. 1997. Vultures drowning in farm reservoirs. Pages 98-101. In: A.F. Boshoff *et al.*, *op. cit.*
- ANDERSON, M. & SCOTT, A. 1996. Skep 'n aasvoël-'restaurant'. *Landbouweekblad* 23rd August: 34-37.
- ANON, 1998. Pan Africa conservation program. *Peregrine Fund 1997 Annual Report*: 16.
- AVISE, J.C., NELSON, W.S. & SIBLEY, C.G. 1994. DNA sequence support for a close phylogenetic relationship between some storks and New World vultures. *Proc. Natl Acad. Sci.* 91: 5173-5177.
- BALANCA, G. & DE VISSCHER, M.-N. 1997. Composition et évolution saisonnière d'un peuplement d'oiseaux au nord du Burkina Faso (nord-Yatenga). *Malimbus* 19: 68-94.
- BARRAU, C., CLOUET, M. & GOAR, J.L. 1997. Deux jeunes Gypaètes barbus *Gypaetus barbatus meridionalis* à l'envol dans une aire des Monts du Balé (Ethiopie). *Alauda* 65: 200-201.
- BED'HOM, B. 1996. Phylogenetic and evolutionary consequences of the atypical karyotype of Accipitridae. Page 136. In: M. Pandolfi (Ed.) *Abstracts 2nd Int. Conf. Raptors*. RRF and University of Urbino (Italy).
- BELLATRECHE, M. 1994. Données nouvelles sur l'avifaune algérienne. *Alauda* 62: 136-138.
- BENSON, P.C. 1997. Status of vultures in the Northern Province, South Africa. Pages 21-29. In: A.F. Boshoff *et al.*, *op. cit.*
- BLANCO, J.C. & GONZALEZ, J.L. (eds) 1992. *Libro rojo de los vertebrados de España*. ICONA Col. Tec., Madrid.
- BOSHOF, A.F. 1991. Poison collar kills vultures in the north-eastern Cape Province. *Vulture News* 25: 15-16.
- BOSHOF, A.F., ANDERSON, M.D. & BORELLO, W.D. (eds) 1997. *Vultures in the 21st century*. Vulture Study Group, Johannesburg.
- BRETAGNOLLE, F. 1993. An annotated checklist of birds of north-eastern Central African Republic. *Malimbus* 15: 6-16.
- BRIDGEFORD, P.A., BRIDGEFORD, M. & ERASMUS, J. 1995. First record of two Lappetfaced Vulture chicks reared in one nest. *Ostrich* 66: 35-37.
- BROWN, C.J. 1992. Distribution and status of the Bearded Vulture *Gypaetus barbatus* in southern Africa. *Ostrich* 62: 1-9.
- BROWN, C.J. 1997. Population dynamics of the bearded vulture *Gypaetus barbatus* in southern Africa. *Afr. J. Ecology* 35: 53-63.
- BROWN, C.J. & BRUTON, A.G. 1991. Plumage colour and feather structure of the bearded vulture (*Gypaetus barbatus*). *J. Zool., Lond.* 223: 627-640.

- BROWN, G.H.H. 1963. Habits of the Lammergeyer. *J. E. Afr. Nat. Hist. Soc. Coryndon Mus.* 24 (no. 106): 72-73.
- BUTCHART, D. 1995. Some observations on the Palmnut Vulture in Gabon, Central Africa. *Vulture News* 32: 19-22.
- BUTCHART, D. 1997a. Silverbills and Shoebills. *Africa-Birds & Birding* 2(2): 24-30.
- BUTCHART, D. 1997b. Northern Tanzania. A bounty of birding. *Africa-Birds & Birding* 2(5): 37-43.
- CHITTENDEN, H. & MYBURGH, N. 1996. Vultures in the village. Mtunzini's Palmnut Vultures. *Africa-Birds & Birding* 1(1): 20-27.
- CLARKE, G. 1985. Bird observations from northwest Somalia. *Scopus* 9: 24-42.
- CLOUDSLEY-THOMPSON, J. 1981. *Vultures*. Wayland, Hove (England).
- COLAHAN, B.D. 1991. Bearded Vultures killed with coyote getters (R) in the eastern Orange Free State, South Africa. *Vulture News* 25: 13-14.
- DAVEY, P. 1994. Egyptian Vulture *Neophron percnopterus* behaviour. *Scopus* 18: 62.
- DE JUANA A., E. 1994. Observaciones homologadas de aves raras en España y Portugal. Informe de 1992. *Ardeola* 41: 103-117.
- DE JUANA A., E. 1995. Observaciones homologadas de aves raras en España y Portugal. Informe de 1993. *Ardeola* 42: 97-113.
- DEMEXY, R. 1998. Recent reports. *Bull. Afr. Bird Club* 5: 69-75.
- DONALDSON, P. & DONALDSON, E. 1996. To: I-Spy. *Gyps Snips* November: 4.
- DOUTHWAITE, R.J. & MISKELL, J.E. 1991. Additions to *Birds of Somalia, their habitat, status and distribution* (Ash & Miskell 1983). *Scopus* 14: 37-60.
- FRANCHIMONT, J. & MOUMNI, T. 1996. Suivi partie de la migration post-nuptiale des rapaces diurnes sur la rive sud du Déroit de Gibraltar en 1995. *Porphyrio* 8: 55-76.
- FRANCHIMONT, J. & SAYAD, A. 1993. Création d'une association marocaine d'ornithologie. *Proc. Pan-Afr. Ornithol. Congr.* 8: 265-270.
- GIORDANO, A., RICCIARDI, D., CANDIANO, G., CELESTI, S. & IRRERA, A. 1998. Anti-poaching on the Straits of Messina: results after 15 years of activities. Pages 623-630. In: R.D. Chancellor, B.-U. Meyburg & J.J. Ferrero (Eds.) *Holarctic birds of prey*. WWGBP and Adenex, Berlin and Mérida.
- GORE, M.E.J. 1994. Bird records from Liberia. *Malimbus* 16: 74-87.
- GRIESINGER, J. 1996. Autumn migration of Griffon Vultures (*Gyps f. fulvus*) in Spain. Pages 401-410. In: J. Muntaner & J. Mayol (Eds.) *Biología y conservación de las rapaces Mediterráneas, 1994*. SEO/BirdLife Monogr. nr 4, Madrid.
- GRIESINGER, J. 1998. Juvenile dispersion and migration among Griffon Vultures *Gyps fulvus* in Spain. Pages 613-621. In: R.D. Chancellor, B.-U. Meyburg & J.J. Ferrero (Eds.) *Holarctic birds of prey*. WWGBP and Adenex, Berlin and Mérida.
- GRIFFITHS, C.S. 1994. Monophyly of the Falconiformes based on syringeal morphology. *Auk* 111: 787-805.
- GRIMSHAW, J.M. 1995. Birds of prey and owls of the western and northern slopes of Mt Kilimanjaro, Tanzania. *Scopus* 19: 27-37.
- GUYOT, A. & LIGOR, J.-L. 1993-94. Un élément de dimorphisme chez le Vautour percnoptère (*Neophron percnopterus*). *Nos Oiseaux* 42: 40.
- HADDANE, B. 1996. The impact of human activities and rehabilitation of raptors: case study: current situation of raptors in Morocco. Page 111. In: M. Pandolfi (Ed.) *Abstracts 2nd Int. Conf. Raptors*. RRF and University of Urbino (Italy).
- HALLEUX, D. 1994. Annotated bird list of Macenta Prefecture, Guinea. *Malimbus* 16: 10-29.
- HARRIS, D., HARRIS, J., HARRIS, C. & GOODWIN, W. 1994. Observations on the Palmnut Vulture in South Africa. *Birding in SA* 46: 73-78.
- HARRISON, J.A., ALLAN, D.G., UNDERHILL, L.G., HERREMANS, M., TREE, A.J., PARKER, V. & BROWN, C.J. 1997. *The atlas of southern African birds*, vol. 1. BirdLife South Africa, Johannesburg.
- HENDERSON, I. 1997. The last record of Lammergeier in Hell's Gate? *Kenya Birds* 5: 84-85.
- HERTEL, F. 1994. Diversity in body size and feeding morphology within past and present vulture assemblages. *Ecology* 75: 1074-1084.
- HERTEL, F. 1995. Ecomorphological indicators of feeding behavior in recent and fossil raptors. *Auk* 112: 890-903.
- HOLDAWAY, R.N. 1994. An exploratory phylogenetic analysis of the genera of the Accipitridae, with notes on the biogeography of the family. Pages 601-649. In: B.-U. Meyburg & R.D. Chancellor (Eds.) *Raptor conservation today*. WWGBP, Berlin/Pica Press.
- HOUSTON, D.C. & COPSEY, J.A. 1994. Bone digestion and intestinal morphology of the Bearded Vulture. *J. Raptor Research* 28: 73-78.

- HOUSTON, D.C., HALL, A. & FREY, H. 1993. The characteristics of the cosmetic soils used by Bearded Vultures *Gypaetus barbatus*. *Bull. B.O.C.* 113: 260-263.
- HUSTLER, K. & IRWIN, M.P.S. 1995. Fifth report of the OAZ rarities committee. *Honeyguide* 41: 103-106.
- JANA, A. 1995. Palmnut Vultures in the Honde valley. *Honeyguide* 41: 109.
- JAUBERT, J.-P. 1989. Le vautour fauve. *Bibliothèque de Travail* 1009: 24.
- JENNINGS, M.C. 1995. *An interim atlas of the breeding birds of Arabia*. Natl Comm. Wildl. Conserv. Developm., Riyadh.
- KEMP, A.C. & CROWE, T.M. 1990. A preliminary phylogenetic and biogeographic analysis of the genera of diurnal raptors. Pages 161-175. In: G. Peters & R. Hutterer (Eds.) *Vertebrates in the tropics*. Museum Alexander Koenig, Bonn.
- KEMP, A.C. & CROWE, T.M. 1993. Morphometrics of African diurnal raptors. *Proc. Pan-Afr. Ornithol. Congr.* 8: 83-94.
- KEYSER, C., MONTAGNON, D., SCHLEE, M., LUDS, B., PFFITZINGER, H. & MANGIN, P. 1996. First isolation of tandemly repeated DNA sequences in New World vultures and phylogenetic implications. *Genome* 39: 31-39.
- KIRWAN, G. 1993. Around the region. *OSME Bull.* 31: 39-46.
- KIRWAN, G. 1994. Around the region. *OSME Bull.* 32: 43-48.
- KOMEN, J. 1992. Energy requirements of adult Cape Vultures (*Gyps coprotheres*). *J. Raptor Research* 26: 213-218.
- KOMEN, J. & BROWN, C.J. 1993. Food requirements and the timing of breeding of a Cape Vulture colony. *Ostrich* 64: 86-92.
- LAYNA, J.F. 1997. Eurasian Griffons *Gyps fulvus* migrating into Cap Blanc, Mauritania, Western Sahara. *Vulture News* 36: 35-36.
- LEVY, N. 1990. Biology, population dynamics and ecology of the Egyptian Vultures, *Neophron percnopterus*, in Israel. English summary, 27pp. M.Sc. thesis, Tel-Aviv University.
- LEVY, N. 1995. Six species of vulture seen together in Kenya. *Vulture News* 32: 26.
- LEVY, N. 1996. Present status, distribution and conservation trends of the Egyptian Vulture (*Neophron percnopterus*) in the Mediterranean countries and adjacent arid regions. Pages 13-33. In: J. Muntaner & J. Mayol (Eds.) *Biología y conservación de las rapaces Mediterráneas*, 1994. SEO/Bird Life Monogr. nr. 4, Madrid.
- LEVY, N. & SEGEV, H. 1996. Reproductive biology, courtship behaviour and status of the Egyptian Vulture *Neophron percnopterus* in Israel. Pages 415-424. In: J. Muntaner & J. Mayol (Eds.) *Biología y conservación de las rapaces Mediterráneas*, 1994. SEO/BirdLife Monogr. nr 4, Madrid.
- MARITZ, A. 1998a. *Kalahari Raptor Project status report* [pamphlet]. Raptor Conservation Group and S.A. Eagle Insurance, Johannesburg.
- MARITZ, A. 1998b. Interesting observations. Lappetfaced Vultures. *Vulture News* 39:53.
- McCALL, M. 1994. Palmnut Vulture sighting. *Promerops* 214: 8.
- MEDLAND, R.D. (ed.). 1993. Flora and fauna records. *Nyala* 16: 77-90.
- MEININGER, P.L. 1996. From the verge of the western Palearctic: birds of Gebel Elba area, Egypt. *Dutch Birding* 18: 285-292.
- MEININGER, P.L. & DE RODER, F.E. 1992. The migration of birds of prey at Suez, spring 1990. *Courser* 3: 23-34.
- MEYBURG, B.-U. 1986. Some observations on raptors in Libya. *Newsletter WWGBP* 4: 14.
- MOALI, A. & GACI, B. 1992. Les rapaces diurnes nicheurs en Kabylie (Algérie). *Alauda* 60: 164-169.
- MUNDY, P.J. 1995. Rüppell's Griffons in Zimbabwe. *Honeyguide* 41: 218-221.
- MUNDY, P.J. 1997. Vultures in Zimbabwe. Pages 76-81. In: A.F. Boshoff *et al.*, *op. cit.*
- MUNDY, P.J. 1998. Rüppell's Griffon in Zimbabwe - a third time. *Honeyguide* 44: 23-24.
- MUNDY, P.J., BENSON, P.C. & ALLAN, D.G. 1997. Cape Vulture. Pages 158-159. In: J.A. Harrison *et al.*, *op. cit.*
- MUNDY, P., BUTCHART, D., LEDGER, J. & PIPER, S. 1992. *The vultures of Africa*. Acorn Books and Russel Friedman Books, Randburg and Halfway House (South Africa).
- NEWBY, J., GRETTEMBERGER, J. & WATKINS, J. 1987. The birds of the northern Air, Niger. *Malimbus* 9: 4-16.
- OATLEY, T.B. 1994. Selected recoveries from SAFRING: January 1994-June 1994. *Safring News* 23: 95-102.
- OATLEY, T. 1996. Revelations from bird ringing. *Bird Numbers* 6: 16-17.
- OATLEY, T.B., OSCHADLEUS, H.D., NAVARRO, R.A. & UNDERHILL, L.G. 1998. *Review of ring recoveries of birds of prey in southern Africa: 1948-1998*. Endangered Wildlife Trust, Johannesburg.
- OBEPRIELER, O. 1998. Palmnut Vulture in the dry west. *Gyps Snips* July:4.
- PARKER, V. 1995. The current status of some birds of prey in southern Mozambique. *J. Afr. Raptor Biology* 10: 2-3.

- PARKER, V. 1997. The status of vultures in Swaziland and Mozambique. Pages 90-92. In: A.F. Boshoff *et al.*, *op. cit.*
- PIPER, S.E. 1993. *Mathematical demography of the Cape Vulture*. Unpubl. Ph.D. thesis, University of Cape Town.
- PIPER, S.E. 1995. A model of the ring-recovery reporting process for the Cape Griffon *Gyps coprotheres*. *J. Appl. Statistics* 22: 641-659.
- PIPER, S.E., BOSHOF, A.F. & SCOTT, H.A. in press. Modelling survival rates in the Cape Griffon *Gyps coprotheres*, with emphasis on the effects of supplementary feeding. *Bird Study*.
- PRINGLE, A. 1990. Cape Vultures feeding on a live cow. *Witwatersrand Bird Club News* 150: 10.
- ROBERTSON, I. 1995. Recent reports. *Bull. Afr. Bird Club* 2: 61-64.
- RODRIGUEZ, J.L. 1992. *Monfragüe, sierra brava*. Fondo Natural, Madrid.
- SALEWSKI, V. 1997. Notes on some bird species from Comoé National Park, Ivory Coast. *Malimbus* 19: 61-67.
- SCHOLTE, P. 1998. Status of vultures in the Lake Chad Basin, with special reference to northern Cameroon and western Chad. *Vulture News* 39: 3-19.
- SCOTT, H.A. 1991a. Atypical griffon at Potberg Cape Griffon colony in the De Hoop Nature Reserve, south-western Cape. *Vulture News* 25: 10-11.
- SCOTT, H.A. 1991b. A 'miracle' Cape Griffon. *Vulture News* 25: 17-20.
- SCOTT, H.A. 1994. Sick or incapacitated Cape Griffons *Gyps coprotheres* treated at the De Hoop Nature Reserve, Western Cape from May 1985 to May 1993. *Vulture News* 30: 10-18.
- SCOTT, A. 1997. Reported depredation of lambs by Cape Griffons *Gyps coprotheres* in the Overberg region, western Cape. *Vulture News* 37: 28-30.
- SCOTT, A. & ANDERSON, M. [1998]. *Vulture restaurants* [pamphlet]. Overberg Conservation Services, Gansbaai.
- SCOTT, H.A. & BOSHOF, A.F. 1994. *A supplementary feeding scheme for the Cape Griffon Vulture in the southwestern Cape Province, 1984- 1992*. Internal Report no. 13, Cape Nature Conservation, [Cape Town]. 33 pp.
- SIBLEY, C.G. & AHLQUIST, J.E. 1990. *Phylogeny and classification of birds*. Yale University Press, New Haven.
- SIEBOLD, I. & HELBIG, A.J. 1995. Evolutionary history of New and Old World vultures inferred from nucleotide sequences of the mitochondrial cytochrome b gene. *Phil. Trans. R. Soc. Lond. B* 350: 163-178.
- SIGISMONDI, A. & POLITANO, E. 1996. Unusually high concentrations of the Egyptian Vulture *Neophron percnopterus* in a border area of the Dancalia region of Ethiopia, pp. 88-89. In: M. Pandolfi ed. *Abstracts 2nd Int. Conf. Raptors*, RRF and University of Urbino (Italy).
- SIMMONS, R.E. 1995. Mass poisoning of Lappetfaced Vultures in Namibia. *J. Afr. Raptor Biology* 10: 3.
- SIMMONS, R.E. & BRIDGEFORD, P. 1997. The status and conservation of vultures in Namibia, pp. 67-75. In: A.F. Boshoff *et al.*, *op. cit.*
- SNYMAN, J. & SNYMAN, P.H. 1994. Aerial display performed by Rüppell's Griffons (*Gyps rueppellii*) in the Blouberg mountain region, Northern Province, South Africa. *Vulture News* 31: 13-15.
- SNYMAN, P.H., SNYMAN, J., LAWSON, M.E. & LAWSON, N.F. 1994. Rüppell's Griffon sightings at Blouberg in the Northern Province, South Africa. *Vulture News* 31: 10-12.
- SORLEY, C.S. & ANDERSEN, D.E. 1994. Raptor abundance in south-central Kenya in relation to land-use patterns. *Afr. J. Ecology* 32: 30-38.
- STILES, E.K. 1994. Cape Griffon in the Zambezi valley. *Honeyguide* 40: 248.
- STRONACH, N. 1993. Checklist of the birds of Selous Game Reserve. *SCP Disc. Paper* no. 15, 23 pp.
- THOMSETT, S. 1993a. Bringing back the Lammergeyer of Hell's Gate. *Kenya Birds* 2(1): 24-25.
- THOMSETT, S. 1993b. The raptors of Naivasha and Hell's Gate. *Kenya Birds* 2(1): 27-29.
- TREE, A.J. 1998. Recent reports. *Honeyguide* 44: 35-48.
- TYLER, S.J. & BISHOP, D.R. 1998. Important bird areas of Botswana. Pages 333-354. In: K.N. Barnes (Ed.) *The important bird areas of southern Africa*. BirdLife South Africa, Johannesburg.
- ULLMAN, M. 1985. Raptor migration at Suez in March 1982. *Dutch Birding* 7: 11-17.
- VAN ROOYEN, C.S. & PIPER, S.E. 1997. The effects of powerlines on vultures. Pages 102-104. In: A.F. Boshoff *et al.*, *op. cit.*
- VAN WYK, E., VAN DER BANK, F.H., VERDOORN, G.H. & BOUWMAN, H. 1993. Chlorinated hydrocarbon insecticide residues in the Cape Griffon Vulture (*Gyps coprotheres*). *Comp. Biochem. Physiol.* 104C: 209-220.
- VERDOORN, G.H. 1994. What are Rüppell's Griffon doing in the Blouberg ? *Vulture News* 31: 2-3.
- VERDOORN, G.H. 1995a. Turning the tide for birds of prey in South Africa. *Birding in SA* 47: 110-113.

- VERDOORN, G. 1995b.** A year of vulture history for South Africa. Pages 50-59. *In: D. Holt-Biddle (Ed.) Vision of wildlife, ecotourism and the environment in southern Africa. 1996 Annual.* Endangered Wildlife Trust, Johannesburg.
- VERDOORN, G. 1997a.** Red-hot birding ... discover the Kalahari. *Africa - Birds & Birding* 2(2): 60-68.
- VERDOORN, G.H. 1997b.** The impacts of poison on vultures. Pages 105-108. *In: A.F. Boshoff et al., op. cit.*
- VERDOORN, G.H. 1998.** The epic of Pharaoh's Chicken in South Africa. *Endangered Wildlife* 29: 4-9.
- VERDOORN, G.H., TERBLANCHE, D. J.J. & DELL, S. 1997.** Vultures in the North West Province, South Africa. Pages 33-36. *In: A.F. Boshoff et al., op. cit.*
- VERSTER, R. 1992.** Python almost swallows a vulture. *Birding in SA* 44: 30.
- VITTERY, A. 1983.** Movements of palaeartic raptors in the Ethiopian Rift Valley. *Scopus* 7: 1-9.
- WINK, M. 1998.** Advances in the molecular phylogeny of vultures, eagles, hawks and falcons. Pages 61-62. *In: Abstracts Vth world conference on birds of prey and owls.* WWGBP/RCG/VSG/EWT, Johannesburg.
- WYSOKE, J.M., ERASMUS, A., TRENDLER, K.O., TRENDLER, R., VAN DER TOORN, J.J.T.K. & VERDOORN, G.H. 1994.** A paralysis syndrome in Cape Griffons (*Gyps coprotheres*) associated with depressed plasma cholinesterase levels. *Vulture News* 31: 4-8.
- YOSEF, R. 1996.** Sex and age classes of migrating raptors during the spring of 1994 at Eilat, Israel. *J. Raptor Research* 30: 160-164.
- YOSEF, R. & ALON, D. 1997.** Do immature Palearctic Egyptian Vultures *Neophron percnopterus* remain in Africa during the northern summer ? *Vogelwelt* 118: 285-289.

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