

RAPTOR CONSERVATION IN THE NORTHERN CAPE PROVINCE, SOUTH AFRICA

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INTRODUCTION

With a surface area of 369 000 km² and a population of only 800 000 people, the semi-arid Northern Cape Province (NCP) is the largest and most sparsely populated province in South Africa.

The NCP's flora is diverse due to summer and winter rainfall climates, complex topography and diverse geology and soils (Cowling & Hilton-Taylor 1994). Five major vegetation units converge in the NCP, namely the Savanna, Nama Karoo, Succulent Karoo, Fynbos and Grassland Biomes (Low & Rebelo 1986). Of these five Biomes, the Savanna Biome and Nama Karoo Biome cover 84% of the Province's surface area (Low & Rebelo 1986). The climate is dry and the rainfall varies from less than 100 to more than 430 mm per annum. Two major perennial rivers, the Vaal and the Orange, and numerous ephemeral rivers, such as the Kuruman and the Molopo, flow through the Province. The Langeberg, Koranneberg, Kuruman Hills and Roggeveldberge add relief to the relatively flat topography. The predominant land-use activity is small-stock farming and the properties are generally larger than 5 000 ha. With a dry climate and resultant extensive agricultural activities, the NCP is relatively undisturbed and untransformed.

A large number of raptor species frequent the NCP and of the 81 southern African species, 51 (63%) were recorded in this area during the Southern African Bird Atlas Project (Harrison 1987, 1989, 1992). Of these 37 are resident, 20 are common and 14 are seldom encountered. Two species were not recorded during the SABAP, but have previously been reported for the NCP; the Sooty Falcon (Liversidge, Richardson & Gubb 1981) and the European Marsh Harrier (pers. obs.).

All raptors are protected by legislation, the Cape Province Nature & Environmental Conservation Ordinance (No. 19 of 1974), but despite this most raptors have been negatively affected, either directly or indirectly, by man's activities in the NCP. Some previously widespread species, such as the Lappetfaced Vulture and Bateleur (Boshoff & Vernon 1980) have now severely contracted their ranges, while others, such as the Black

Eagle, have not decreased their range and this eagle is seven times more abundant than any other eagle (Boshoff & Vernon 1980).

This study reviews the impact of man on raptors in the NCP and includes information on: the status of raptors, land-use and its impact on raptors, the use by raptors of man-made structures, reservoir drownings, direct persecution, utilization, electrocution, deliberate poisoning, inadvertent poisoning, Redbilled Quelea control, road casualties, and collisions. Mention is also made of current raptor conservation initiatives in the NCP.

METHODS

Information was obtained from various sources: published literature, personal unpublished observations, observations of the members of the Raptor Conservation Group, the Southern African Bird Atlas Project data (Harrison 1987, 1989, 1992) and a 1992 farmer questionnaire survey (Anderson 1995). The questionnaire was sent to 4880 landowners of which 1720 were completed and returned to give a poll of 35.2%.

RESULTS & DISCUSSION

The status of raptors in the Northern Cape Province

Eight of the raptors which occur in the NCP are currently considered threatened in the *South African Red Data Book - Birds* (Brooke 1984), while four species are included in the *World List of Threatened Birds* (Collar, Crosby & Stattersfield 1994) (Table I). Boshoff, Vernon & Brooke (1983) showed that 23.6% of the 55 diurnal raptor taxa surveyed in the former Cape Province have decreased their range during recent years. They suggested that these taxa can be classed as “specialists” in that they occupy narrow ecological niches (for example, vultures). On the other hand the “generalists” are able to persist, usually through adaptation. The decline of raptors in the NCP can be attributed to decreasing food supplies, loss of habitat due to agricultural and urban development and direct and indirect persecution (Siegfried 1963a, 1968; Skead 1967; Heyl 1972; Winterbottom 1972; Siegfried, Frost, Cooper & Kemp 1976; Boshoff & Vernon 1980; Brooke 1984). The positive and negative impact of man in the NCP on each raptor species is listed in Table I. The scavenging eagles (Tawny Eagle and Bateleur) and vultures (Lappetfaced Vulture and Whiteheaded Vulture) are the most threatened raptors, having the highest portion of threatened species than any other guild of birds in South Africa (Brooke 1984). A comparison of the farmer raptor questionnaire surveys conducted during 1976 (Boshoff 1980, Boshoff & Vernon 1980) and 1992 (Anderson 1995) showed that one species, the Tawny Eagle, has decreased its range considerably during this period.

Table I A summary of human impacts on raptors in the Northern Cape Province, South Africa

Species	Status		Impacts								
	S1	S2	P1	Positive			Negative				
	S1	S2	P1	P2	P3	N1	N2	N3	N4	N5	N6
Secretarybird	b,r						?				?
Cape Vulture	v	v1,v2					X		?	X	?
Whitebacked Vulture	b,r			X		X	X		X	X	X
Lappetfaced Vulture	b,r	v1				X	X		X		
Whiteheaded Vulture	b,r	r1					X				
Yellowbilled/Black Kitepm							X				?
Blackshouldered Kite	b,r			X	X		X			X	X
Black Eagle	b,r			X				X	X	X	
Tawny Eagle	b,r			X		X	X	X	X	X	
Steppe Eagle	pm							?			
Lesser Spotted Eagle	v,pm							?			
Wahlberg's Eagle	b,im										
Booted Eagle	b,pm		X						X		
African Hawk Eagle	v,r=?							?			
Martial Eagle	b,r	v1	X	X		?		X	X	X	X
Brown Snake Eagle	b?,r			X							
Bb Snake Eagle	b,r			X					X		
Bateleur	b,r	v1				X	X				
African Fish Eagle	b,r		X		X	X	X			X	
Steppe Buzzard	pm				X					X	X
Jackal Buzzard	b,r			X					X		X
Rb Sparrowhawk	v,b,r?		X								
Little Banded Goshawk	b,r										
Gabar Goshawk	b,r		X		?			X	X		
Pale Chanting Goshawk	b,r		X	X	?			?	X	X	X
African Marsh Harrier	b,r				X						
Montagu's Harrier	pm	nt2									
Pallid Harrier	pm	nt2									
Black Harrier	b,r										
Gymnogene	b,r										
Osprey	pm				X				X		

Species	Status		Impacts									
	S1	S2	Positive			Negative						
			P1	P2	P3	N1	N2	N3	N4	N5	N6	
Peregrine Falcon	b,r	r1										
Lanner Falcon	b,r			X	?			X	X	X	X	
Hobby Falcon	v,pm											
African Hobby Falcon	v,im											
Rednecked Falcon	b,r	i1							X			
W. Redfooted Kestrel	pm						X					
E. Redfooted Kestrel	pm						X					
Rock Kestrel	b,r			X	?				X		?	
Greater Kestrel	b,r			X					X			
Lesser Kestrel	pm	v2				X	X					X
Pygmy Falcon	b,r					X						
Barn Owl	b,r			X	X				X			
Grass Owl	v,r?	i1										
Marsh Owl	b?,r											
African Scops Owl	b,r											
Whitefaced Owl		b,r		X								
Pearlspotted Owl	b,r		X									
Cape Eagle Owl		b,r										
Spotted Eagle Owl	b,r			X	X				X			X
Giant Eagle Owl	b,r								X	X		

Key

S1 (status): b = breeding, r = resident, pm = Palearctic migrant, im = Intra-Africa migrant, v = vagrant
S2 (status): v = vulnerable, r = rare, I = indeterminate, nt = near threatened; 1 = Brooke (1984), 2 = Collar, Crosby & Stattersfield (1994)

P (positive impact) 1 = nests on exotic trees, 2 = nests on man-made structures, 3 = increased habitat

N (negative impact) 1 = habitat destruction, 2 = poisons, 3 = direct persecution, 4 = drowning, 5 = electrocution, 6 = collisions

Landuse of the Northern Cape Province

Rapidly changing land-use patterns have potential direct and indirect impacts on raptors. Human-caused habitat alteration can influence raptor abundance through direct changes in habitat characteristics (e.g. perch density and nest site availability) or indirectly through impacts on prey abundance and availability (Sorley & Andersen 1994).

Because of the arid climate and low productivity there has fortunately been relatively little habitat transformation. In some areas where the natural vegetation has been converted to cultivation, species such as the Blackshouldered Kite may have benefited, and in other areas of South Africa this species has increased its range (Tarboton & Allan 1984; Brandl, Utshick & Schmidtke 1985). The increased availability of rodents around cultivated lands has benefited the Barn Owl and Spotted Eagle Owl.

The most widespread agricultural activity is small domestic-stock (sheep and goats) farming, on relatively large properties (Table II). This is especially true for the Kalahari and the Karoo. Large domestic stock (cattle) are farmed in the north-eastern areas, primarily east of 22° longitude and north of 29° latitude. Crop farming is confined to the areas immediately adjacent to the Orange and Vaal Rivers and Vaalharts Irrigation Scheme, where intensive irrigation farming is practiced (primarily grapes, wheat, cotton, vegetables and maize). This is the only major area of habitat transformation which, as a result, is now totally unsuitable for most raptors. One of the most important crop-types is wheat, which attracts large numbers of Redbilled Quelea during late winter and early summer. This in turn attracts various raptors, such as Lanner Falcons. Game farming is widespread and there are more than 1000 farmers with “adequate enclosure certificates” (Northern Cape Nature Conservation Service, unpubl. data). Urban expansion is limited and there are few large towns and cities.

Table II Farm size class breakdown of the raptor questionnaires returned, for which a size class was given (n = 1 583) (Anderson 1995)

Size class	Area of farm	Returned	% of total
A	0-49 ha	96	6.1%
B	50-999 ha	177	11.2%
C	1 000-2 499 ha	268	16.9%
D	2 500-4 999 ha	344	21.7%
E	5 000+ ha	698	44.1%

The construction of artificial impoundments has been limited and only four large dams have been built, Vanderkloof Dam and Boegoeberg Dam on the Orange River, Spitskop Dam on the Harts River and the Smart Syndicate Dam in the Karoo. Although these

dams provide additional habitat for a few pairs of African Fish Eagles, this species may have benefited more by the growing of tall exotic trees on the banks of the Vaal and Orange Rivers.

The exotic *Prosopis* spp. has invaded an area of 180 400 ha, while the potential area suitable for this plant is 935 000 ha (Harding & Bate 1991, Henderson 1991). These plants form dense, impenetrable stands and as such could negatively effect raptors in an area by, for example, reducing the prey-base.

Only 3.63% of the NCP is conserved, significantly less than the internationally recommended 10% (Low & Rebelo 1996). There are only ten formal conservation areas, five national parks and five provincial nature reserves. Eagles and vultures need huge territories and some species breed in areas of 30-190 km² (in extremes up to 400 km²) (Newton 1976, Van Zyl 1992). If one assumes that for long-term conservation a minimum effective population size of fifty is needed (Soule 1980, Schaffer 1981), one can estimate that areas up to 10 000 km² are needed for the conservation of raptors in protected areas (Brandl, Utschick & Schmidtke 1985). In the NCP only the Kalahari Gemsbok National Park (KGNP), with an area of 95 910 km² is large enough to support large populations of raptors (Herholdt 1995). This emphasizes the importance of private farmland for the conservation of viable populations of these birds. Presently though there is a marked contrast between the density of raptors inside and outside protected areas. For example, Sorley & Andersen (1994) recorded 4.27 raptors/km inside the Nairobi National Park in comparison to 0.40 raptors/km outside the park. In the NCP Liversidge (1994) found that raptors were generally from 10-196 times more abundant in the KGNP than outside. The only exception was the Pygmy Falcon which was 2.6 more times abundant outside the park.

Use of man-made structures

Of 34 raptors which breed in the NCP, 14 have been recorded nesting on artificial structures. The use of man-made structures usually occurs where natural nest-sites are either absent or of a poor quality. The Black Eagle breeds on at least five concrete and steel lattice microwave towers (Boshoff & Fabricius 1986; Ledger, Hobbs & van Rensburg 1987; pers. obs.) and on the ledges of man-made mining pits in Kimberley and Lime Acres (Boshoff & Fabricius 1986, pers. obs.). The Martial Eagle, which normally nest in trees, breeds on metal high voltage transmission pylons (Dean 1975, Steyn 1982, Tarboton & Allan 1984). Similarly the Tawny Eagle, also normally a tree nester, is known to use these metal towers (Boshoff & Fabricius 1986, Vernon 1985). The availability of man-made towers and exotic trees in tree- or cliff-less areas may actually increase the local breeding populations of the Black, Martial and Tawny Eagle. Just east of Kimberley, in the Free State Province, the Whitebacked Vulture nests on metal

electricity transmission towers, the only locality where this is known to occur (Ledger & Hobbs 1985). Various other species have been recorded nesting on telephone and electricity utility structures, including the Rock Kestrel, Greater Kestrel, Lanner Falcon and Jackal Buzzard (Allan 1987, pers. obs). The Rock Kestrel nests on buildings in towns, Lanner Falcon in the Kimberley “big hole”, and Spotted Eagle Owl and Barn Owl make extensive use of buildings, mine shafts, quarries, and other artificial structures (pers. obs). Telephone and electricity structures are used as hunting perches by the Blackshouldered Kite, Steppe Buzzard, Pale Chanting Goshawk and three kestrel species.

A few species use exotic trees for their nesting purposes, including the Booted Eagle (one nest in Namaqualand, Mackenzie pers. comm.), Pale Chanting Goshawk (beefwood trees in Bushmanland, Steyn & Myburgh 1992), African Fish Eagle (bluegum trees), and Gabar Goshawk (pine trees in Kimberley). The NCP’s climate is too arid for the planting of exotic plantations, but in the east and south-east there are small stands of exotic trees which provide habitat for the Redbreasted Sparrowhawk, and without this habitat this species would not occur in the NCP (Macdonald 1986). According to Boshoff *et al.* (1983), the Redbreasted Sparrowhawk and Lesser Kestrel are the only two diurnal raptor species which have increased their range in the former Cape Province. Exotic trees are used for roosting by the Lesser Kestrel, and there are large roosting sites in Galeshewe, Kimberley (2363 individuals, 3 March 1996, Oosthuysen pers. comm), De Aar (6905 individuals), Hanover (7155 individuals) and Philipstown (10 300 individuals, all records from March 1996: Taljaard pers. comm.).

The Pygmy Falcon makes almost exclusive use of the Sociable Weaver nest for its roosting and breeding purposes (Maclean 1970). As the Sociable Weaver also uses artificial structures, such as utility structures and windmills (Maclean 1972) and exotic trees (Anderson 1994a), as nesting platforms, its range has expanded into previously “unsuitable” areas. The Pygmy Falcon too may have therefore expanded its range..

Direct persecution

The direct persecution of raptors by farmers is usually in retaliation to these birds catching domestic livestock and poultry, or fouling drinking water. Targeted species are the Martial and Black Eagle, accipiters, and vultures. The Martial Eagle, which is often referred to as the “lammervanger” (lamb-catcher), is not liked by farmers in general, even those who are favourably disposed towards other eagles (Boshoff & Vernon 1980) and it is probably the most severely persecuted raptor in the NCP. During the raptor questionnaire survey a few farmers (n=11) volunteered that they or their neighbours killed raptors (eagles) after they were suspected to kill domestic livestock.

A total of 265 farmers who returned the raptor questionnaire reported that they were experiencing eagle stock depredations. The number of farmers who reported losses of stock and game to raptors is given in Table III and it is evident that the sheep and goat category (86.4% of total loss reports) is the most important. These depredations were primarily by the Black Eagle, Tawny Eagle and Martial Eagle (92.5%). Not a single farmer reported any depredations by eagles of calves.

Most farmers reported minimal losses due to eagles, with only 74 of the farmers who reported stock losses (27,9%) losing more than 20 small livestock per annum (Table IV). The majority (93.9%) of the small-stock loss reports came from properties larger than 2500 ha.

Table III Number of farmers who reported eagle depredations of domestic stock, game and poultry

	Sheep	Goats	Calves	Game	Poultry	Total	%of total
Black Eagle	99	47	0	8	3	157	59.2
Tawny Eagle	24	12	0	6	4	46	17.4
Martial Eagle	19	12	0	9	2	42	15.8
Bateleur	9	5	0	1	0	15	5.7
Unknown Eagle	2	0	0	1	2	5	1.9
African Fish Eagle	0	0	0	0	0	0	0
Total	153	76	0	25	11	265	100

Table IV Number of farmers who reported that more than 20 small livestock (goat kids and sheep lambs) units were lost due to eagle depredations per annum on their properties

	Sheep	Goats	Total
Black Eagle	33	13	46
Tawny Eagle	12	3	15
Martial Eagle	10	3	13
Total	55	19	74

The distribution of farmers who reported stock depredations by the Black, Martial and Tawny Eagle coincides with the various mountain ranges (Langeberg and Asbestos Mountains, and the mountain ranges of the Karoo) and the Vanzylsrus area. These areas provide suitable habitat for these species and the Vanzylsrus area is a possible dispersal route along the Shabe and Molopo Rivers for young raptors from Botswana.

It is fairly well known that eagles do sometimes depredate on domestic livestock (Davies 1994). The losses can be reduced by, for example, re-establishing the natural predator-prey balance on farmland and, where possible, changing various farm management practices (such as "kraaling" sheep during the early lambing period) to minimize the likelihood of depredation (Davies 1994).

Fifteen farmers reported that they were experiencing problems with smaller raptors (referred to as "valke", "blouvalke" or "bleeksingvalke"). They contended that these raptors, presumably accipiters such as the Pale Chanting Goshawk, but possibly also the Lanner Falcon and Booted Eagle, were catching their domestic chickens. This appears to happen on a very small scale, on farms where poultry is not a dominant farming activity. Nevertheless, these farmers may retaliate by shooting the culprit(s).

Two farmers reported that they had taken action against vultures after they had bathed in their domestic stock drinking troughs.

Deliberate poisoning of raptors

Very little (if any) deliberate poisoning of scavenging raptors takes place in the NCP.

Inadvertent poisoning

One of the most important threats to raptors is poisons, placed in carcasses in the veldt to kill mammalian predators. These chemicals are assumed to cause poisoning of scavenging birds when they eat from the poisoned carcass (or baits), and also secondary poisoning when the raptors are assumed to eat the dead carnivores.

Ranchers who farm predominantly with small-stock (sheep and goats) use more poison than those where large stock (cattle) are farmed (Ledger 1985) so the problem may be significant in the NCP. The widespread use of poisons for the control of mammalian predators has been implicated in the decrease of several avian scavengers in southern Africa (Allan 1989; Brooke 1984; Brown 1986, 1988, 1991). Strychnine (Allan 1989) and synthetic organic pesticides (mainly monocrotophos; Fourie, Basson, Basson, Ferreira, van den Berg, Smith & Labuschagne 1996) are used and the main target species is the black-backed jackal. The decline of three previously common scavenging raptors in the NCP, the Bateleur, Tawny Eagle and Lappetfaced Vulture, suggests that the indiscriminate use of poisons probably poses the most serious threat to the conservation of birds of prey in this Province. Other scavenging birds, such as the Whitebacked Vulture (Anderson 1994b), African Fish Eagle, Jackal Buzzard (Schmitt, Baur & von Maltitz 1987), Martial Eagle, Yellowbilled Kite, Pied Crow and Black Crow are also negatively affected by poisons.

An additional effect of poisons on raptors may be the little known but apparently harmful effect of certain cattle dips on scavenging raptors (Verdoorn pers. comm.). These raptors (and particularly vultures) are exposed to these poisons when they scavenge on dead cattle. Mundy, Grant, Tannock & Wessels (1982) found very low levels of DDE residues in Whitebacked Vulture eggs collected from a farm near Kimberley. They suggested that these levels were low because griffon vultures do not eat the skin of carcasses and consequently would not come into contact with cattle dips. However, they also reported that four eggs which were collected elsewhere contained toxaphene, a compound used in cattle dips. Cattle dips have also been suspected to be the possible indirect cause of death of at least six Whitebacked Vultures in the Nooitgedacht area, north-west of Kimberley (Anderson & Potgieter unpubl. data).

There has been very limited use of DDT and other organochlorines, partly because there is no tsetse fly (*Glossina* spp.) or mosquito (*Anopheles* spp.) problem.

Redbilled Quelea and brown locust control

Many birds of prey (e.g. Steppe Buzzard, Steppe Eagle, Yellowbilled Kite) are killed during Redbilled Quelea control operations (Bruggers, Jaeger, Keith, Hegdal, Bourassa, Latigo & Gillis 1989), such as the recent incident at Dwaalboom (Verdoorn 1993). Death of these raptors is as a result of secondary poisoning after the ingestion of dead or dying quelea which have been poisoned with organophosphates, such as queletox (active ingredient: fenthion). Despite the raptor mortalities elsewhere in South Africa, and the potential negative effect of these poisons (Hunt, Bird, Mineau & Shutt 1991), there have been no reported secondary poisoning incidents in the NCP. Today the explosives method of quelea control is used more frequently in the NCP. Brown locust control operations using organophosphate poisons may also result in the secondary poisoning of raptors. There has, however, been a shift from the usage of organophosphate poisons (fenitrothion) to the more environmentally friendly synthetic pyrethroids (deltamethrin) and the effects of the latter chemicals on non-target organisms should be less persistent and there is less risk to vertebrates (Hartley, Hustler & Mundy 1996).

Gin traps

Raptors are also killed or injured in gin traps, which are set to capture mammalian predators and this is particularly so when these traps are set at carcasses. This can, however, be prevented by placing the trap in an area, or setting the trap in a manner, that will limit this unfortunate cause of mortality/injury. The padding of gin traps also allows non-target animals (such as raptors and medium- and large-size mammals) to be released. Some farmers use gin traps (secured to the top of poles or placed at carcasses) to catch “problem” eagles.

Reservoir drownings

The drowning of raptors in circular farm reservoirs is believed to be a significant mortality factor in the NCP and thus far 18 species have been recorded to drown in these storage dams (Anderson unpubl. data; Anderson 1995a; Knight 1987; Maritz pers. comm.; Mundy, Butchart, Ledger & Piper 1992) (Table V).

In arid areas, such as the Kalahari, raptors rely to a greater extent on artificial water for drinking and bathing purposes, which is usually in the form of steep-walled concrete reservoirs which are seldom full. It is believed that, while attempting to drink, they fall or slip into farm reservoirs and as the walls do not provide purchase for them to climb out, they eventually drown. The reasons for the mass drowning of vultures, of which there have been at least three recent incidences in the NCP, is not clear (Anderson 1995, Knight 1987, Maritz pers. comm.). An example is the incident during January 1996 when 38 Whitebacked Vultures drowned in a single reservoir in the Kalahari. Mass drownings could be related to the ingestion of poisons. Alternatively, like feeding activity, which is normally triggered by the actions of one individual that releases the feeding response in the group, it is suggested that bathing too is a group activity, triggered by the first individual to enter the water.

There are many simple and effective solutions to this problem (for example, Johnson 1991; Anderson & Taljaard 1994a,b,c) and these are currently being promoted during farmer extension programmes, through farmers magazines and newsletters, a television programme, and by means of a pamphlet.

Electrocution

Throughout the world electricity powerlines pose a grave danger to raptor populations (e.g. Ferrer, de la Riva & Castroviejo 1991; Ledger & Annegan 1981). Raptors are usually killed when they alight on these "convenient" perches and death can be as a result of a "phase-to-phase" or a "phase-to-earth" electrocution. In South Africa Eskom has an extensive electrification scheme, comprising mainly of 11 kV and 22 kV lines on wooden-pole structures, with 60 000 km of such lines across rural terrain (Ledger, Hobbs & Smith 1993).

In the NCP many raptor species have succumbed because of electrocution on these powerlines. Recent records include the following species: Tawny Eagle (Boshoff & Basson 1993), Martial Eagle (Boshoff & Basson 1993, Ledger *et al.* 1993), Black Eagle (Ledger *et al.* 1993), African Fish Eagle (pers. obs), Jackal Buzzard (Ledger *et al.* 1993), Whitebacked Vulture (Anderson & Kruger 1995), Lanner Falcon (pers. obs.) and Pale Chanting Goshawk (pers. obs).

Eskom are trying to resolve this problem (Kruger pers. comm.) and all new powerlines are of a "raptor-friendly" design, with staggered insulators, and existing powerlines are modified to prevent electrocutions. This is achieved by fitting the locally developed RP3 raptor-protector over the middle-phase conductor and by cutting a 500 mm gap in the downlead earth-wire below the cross-arm braces.

Table V Raptor species which have drowned in 57 separate incidents in farm reservoirs in the Northern Cape Province since 1975

Species	Number of birds drowned	Number of incidents
Whitebacked Vulture	50	5
Lappetfaced Vulture	2	2
Black Eagle	12	9
Tawny Eagle	6	6
Booted Eagle	1	1
Martial Eagle	9	9
Blackbreasted Snake Eagle	1	1
Jackal Buzzard	3	3
Gabar Goshawk	3	3
Pale Chanting Goshawk	6	4
Osprey	1	1
Lanner Falcon	3	3
Rednecked Falcon	1	1
Rock Kestrel	2	2
Greater Kestrel	2	2
Spotted Eagle Owl	1	1
Giant Eagle Owl	1	1
Barn Owl	3	3
18 species	107	57

Road casualties

An additional raptor mortality factor in the NCP is road casualties, and raptors are killed when they scavenge on dead animals or feed on road verges. The species most frequently affected is the Spotted Eagle Owl, probably killed while feeding on insects on the road at night. Other road casualties have included an immature Martial Eagle, a Pale Chanting Goshawk, Steppe Buzzard, and numerous Lesser Kestrels and Blackshouldered Kites. A possible solution to this problem is to erect signboards next to roads, to warn

motorists about areas where there is a high density of raptors (e.g. close to wetlands) and consequently a higher incident of road casualties.

Collisions

Although large terrestrial birds (such as the Blue Crane and Kori Bustard) frequently collide with the earth-wires of transmission powerlines (unpubl. data), there are relatively few incidents of the collision of raptors with these structures. Known casualties include the Secretarybird, Whitebacked Vulture and Lanner Falcon.

Utilization

The impact of the collection of raptors or their eggs for ethno-medicine, falconry and museum collections is believed to be negligible in the NCP.

Raptor conservation in the Northern Cape

In the NCP much is being done to conserve raptors. The Northern Cape Raptor Conservation Forum was established in 1992 to serve as a means of communication for all parties directly or indirectly involved in raptor conservation and to coordinate raptor conservation activities. Meetings are held bi-annually, 12 organizations are represented, and the forum has many achievements to date, including the production of a certificate, which is presented to landowners who have certain species of breeding raptors on their properties (Anderson 1994c,d,e). About 150 certificates have been awarded thus far. A floating trophy (bronze Pale Chanting Goshawk), the "Gariiep Raptor Conservationist Award", is presented annually to the individual/organization who/which makes the most significant contribution to raptor conservation each year. The former two initiatives are seen as an incentive to encourage raptor conservation in the Province. Other achievements are the initiation of collaborative projects (for example, the re-establishment of Rednecked Falcons in the Kalahari) and the production of articles and a pamphlet on raptors and farm reservoirs.

A veterinarian at a raptor rehabilitation centre in Kuruman attends to the treatment of injured and poisoned raptors.

"Vulture restaurants", or the artificial provisioning of food, in the form of large animal carcasses at specific sites (Butchart 1988b, Anderson & Scott 1996), have been established at various localities. These restaurants have been implemented as management tools to artificially supplement the diet of vultures with uncontaminated meat (*viz.* reduce the risk of pesticide poisoning). These include a restaurant at De Beers's Dronfield farm, near Kimberley (Anderson 1994f), and a restaurant at Damhoek, near Olifantshoek.

The Endangered Wildlife Trust's Raptor Conservation Group has two projects in the NCP; one in the Karoo, the "Platberg Raptor Project" which is coordinated by Francois Taljaard and the other in the Kalahari, the "Kalahari Raptor Project", coordinated by Abrie Maritz. These projects include farmer extension and raptor monitoring (road censusing and nest monitoring). The Northern Cape Nature Conservation Service also has a farmer extension programme.

Various conservancies are being established with the intention of conserving birds of prey. The "Molopo Raptor Conservancy", just outside the NCP, protects the Bateleur, Wahlberg's Eagle, Whitebacked Vulture and other species which breed in the Molopo area. The "Rooibergbewarea", when established, will protect the Black Eagle and Booted Eagle (Anderson, Maritz & Anderson 1995) population and other smaller species which occur in the Asbestos Mountains. Other conservancies are in the pipeline: a conservancy around Kimberley and a conservancy in the Kalahari, in the vicinity of Severn.

One of the more recent developments is the development of a "raptor tourist route" through the Kalahari. A pamphlet has been produced, which includes a map and details of the species which are likely to be seen along a specified route through this area. One of the main aims of this initiative is to show the inhabitants of the Kalahari that the raptors have a monetary value and by attracting ecotourists to this area, valuable revenue will be made available to businesses and entrepreneurs.

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