Birds of the Karoo

Ecology and Conservation

Contents

Cover image: Malachite Sunbird

Acknowledgements

This work is based on the research carried out during the BirdLife South Africa Karoo Birds Research and Conservation Project, conducted from 2017-2019, made possible thanks to a donation to BirdLife South Africa from Mrs Gaynor Rupert. In addition, the project partnered with the SANBI Karoo BioGaps Project, supported by the National Research Foundation of South Africa (Grant Number: 98864), awarded through the Foundational Biodiversity Information Programme (FBIP), a joint initiative of the Department of Science of Technology (DST), the National Research Foundation (NRF) and the South African National Biodiversity Institute (SANBI).

AL wishes to thank Richard Dean for his time, insights and comments. Domitilla Raimondo of SANBI is thanked for the invitation to become part of the SANBI Karoo BioGaps project. Gigi Laidler and Carol Poole are thanked for all their groundwork. Campbell Fleming is thanked for assistance during surveys during 2017, and Eric Herrmann for hard work in the field in 2018. Thanks to Adrian Craig and Salome Willemse for assistance with atlassing efforts. Thanks to Joseph Steyn, Mark Anderson and Kerry Purnell for comments on drafts of this book.

Thank you also to Stefan Theron for completing the Afrikaans translation and Ernst Retief for reviewing the Afrikaans version.

The many landholders who allowed us access to their land and provided coffee and conversation are especially thanked, as are the several landholders who facilitated our surveys by offering a place to stay. Dankie julle almal!

Image credits

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Recommended citation

Wright DR, Theron S, Lee ATK 2019. Birds of the Karoo: Ecology and Conservation. BirdLife South Africa. Johannesburg, South Africa.

Layard's Tit-babbler

Secretarybird

Introduction

Aims of this booklet

The Karoo landscape and culture is unique and has maintained its aesthetic for many generations, whilst other areas have succumbed to excessive development and change. In many respects, the landholders, primarily private and communal farmers, are the key custodians of this landscape. This includes being responsible for the birds and other biodiversity which call this area home. The work of BirdLife South Africa has shown that agriculture and birds can happily coexist and the traditional sheep farming of the region can support biodiversity. However, certain threats to this region and its biodiversity remain. Threats in some instances are even increasing, in particular due to mining and renewable energy facilities. The aims of this booklet are to educate and inspire people to take action where necessary, or continue with existing positive actions which support the conservation of the region's birds and biodiversity. The booklet firstly introduces a suite of the bird species which occupy the region, specifically including those charismatic species which may spark an interest in birds, as well as the endemic species which occur nowhere else in the world! The species descriptions and images should assist interested parties with identification, whilst also providing an introduction to the ecology of these birds. The Karoo endemic species are part of South Africa's unique natural heritage and it is our responsibility to create awareness of these birds and encourage people to support their conservation. In addition, the booklet describes some of the threats to the Karoo landscape and specifically to its birds and biodiversity. In many instances these are shared threats and we hope that knowledge of them may also support action to mitigate their impact on our biodiversity. Finally, the booklet provides conservation recommendations and actions which can be taken by interested landholders, private farmers, communal property owners, environmental organisations and government agencies. In this way, the booklet intends to support the people and organisations already undertaking conservation initiatives in the Karoo, whilst also encouraging action from all who call the region home.

About BirdLife South Africa

Vision

BirdLife South Africa wishes to see a country and region where nature and people live in greater harmony, more equitably and sustainably.

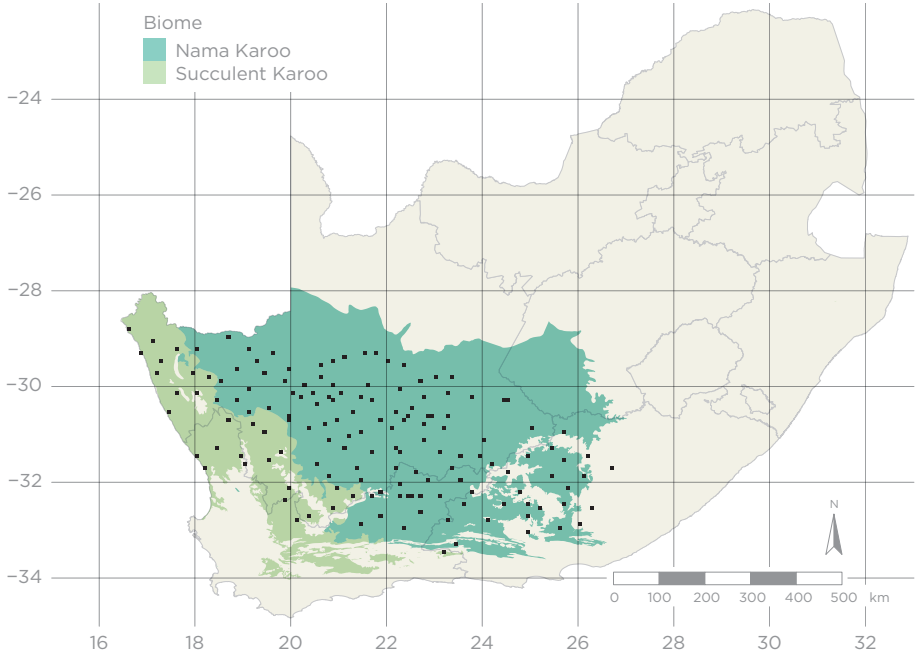
Mission

BirdLife South Africa strives to conserve birds, their habitats and biodiversity through scientifically-based programmes, through supporting the sustainable and equitable use of natural resources and by encouraging people to enjoy and value nature.

The Karoo – climate and geography

The Karoo *sensu lato* describes the arid south-western zone of South Africa. It is a diverse region from all perspectives: historical, geological, and environmental, stretching from the Atlantic Ocean in the west to beyond the Gariep (Orange) River in the north-east. This includes the flowering carpets of the Namaqualand, to the seemingly empty Aberdeen plain, the extremely dry Tankwa and Richtersveld, whispering grasslands of Bushmanland, snow-capped heights of the Hantam and escarpment of the Great Karoo. It is a region of contrasts and extremes, bounded by Fynbos to the south, grasslands to the east, and deserts to the north. This juxtaposition of biomes and environments has created an incredible array of unique habitats exploited by different and remarkable plants and animals, many adapted to life at its harshest.

The region consists of two climatically and botanically distinct biomes: the Succulent Karoo with predominantly stable winter rainfall, and Nama Karoo with predominantly higher summer rainfall but where amounts vary significantly between years. The Nama and Succulent Karoo together cover over 450 000 km², approximately 25-30% of South Africa and at least 25% of Namibia's surface areas. As this is an arid zone, annual rainfall is low (50-400 mm) and is often highly localized, varying annually in amount and timing. There are two notable rainfall gradients across the region: firstly, seasonality, with rainfall



The two biomes that make up the 'Karoo' are floristically very different. Black squares mark the locations of survey areas visited by the author team during 2017 and 2018.

Thunderstorm over the Karoo

transitioning from winter rainfall in the west, through aseasonal, to summer rainfall in the east. Secondly, mean annual rainfall amounts also show a general pattern of increase from west to east, and from north to south. The variability of the rainfall and long dry spells or severe regional droughts create a mosaic so that high and low resource areas occur as patches in the landscape. The Karoo also experiences a dramatic range of temperatures, from frost and snow prone high-altitude areas (e.g. -16°C at Sutherland), to extremely hot central regions bordering the Kalahari Desert (up to 50°C at Vioolsdrif).

Many iconic mammals are found in the Karoo. Springbok and Steenbok are common antelope and endangered species, such as Riverine Rabbit and Black-footed cat, also occur. There are negative perceptions associated with species, such as Black-backed Jackal and Caracal.

Birds of the Karoo

The Karoo, used in this booklet to mean both Succulent and Nama Karoo biomes (see map on page 2), is rich in species for an arid region: over 407 bird species, of which 294 species are considered typical of the region (Dean 1995). The Nama Karoo has a high species richness of nomadic birds which move into areas following high rainfall, such as Lark-like Bunting, Black-eared Sparrowlark, Grey-backed Sparrowlark and Stark's Lark. Both the Succulent and Nama Karoo have high species richness of larks (Alaudidae) compared with other biomes. While typically referred to as LBJs, due to their seemingly drab appearance, they have unique calls and life-history strategies and, with a bit of interest, can readily be told apart.

Stark's Lark, a nomadic granivore

Resident species of birds tend to maintain low densities and wait for rainfall events, whereas nomadic species search for rich resource patches scattered in time and space, so that their respective densities likewise vary temporally and spatially. Resident birds tend to be insectivorous or omnivorous, and often become habituated around human habitats: the Familiar Chat, Karoo Scrub Robin and Mountain Wheatear are good examples. Certain species have become very dependent on humans in the landscape, notably House and Cape Sparrow. These, as well as Pied Starlings, do very well where supplemental feed is given to livestock.

Homesteads on farms provide many resources for birds, and as such tend to have higher species richness than the surrounding landscape. As well as supplemental food, there is usually water, trees, shrubs and watered gardens, which provide food and nesting places for birds. Red-eyed Bulbuls, Cape Weavers, Cape Robin-Chats, Karoo Thrush and mousebirds all love Karoo garden environments. Sheds for livestock provide nesting resources for Speckled Pigeon,

Karoo Scrub Robin

Little Swift, Rock Martin and swallows. Agricultural pastures are frequented by Spur-winged Geese, Cape Francolin, Red-capped Lark, Sacred Ibis and many other species. Irrigated lands have resulted in the expansion of Hadeda Ibis and Egyptian Goose into the Karoo.

However, those birds restricted to the Karoo (the endemics) are normally found in naturally occurring veld. The following 10 species are endemic to the Karoo: Karoo Korhaan, Karoo Lark, Red Lark, Sclater's Lark, Black-eared Sparrowlark, Karoo Eremomela, Cinnamon-breasted Warbler, Namaqua Warbler, Karoo Long-billed Lark and Barlow's Lark.

The following have core ranges strongly centred on the Karoo (Karoo Near-endemic): Cape Long-billed Lark, Large-billed Lark, Ludwig's Bustard, Grey Tit, Sickle-winged Chat, Karoo Chat, Karoo Scrub Robin, Rufous-eared Warbler, Black-headed Canary, Layard's Tit-Babbler and Pale-winged Starling.

Grey-backed Sparrowlark

Familiar Chat

Namaqua Sandgrouse

In addition, a variety of arid zone species have at least half of their distribution range in the Karoo, e.g. Fairy Flycatcher, Karoo Prinia, Grey-backed Cisticola, Pririt Batis, White-throated Canary, Namaqua Sandgrouse, Namaqua Dove, Double-banded Courser and Dusky Sunbird. Of the species reliant on the Karoo, two are considered species of conservation concern: Ludwig's Bustard (Endangered) and Red Lark (Vulnerable), with Sclater's Lark listed as Near Threatened. A subset of the most iconic Karoo birds, including the endemics and near-endemics, are described in further detail here.

Bird tourism opportunities

Avitourism, or people who travel for the purpose of birdwatching, is one of the fastest growing nature-based tourism activities worldwide: in South Africa the market is about 40 000 people per year. Birdwatchers tend to spend more money compared to other tourists, and encouraging birdwatchers to visit your establishment can be of great benefit. Read more about Bird-friendly establishments and their requirements here: **www.birdlife.org.za/go-birding/bird-friendly-establishments/**

Many Karoo landholders have infrastructure (jaghuisies, etc) that can be tailored to provide facilities for visiting birdwatchers. The biggest attraction to birders are the endemics, the birds found only in the Karoo and nowhere else. Places that have a variety of habitats that support a variety of birds are popular with birdwatchers. Old, well established farmsteads with tall trees, shallow dams, as well as good farm tracks for exploring surrounding rangelands, are ideal for this purpose.

Knowing which species are important to birdwatchers can be a valuable service to visiting birdwatchers, and we highlight some of these species in the following pages. Getting up close and personal with birds is a highlight for birdwatchers; for example, in bird hides or around habituated wild birds. Birds can become easily tolerant of people's presence if they are regularly fed. However, one should also ensure that birdwatchers abide by a standard code of conduct and do not disturb sensitive birds unduly; for example, birds on nests. People watching birds should be familiar with the bird watchers' code of ethics: **www.birdlife.org.za/wp-content/uploads/2018/01/BLSA-Code-of-Conduct-Eng.pdf**

Birdwatchers scanning for Larks and other arid zone species

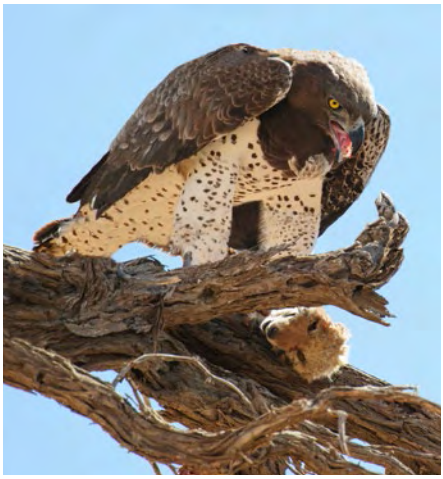
Species descriptions and ecology

Large terrestrial birds and raptors

Verreaux's Eagle/Witkruisarend
Aquila verreauxii

A very large black raptor, frequenting mountainous areas of the Karoo, where they nest on cliffs. In flight the bird has distinctive white panels on the underside of the wings, and a large white "V" on the back, and white rump. Their preferred food is the rock hyrax (dassie), but also take other small mammals, such as young antelope, baboons, monkeys or hares. Occasionally observed to scavenge, they only take livestock rarely, probably when no natural food can be found. Generally, they provide a valuable service to landholders by controlling species that compete with livestock for natural food.

Conservation status
National: Vulnerable;
Global: Least Concern



Martial Eagle/Breëkoparend
Polemaetus bellicosus

One of the largest raptors in South Africa and the world, they have a dark chocolate brown head and neck, with a slight crest, which contrasts with a cream coloured, slightly flecked breast, and dark brown back and wings. They range across much of South Africa but are in serious decline due to multiple threats, including habitat loss, persecution, electrocution and collision with infrastructure. While often seen as a threat by small livestock farmers, a variety of prey including mongoose, antelope, hares and even jackals are taken. Often seen roosting on electricity pylons, on which they also nest occasionally. They prefer open, wooded habitats, like the Kalahari, but also grassland and Karoo, where they are very rare.

Conservation status
National: Endangered; Global: Vulnerable

Pale Chanting Goshawk/Bleeksingvalk
Melierax canorus

A common, medium-sized, pale grey raptor, with fine grey barring on the breast, and bright red legs and cere (small area just above the bill). In flight, the white wings contrast with the black wing tips. They frequent arid and semi-arid shrublands including the Karoo and Kalahari habitats. They are often seen conspicuously perched on telephone poles or other infrastructure from which they scan for suitable prey, which includes mostly small mammals such as rodents, but also small birds and reptiles.

Greater Kestrel/Grootrooivalk
Falco rupicoloides

A raptor, smaller in size than the Pale Chanting Goshawk, and with an overall rufous-brown appearance. The rufous-brown colouring is broken by dense black and brown barring on the back and wings. Preys primarily on insects, such as termites and grasshoppers, but may also take small birds, reptiles and mammals. They are also often visible perched on telephone poles or as they hover whilst hunting. They like to build their nests on windmills.

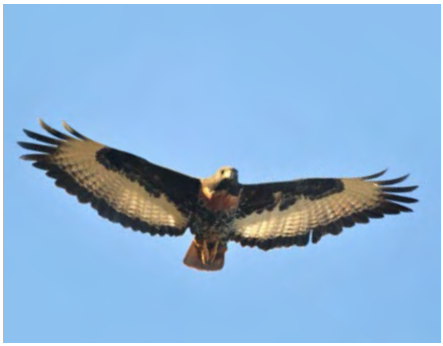
Secretarybird/Sekretarisvoël
Sagittarius serpentarius

A very large, upright raptor with a predominantly grey body, and black feathers on its thighs, above long, bare legs. They're often seen walking through the veld and prefer more open grassland habitats where they hunt snakes and other reptiles, small birds, rodents, amphibians and even hares, using their strong legs and feet to strike and kill their prey. They have a distinctive yellow-orange facial skin, and a crest of feathers often seen standing up in the wind. They nest on the top of flat trees and are under threat due to habitat loss across South Africa. They are prone to entanglement with fences and collision with overhead cables.

Conservation status
National: Vulnerable; Global: Vulnerable

Other raptors/birds of prey

Other typical raptors in the Karoo include Black-shouldered Kite, Rock Kestrel, Jackal Buzzard and Gabar Goshawk. Black-chested Snake-eagle and Booted Eagle also occur, the latter mostly in summer. The Endangered Black Harrier passes through between their winter breeding grounds of the Cape Floristic Region and summer hunting grounds of Lesotho and the Drakensberg. Most other eagles are vagrant. White-backed Vulture occasionally occur in the north, and Cape Vulture to the east, but are also rare.



Jackal Buzzard

Globally important roosts of hundreds (and at some roosts thousands) of Lesser Kestrel occur in tall stands of trees at various towns such as Victoria West, Hanover, De Aar and as far south as Uniondale. This species migrates to South Africa from Asia. Flocks of the migratory Amur Falcon can also be seen in the eastern Karoo. Lanner Falcon, with its rufous cap, and Peregrine Falcon (dark cap) are found in pairs at low densities, with Lanner more associated with landscapes which are treed, and Peregrine with mountains and cliffs. Pygmy Falcon are found associated with Sociable Weaver nests in the north-eastern Karoo. Nocturnal raptors include Barn Owl,

Spotted Eagle Owl and Cape Eagle Owl, with other owl species becoming more frequent closer to the Kalahari. Spotted Eagle Owl is the most frequently seen, often perched along fences or telephone poles from dusk and through the night.

Lesser Kestrel

Spotted Eagle Owl

As apex predators, raptors are very vulnerable to chemicals. For instance, DDT and other organochlorines can result in the thinning of eggshells in Black Harrier, and likely most raptors. Raptors are vulnerable to secondary poisoning associated with rodent control, i.e. if they eat rodents that have died after consuming rodent baits the birds can also die. Rodents killed using poison baits should be properly disposed of, i.e. buried or burnt. Owls provide a valuable pest control service: a breeding family of Barn Owls can easily eat over 10 mice a day. You can attract owls to your property by placing owl boxes, which are easy to build or buy: **www.birdlife.org.za/old-navigation/owl-boxes**

Kori Bustard/Gompou
Ardeotis kori

Considered to be one of the heaviest flying birds in the world at approximately 15.7 kg, and standing more than one metre tall! The distinctive fine grey barring on the neck, brown back and white underbelly, together with the very large size and prominent crest on the back of the head assist in identification. They walk through open habitats, such as the karoo, grasslands and savanna, preying primarily on insects and large reptiles such as lizards, snakes and chameleons. They are threatened due to collisions with infrastructure and through loss of habitat.

Conservation Status
National: Near-threatened;
Global: Near-threatened

Ludwig's Bustard/Ludwigse pou
Neotis ludwigii

A large terrestrial bird, which is nearly one metre tall. They have a rufous-brown colour back with white underbelly, and dark grey-brown fore-neck with a rusty orange hind-neck. Their diet consists of a wide variety of food including insects, small reptiles and mammals and also plant berries and seeds. As with many other large birds and raptors, they are particularly vulnerable to collisions with powerline infrastructure. Much of their core distribution is centred on the Karoo, where they favour dwarf-shrubland habitats. To the east and south their range overlaps with the Denham's Bustard, which prefers grassland habitats.

Conservation status
National: Endangered;
Global: Endangered. Near-endemic.

Karoo Korhaan/Vaalkorhaan
Eupodotis vigorsii

This species appears uniform grey-brown in colour, with the black chin and black eye contrasting the rest of the body. They are of a similar shape to the bustards, but smaller in size: similar in size to the Northern Black Korhaan. Karoo Korhaans have more melodious frog-like calls. They prefer shrubland to grassland habitat, but also make use of agricultural fields. This species also feeds on small reptiles, insects and plant matter which it finds as it walks through the more open habitats. Groups of three are frequently seen.

Conservation status
National: Near threatened;
Global: Least concern. Endemic.

Northern Black Korhaan/ Witvlerkkorhaan
Afrotis afraoides

Similar in shape and size to the Karoo Korhaan, but with a pitch black neck, breast and underbelly in the males. Females are a uniform rufous-brown colour with fine black barring on the back and neck. The males also have a conspicuous white cheek patch. They are often located by the very loud keraak-ker-aaak-kerraak calls given during the territorial display flight or from the ground. As omnivores they feed on insects, seeds, plant material and small reptiles. They are not threatened and common throughout much of the north-east-Karoo where grass cover dominates.

Other large birds

The eastern Nama Karoo is home to large numbers of Blue Crane, South Africa's national bird. Grey-crowned Crane have been seen in agricultural fields associated with irrigation in the Eastern Cape.

White Storks can be seen flying overhead, occasionally stopping to forage on their way south; and Black Stork appear intermittently here and there. Blue Korhaan are found where Nama Karoo interfaces with grassland, e.g. Mountain Zebra National Park in the eastern Karoo.

Blue Crane

Black Stork

White Storks

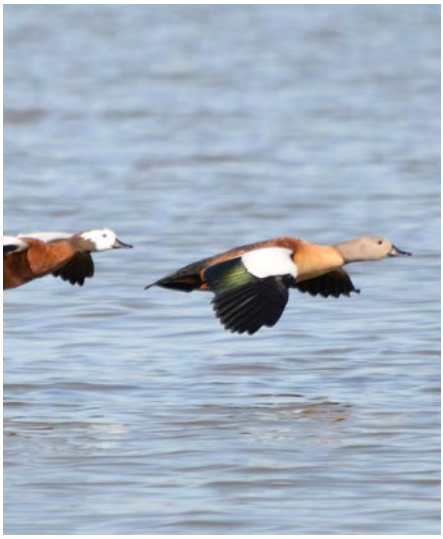
Waterbirds

Pied Avocet/Bontelsie
Recurvirostra avosetta

The upturned bill of the Pied Avocet is diagnostic, with its black and white plumage. A pair or flock grace many shallow dams and pans.

Black-winged Stilt/Rooipootelsie
Himantopus himantopus

The all white head, shorter bill and long red legs of this wader distinguishes it from the Pied Avocet. Pairs are often found on small, shallow dams, while congregations can get fairly large on larger water-bodies.



South African Shelduck/Kopereend
Tadorna cana

One of the region's few obviously sexually dimorphic geese, the male has a grey head and the female has a white face and black crown. The Karoo is a population stronghold for this southern African endemic species.

Other waterbirds

The ephemeral pans and dams of the Karoo can host large congregations of waterbirds, including Red-billed and Cape Teal, Yellow-billed Duck, Greater and Lesser Flamingo. Cape Wagtail, Blacksmith Lapwing, Kittlitz's and Three-banded Plovers can be seen along the shore of most long-lasting water-bodies, with the occasional African Spoonbill. Over summer, a variety of migrant waders appear, including Curlew Sandpiper, Little Stint, Ruff, Common Greenshank, Wood, Common and Marsh Sandpipers. These are best identified using dedicated field guides, such as Faansie Peacock's *Waders of Southern Africa*. Reed beds around dams can team with a wide variety of birds, including African Red Bishop, Levaillant's Cisti-cola and various warbler species.

There are few flowing rivers in the Karoo, with the notable exception being the Orange/Gariep River. This, and other rivers of the Eastern Cape, host a wide variety of birds with life histo-ries associated with water, including Pied and Giant Kingfisher, Reed and White-breasted Cormorant, African Fish Eagle, African Black Duck, Hamerkop, Goliath Heron and various egrets.

Where the Karoo meets the sea on the west coast, a variety of coastal birds can be observed, and estu-aries are particularly prolific birding spots, home to further varieties of coastal waders, gulls and more.

Common Tern roost, West Coast

Kittlitz's Plover (with Grey-headed Gull)

Malachite Kingfisher

Larks

Large-billed Lark/Dikbeklewerik
Galerida magnirostris

A heavy-built and robust lark species, with a large, heavy bill relative to other lark species, with yellowish base. A small crest on the back of the head and heavy streaking on the breasts also helps with identification. They are often the most conspicuous lark species in an area due to their highly vocal nature. They have a melodious, repeated call often likened to 'open-the-squeaky-gate'. They are most likely to be confused with Sabota Larks to the east of their range, which are superficially similar but prefer to perch on bushes and imitate other birds. Much of their distribution centres on the Karoo region where they are a common resident. They are not threatened, with a population estimate of more than 750,000 individuals for the Karoo.

Karoo Lark/Karoolewerik
Calendulauda albescens

This species forms part of a larger complex of related birds, which also includes the Red Lark and Barlow's Lark. The Karoo Lark is the smallest and has the heaviest streaking of these species, with the breast streaking extending on to the belly and flanks. Colour often depends on the sands where they occur. They prefer slightly denser and taller vegetation, and often forage on open sandy patches between larger bushes, where they feed on a variety of insects and plant material. They perform aerial display flights, hovering high and calling, especially after rain. They are most common in the Namaqualand, Tankwa and Hantam Karoo, but absent from Bushmanland and eastern Karoo. The population size is estimated to be more than 700,000 individuals.

Conservation status
Not threatened. Karoo endemic.

Red Lark/Rooilewerik
Calendulauda burra

One of the only threatened Lark species in the Karoo region, with a total population size estimated at 47,000 individuals. They are restricted to the northern and western Karoo region, from Concordia across Bushmanland to south of Brandvlei and eastwards to Vanwyksvlei, and absent elsewhere. They are associated with habitats that have good grass and shrub cover. The larger size and heavier build separate it from the Karoo Lark. The reddish colouration contrasts with the white belly, and streaking is restricted to the upper breast. A pair will defend a territory of several hectares, where males perform hovering display flights with melodious 'trp trp t trr-rip' calls sometimes up to 100 m up, but usually 20-40 m. The Red Lark is replaced by the superficially similar Fawn-coloured Lark where the Karoo meets the Kalahari. Their threat status is primarily due to their restricted range and impacts on habitat quality, especially overgrazing.

Conservation status
National: Vulnerable;
Global: Vulnerable. Endemic.

Barlow's Lark/Barlowse lewerik
Calendulauda barlowi

A highly range restricted species, occurring between Port Nolloth and the Orange River mouth in the Northern Cape, and into the Sperrgebiet of Namibia. This species is not yet considered a full species by certain authorities as it is genetically similar to the Dune Lark of Namibia. It is also thought to hybridise with the Karoo Lark in their contact zone, and their calls are basically indistinguishable. In comparison to the Karoo Larks they appear grey in colour, with fine streaking on the upper breast, but with a slightly longer bill than the other "karoo lark complex" species. They are often located on the ground, foraging below bushes and occasionally using their bills to dig up prey. The presence of this species was negatively correlated with heavily grazed veld in poor condition. Their very small population size, estimated at less than 7,000 birds in South Africa, warrants further conservation attention. Usually seen in pairs or small family groups.

Conservation status
Not threatened. Karoo Endemic.

Karoo Long-billed Lark/
Karoolangbeklewerik
Certhilauda subcoronata

One of the most characteristic sounds of the Karoo is the long descending 'wheeeooo' call of the Karoo Long-billed Lark, often given during a dramatic diving display flight. This is not to be mistaken for the Eastern Clapper Lark, with its wing beat and ascending whistle, often performed as a high aerial display flight. The Karoo Long-billed Lark is one of the "long-billed lark" complex of South Africa, which also includes the Cape Long-billed Lark, Agulhas Long-billed Lark and Eastern Long-billed Lark. The Karoo Long-billed is the most widespread of the four species, with a range extending almost 250,000 km², bounding the Cape Long-billed Lark in the west, Agulhas Long-billed Lark south of the Cape Fold Mountains, and Eastern Long-billed Lark associated with the grasslands of the east. The long-billed larks are generally larger than the other lark species, with a diagnostic long, slightly de-curved bill. This bill is used extensively during foraging as the bird digs for insects, flips stones or breaks apart termite nests. Often in pairs.

Cape Long-billed Lark/
Weskuslangbeklewerik
Certhilauda curvirostris

This is another highly range-restricted lark species, found only in sandy zones of the strandveld and Succulent Karoo vegetation along the west coast of South Africa. Their distribution is entirely restricted to a very narrow band down the west coast. According to the latest estimates, its range extends less than 5,000 km² and the population is estimated at less than 40,000 individuals. The call is very similar to the Karoo Long-billed Lark, but the bill is visibly longer, and overall the bird is larger in size. They appear a uniform grey colour, with streaking on the breast. Usually in pairs.

Conservation status
Not threatened. Karoo Endemic.

Sclater's Lark/Namakwalewerik
Spizocorys sclateri

A very small, highly range-restricted lark species which favours gravel plains or stony desert scrub, where it camouflages well with its habitat. The dark "tear drop" stripe below the eye is fairly diagnostic at close range, along with the heavy bill. They are an overall buffy-brown grey colour, with indistinct streaking on the breast. This species is often difficult to see, and easiest located at drinking troughs or other water points, where it occurs in small to large groups.

Conservation status
National: Near threatened;
Global: Near threatened. Karoo Endemic.

Sabota Lark/Sabotalewerik
Calendulauda sabota

This lark is usually seen calling from the top of a bush or small tree, where they imitate the calls of many other birds. A medium-sized, streaky lark, they are associated with the Nama Karoo and savannas, being absent from the Succulent Karoo.

Spike-heeled Lark/Vlaktelewerik
Chersomanes albofasciata

Probably the most widespread and commonly encountered lark across the Karoo, this lark is fairly easily identified by the pale throat, and short, white tipped tail. Small family groups of 2-6 birds forage on the ground through habitats with low shrubs.

Black-eared Sparrowlark/ Swartoorlewerik
Eremopterix australis

Confined to the north-west portion of the Karoo biome in South Africa, the overall black appearance of the male, with chestnut coloured wings contrasting with the rest of the body make them the most easily identifiable of the Karoo endemics. They are a highly nomadic and irruptive species, which move around the landscape in response to rainfall. In the right habitat and conditions they can be very common, forming large flocks, but are generally scarce. They can form mixed flocks with Grey-backed Sparrowlarks, which are more widespread, and more frequently observed visiting drinking troughs.

Conservation status
Not threatened. Karoo Endemic.

Other passerines

Karoo Chat/Karoospekvreter
Cercomela schlegelii

The Karoo Chat is a near-endemic which appears mostly grey, and slightly larger than the other chat species. It is important to check the tail feathers and rump when trying to identify the various chat species; the Karoo Chat has a grey rump with few white feathers on the edge of the tail. It feeds primarily on insects, either foraging on the ground or flying down to the ground from a perch. This species is negatively associated with increasing grass cover, preferring scrub and low bushes. Most chats are found in pairs, with one often conspicuously perched on a shrub while the other forages on the ground.

Sickle-winged Chat/Vlaktespekvreter
Cercomela sinuata

Slightly smaller than the other chat species, this chat most closely resembles the very common Familiar Chat. Unlike the Familiar Chat, they are not common around homesteads or modified habitats, and do not flick their wings as much. The back is pale grey-brown in colour, contrasting with the more pale underparts. The tail pattern is diagnostic, with a rusty-pink rump and black triangle on the tail feathers. They also have an indistinct white eye ring. Forages in a similar way to Karoo Chat, but may spend more time on the ground hunting for insect prey. They are mostly associated with cooler, upland parts of the Karoo, especially the Hantam area, but mostly rare or absent from the central Karoo. A near-endemic, primarily isolated to South Africa, but also occurring in southern Namibia.

Tractrac Chat/Woestynspekvreter
Cercomela tractrac

Juvenile pictured above.

This species is the lightest in colour of the chats, with an overall pale grey-white appearance. The plain white rump and white edging to the tail feathers is also diagnostic. Forages for invertebrate prey from a fence post or similar perch. They are associated with more arid environments, especially the Tankwa. Research suggests they are less common than the Sickle-winged Chat with approximately half the population size. Their range extends far north into Namibia.

Conservation status
Not threatened. Karoo Near-endemic.

Ant-eating Chat/Swartpiek
Myrmecocichla formicivora

A smaller bird with an overall chocolate brown colour, broken only by the white primary feather wing patches, which are clearly visible in flight. They are often spotted hovering above the ground whilst calling during their display flight, or perched prominently on an anthill, as the name suggests. They forage in family groups, primarily on termites, ants and other insects and occur widely across the country and further north.

Karoo Scrub Robin/Slangverklikker
Erythropygia coryphaeus

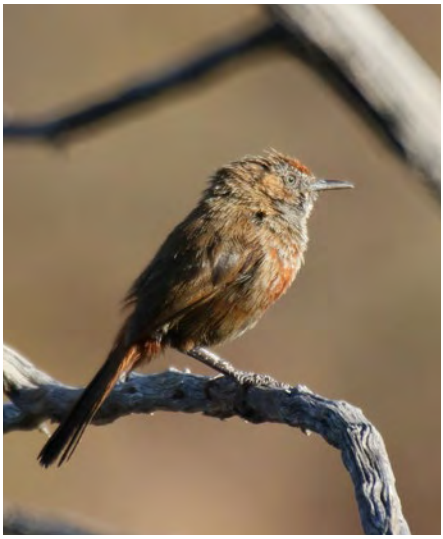
A common near-endemic occurring across the Karoo region and parts of southern Namibia. They are a uniform dark grey colour, with a distinctive white stripe above the eye. The bird also often cocks its tail upwards and flashes the white edges to the tail feathers. They are also negatively associated with grass cover, preferring more bushy habitats. They are often located by their alarm call, heard from a perch or deep within a bush. The song has a wide variety of chattering notes and whistles. Their Afrikaans name comes from their ability to find snakes and give the alarm call to warn other animals.

Conservation status
Not threatened. Karoo Near-endemic.

Karoo Eremomela/Groenbossanger
Eremomela gregalis

A tiny bird of approximately 11-12 cm, with a distinct grey cap, green back and a bright yellow eye. The grey-greenish back contrasts with the white underbelly and yellow vent (base of the tail). A fairly common resident of the western Karoo, with family groups occurring at a density of 4 -5 individuals per km^2. Research indicates that they are negatively associated with increasing grass cover, as with other Karoo endemics, preferring shale ridges and outcrops with scrubby habitat.

Conservation status
Not threatened. Karoo Endemic.



Cinnamon-breasted Warbler/ Kaneelborssanger
Euryptila subcinnamomea

An uncommon species with a total population of approximately 60,000 individuals. They are isolated to rocky slopes, boulder fields and gorges in arid areas, where their cinnamon colouration provides good camouflage with lichen and rocks of the same colour. The reddish breast band, rufous head and rufous coverts at the base of the tail, with the reddy-brown back give an overall grey and reddish appearance. They prey on small insects and may be best located by their call due to their camouflage. The call is a loud, piercing whistle sound - chwee-chwee-chwee.

Conservation Status
Not threatened. Karoo Endemic.

Namaqua Warbler/Namakwalangstertjie
Phragmacia substriata

This small bird is often overlooked as it prefers skulking within Phragmites reedbeds near watercourses; however the loud "trilling" call can give it away and distinguishes it from the similar, but more streaky, Karoo Prinia. The back and flanks are a rufous brown colour which contrasts with the white breast with faint streaking on it. They are associated with habitats near water and increasing vegetation height, likely linked to the reed beds and acacia trees of the drainage lines they prefer. An endemic bird with only a very small part of its distribution in southern Namibia.

Conservation status
Not threatened. Karoo Endemic.

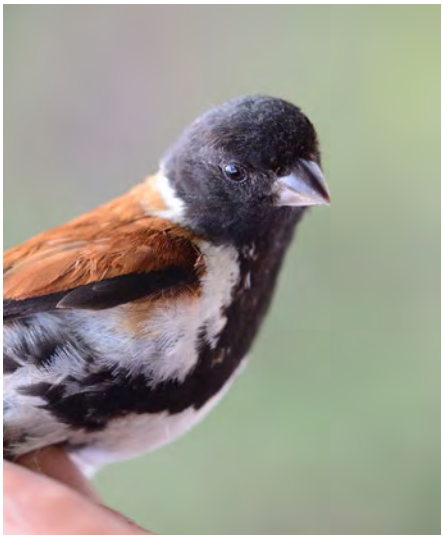
Rufous-eared Warbler/ Rooioorlangstertjie
Malcorus pectoralis

As the name suggests, the bright red ear patch is distinctive. The back is grey with streaking, whilst the plain breast contrasts with a black bar between the breast and throat. One of the more common and widespread species of the Karoo region, with a population estimate of more than two million individuals. Pairs or family groups forage for invertebrates on the ground or among the scrubby karoo plants and are also detected by their piercing call. A near-endemic, also occurring in Namibia and parts of southern Botswana.

Grey Tit/Piet-tjou-tjou-grysmees
Parus afer

This species' Afrikaans name comes from a portion of their loud call, which also includes a variety of whistles, but primarily "piet tjou tjou". The distinctive black crown, black neck and black throat contrast with a white stripe under the eye. Although widespread, they are not always regularly encountered, at a density of less than one individual per km^2. They often make their nests in hollow posts associated with kraals. They mostly forage in pairs or family groups, feeding on insects, and occasionally on spiders, fruit or larvae.

Conservation status
Not threatened. Karoo Near-endemic.



Black-headed Canary/Swartkopkanarie
Crithagra alario

This small arid-zone canary has a distinctive black head and black breast, with a bright rufous back and wings, with black edges to the wing tips. A fairly common arid zone species with approximately 455,000 individuals. They forage in small to large flocks and are nomadic, moving in response to good conditions. They primarily feed on seeds and other plant material, and sometimes drink in large numbers when water is available.

Conservation status
Not threatened. Karoo Near-endemic.

Layard's Tit-babbler/Grystjeriktik
Sylvia layardi

A small grey bird with striking white iris, with a dark-grey to black tail and white vent (area under the tail), as well as fine grey streaking on the white throat and upper breast. A near-endemic which primarily occurs in arid habitats, including the Karoo and dry parts of the Fynbos biome, restricted to South Africa and southern Namibia. Most commonly associated with rocky, scrub dominated mountain slopes, they are usually replaced by Chestnut-vented Tit-babblers in acacia dominated drainage lines or woodlands. They are good mimics, and pairs forage in bushes for insects and fruit.

Conservation status
Not threatened. Karoo Near-endemic.

Pale-winged Starling/Bleekvlerkspreeu
Onychognathus nabouroup

As the name suggests, the pale white wing patch is fairly diagnostic, although only visible in flight. The all blue-black appearance contrasts sharply with the pale wing, and they have a striking pale or yellow eye which distinguishes them from the similar Red-winged Starling. A larger bird at almost 30 cm in length, with a total population size estimated at less than 150,000 individuals in South Africa. Colonies and flocks are associated with mountains and rocky hillsides in the arid zone, but they are generally absent from the Karoo plains unless foraging in nearby wooded drainage lines. Drinks frequently and feeds primarily on insects and fruit.

Conservation status
Not threatened. Karoo Near-endemic.

Red-eyed Bulbul/Rooioogtiptol
Pycnonotus nigricans

A medium-sized bird approximately 20 cm in length. Their dark brown backs contrast with the pale underparts. The black crest and bright red eye ring are diagnostic, together with the yellow vent found in other bulbul species. A common species of the arid zone with a density of approximately 4.5 individuals per km^2. It occurs in South Africa and Namibia. They can occur in flocks around fruiting trees and human settlements, feeding also on other plant material such as flowers. They are also closely associated with water sources.

Conservation status
Not threatened. Karoo Near-endemic.

Cape Sparrow/Gewone Mossie
Passer melanurus

The male "mossie", as it is more commonly known, has a black head and very distinctive white "C" marking on the head, with a rufous coloured back, grey neck and white underparts. They are very common across the region, with a total population estimated at more than 6 million individuals and a density of approximately 20 individuals per km^2. They make conspicuous messy nests, often in thorn trees. They are often found near homesteads and feed primarily on seeds and other plant material.

Conservation status
Not threatened. Karoo Near-endemic.

Southern Masked Weaver/ Swartkeelgeelvink
Ploceus velatus

A typical weaver bird with bright yellow breast and olive-green colouration on the back and wings, contrasting with the dark black face mask. They are highly sociable and will often form colonies with their traditional basket shaped nests hanging in groups in suitable trees. Their loud, "swizzling" call is also diagnostic. They occur in a wide variety of habitats across South Africa and further north.

Sociable Weaver/Versamelvoël
Philetairus socius

As the name suggests, these birds are highly gregarious, always occurring in large groups. Their extremely large nests, with multiple chambers, can be seen across the northern parts of the arid Karoo and Kalahari regions, often on telephone poles. They are a pale brown colour, with mottled marks on their back and a grey bill contrasting with a black chin. Their over-sized nests are an important part of the ecology of the region, providing habitat for species such as Pygmy Falcon, lizards and snakes.

Conservation status
Not threatened.
Endemic to southern Africa.

Lark-like Bunting/Vaalstreepkoppie
Emberiza impetuani

One of the most common birds of the Karoo, although also quite nondescript in plumage. The population was estimated at more than 17 million individuals, with a density of up to 71 individuals per km^2. They are fairly small, with fairly uniform brown plumage with a faint white eye stripe. Nomadic, they are often encountered in small groups or large flocks across the region, and frequently at water sources, where they are usually among the most common birds.

Southern Double-collared Sunbird

Dusky Sunbird/Namakwasuikerbekkie
Cinnyris fuscus

The quintessential sunbird of the arid zone, males with blackish heads and pale bellies, this species can be very common where shrubs, like Lycium (kraaldoring) or Melianthus (kruidjie-roer-my-nie) are in flower, but rare otherwise. Sunbirds are easily told apart: the bright green Malachite Sunbird can be common where flowering aloes are found in the Karoo, and the small, multi-coloured Southern Double-collared Sunbird is restricted to the interface of the Karoo and Cape Floristic Region to the south and east.

Managing crow impacts on livestock

There are three corvid (crow) species that occur across the Karoo. The all-black Cape Crow is an insectivorous species, which can occur in large flocks, but is more commonly seen in pairs. It does not eat meat, unlike the other two species, and is useful for controlling insects like locusts. White-necked Ravens and Pied Crows are superficially similar to each other, except the white on the raven is restricted to the neck only (it has a black belly) and has a heavier bill. The raven prefers rocky or mountainous habitats, as it nests mostly on cliffs. It scavenges on dead animals, including sheep, but has not been reported to harm livestock. Generally, this is a useful species filling the important role of scavenger in mountainous regions.

Pied Crow showing the distinctive white breast

The Pied Crow has increased dramatically across the Karoo in recent years as it has adapted well to human modified landscapes and climate, nesting in predator inaccessible powerline and telephone line infrastructure, as well as windmills. It has filled the ecological niche left by now scarce or extinct vultures, scavenging frequently on roadkill or livestock. It can occur in very large numbers near abattoirs or slaughter houses and in Opuntia orchards. While it can be useful for identifying areas of activity of jackal or caracal, it is now viewed as a pest by many landholders, especially in areas where it has learned to peck the eyes of sheep.

The all black Cape Crow

White-necked Raven

Habitat management

In this section a number of challenges or threats to the birds and biodiversity of the Karoo are described, along with the appropriate conservation actions and solutions to help mitigate each of these threats. These range from large-scale threats with potential severe impacts, such as mining, mineral extraction and electricity infrastructure, to more local scale impacts such as inappropriate fencing and secondary poisoning. It is important for people and organisations to be made aware of these challenges for biodiversity so that they may take

A view over the grassy Karoo plains near Hanover, eastern Karoo.

action where possible. Given the scale of potential development in the Karoo, there is concern that there are few formally protected areas in this biome. The Karoo has the lowest percentage of protected area coverage of any of South Africa's biomes. There is also concern that protected areas in the Karoo are markedly skewed to the higher rainfall areas, and are particularly inadequate for the protection of the endemic and nomadic species of birds.

1.1 Challenge

Mining, mineral extraction and energy production

The Karoo region contains a wealth of mineral resources which can be exploited for commercial gain and play an important role in South Africa's economy and development. Whilst it is essential that certain areas be set aside and used for mineral extraction, it is also important that high priority biodiversity areas be avoided. Existing mineral extraction has included diamonds, gold, iron ore and other metals. There are also new and emerging threats where the impacts of mineral extraction and mining have been poorly quantified, including uranium mining and shale gas extraction, i.e. fracking. Large-scale mining activities lead to an irreversible loss of habitat with knock-on impacts on species which rely on the habitat in those areas. Additional associated impacts include pollution of water sources, air, noise and light pollution. Contamination of water sources is of particular concern in an arid environment such as the Karoo.

Fracking

The recently completed "Karoo BioGaps" study undertaken by the South African National Biodiversity Institute (SANBI) was initiated to address biodiversity information gaps across the southern Karoo area which is defined by shale-gas extraction concessions. 52% of the Nama Karoo and 10% of the Succulent Karoo biomes fall within potential concessions (Todd *et al.* 2016). At least one study on the impact of shale-gas extraction has identified an impact of this activity on bird communities: Farwell *et al.* (2016) suggest that shale gas development has the potential to fragment regional forests and alter avian communities. During our recent BirdLife South Africa survey, no extractive activity related to 'fracking' was observed. An overview of the potential impacts on biodiversity and avifauna has been conducted (Holness *et al.* 2016). This research suggests that under the "Big Gas scenario", as much as 15% habitat loss could result from wellpads alone for species such as Karoo Long-billed Lark, Karoo Chat and Rufous-eared Warbler. Taking additional habitat loss and disturbance along roads into account, it is not unreasonable to expect declines of as much as 20% in the abundance of the above species. Increased road networks and traffic will likely also have negative effects on birds.

The BirdLife South Africa survey identified 30 of 100 of the most commonly encountered species whose presence was associated with the presence of water. These species are all likely to be either attracted by the presence of water in the landscape (and are thus especially vulnerable to the presence of potentially contaminated water that will be a feature of shale gas exploration) or use habitat closely tied to water (e.g. Namaqua Warbler).

In addition to that modelling, a species analysis of life-history traits was conducted on the main Karoo bird community. According to this analysis, 40% of >200 species associated with the Karoo are directly or indirectly reliant on water or associated habitat. This is because some interactions between species and water are subtle. For instance, swallows frequently use mud for nest construction; several species roost in, on or near water or water associated habitats (e.g. Phragmites reedbeds), or may be reliant on insect biota that thrive in aquatic environments.

Certainly, shale-gas exploration in this arid environment spells bad news for biodiversity and especially birds given that research shows water to be an important predictor of species richness and abundance for many species.

Renewable energy developments

BirdLife South Africa supports the development of renewable energy to augment our power needs and replace the more damaging energy production associated with coal mining. However, it is essential that the development of renewable energy facilities does not lead to further negative impacts on the environment. Alternative energy development in the form of wind turbines and solar energy facilities is experiencing rapid growth currently in South Africa, and various bird species, dominated by raptors, have died after colliding with wind-turbines. There are also collision risks associated with large solar energy facilities. In addition to the facilities themselves, there may be further negative impacts on birds due to the powerline infrastructure and distribution network associated with these facilities. In order to mitigate these impacts, BirdLife South Africa has developed the Birds and Renewable Energy Project, which aims to assess the potential and existing impacts on birds, and mitigate these where possible, through proactive engagement with the renewable energy industry.

1.2 Solution

Maintaining a shared vision of the Karoo landscape

The current, predominant land use of agriculture allows for the coexistence of birds, biodiversity and people across the Karoo, given that the veld is managed sustainably. Concerns over fracking, uranium mining or other unsustainable activities are shared by both conservationists and landholders reliant on livestock for an income. The knock-on impacts of large transport trucks associated with mining and the cumulative impacts of mining activities in the general environment will also negatively affect farming activities. All landholders are encouraged to register as interested and affected parties for infrastructure or mining developments within their region or local area. This will ensure that they may have input into such developments. Conservation organisations and committed landholders should work together wherever possible to develop and maintain a shared vision for the landscape, ensuring the conservation of South Africa's natural and cultural heritage.

There are a number of useful resources available on the BirdLife South Africa website: **www.birdlife.org.za/what-we-do/terrestrial-bird-conservation/what-we-do/birds-renewable-energy/**

2.1 Challenge

Electricity grid and other infrastructure

Pylons and the electric grid infrastructure, essential for moving electricity around the country, pose a major threat to the long term viability of populations of Ludwig's Bustard and other species, which are prone to collisions with the overhead cables (Shaw *et al.* 2015). Eskom has a wide variety of bird scaring devices that can be deployed on these lines, but retrofitting is costly. Facilitating the deployment of these devices is a large conservation initiative that needs further attention. In addition, Cape Vulture fatalities, through electrocution on pylons are still recorded, and so pylon design needs continued attention.

Fencing

The Karoo is criss-crossed by thousands of kilometres of a variety of fences, used traditionally for controlling movement of livestock, as well as restricting the movement of problem animals. Fences impact birds in a variety of ways, causing direct mortality through snagging on barbed wire; snaring and snarling (when limbs become entangled in loose strand wires); direct impact (strand fences through wetlands pose a large threat to low flying birds); and barriers for movement of terrestrial birds (Secretarybirds and korhaans).

Big fence projects in effect create population islands for species unable to cross fence lines, although this problem likely does not extend to many bird species. However, strike rates with fences is likely a cause of mortality for large, low flying bird species. Entanglement with single strand fences was frequently observed for jumping game species (Kudu, Mountain Reedbuck, Rhebok). Blue Crane was observed entangled on one occasion and entanglement has been reported for Secretarybirds.

Eagle Owl on fence

The use of electric fences around some camps, or even entire farms seems to have solved or limited the problem of jackal predation of sheep for some farmers. These are usually low line electric fences, although more expensive fences need to be used to keep out caracal, which easily climb fences. The most frequently observed electrical fences are low strand (about 20 cm from the ground) along mesh fences, primarily to control jackal movement. However, of major concern is tortoise bycatch. This is especially a problem in the eastern Karoo regions where large Leopard Tortoises are especially prone to being caught on electric fences, where they die slow and horrible deaths.

2.2 Solution

Bird-friendly infrastructure

Reducing infrastructure collisions
Visibility devices must be deployed on new infrastructure developments since overhead cables are a major source of mortality for cranes and bustards

(Boshoff *et al.* 2011, Jenkins *et al.* 2010, Shaw *et al.* 2010). Eskom and the Endangered Wildlife Trust (EWT) maintain an active partnership regarding improving the safety of electricity grid infrastructure for birds and can be contacted and alerted to problem powerlines. Landholders can contact Eskom to report problem lines and request the installation of visibility devices as required.

Hadeda on a wire

Mitigation of fencing impacts
There are several methods for minimising the unintended impacts of fences on birdlife, which are summarised in this BirdLife South Africa information pamphlet: **www.birdlife.org.za/wp-content/uploads/2019/05/Fences_Birds.pdf**

These include removing non-essential fences and maintaining fence tension. Replacing non-essential barbed wire with smooth wire should be considered, especially for the top strands of long camp fences, as these are especially likely to damage or snag birds like owls. Do not place fences through dams and pans: these are associated with high bird densities. Birds cannot see strand wires under low light conditions and flying into these can kill or maim birds. Increasing fence visibility with flappers, old bottles, metal containers, or similar items will alert birds to the presence of a fence and this also helps prevent Springbok and other game running into fences. Please consider the needs of terrestrial birds, like Secretarybirds, when placing fences, as they can restrict bird movement.

Use of single electric strands rather than fixed, multi-strand fences to control livestock movement could also be considered. To combat the bycatch on fences related to tortoises or other animals, electric fencing can be used as long as temperature controlled timers are used to allow tortoises to escape during the warm periods in which they are most likely to be mobile. These are currently not in use at all, and it would likely require legislation or a major conservation campaign in order to maintain tortoise-friendly electric fences.

Safety of dams and water-points
Many bird species are vulnerable to drowning in cement reservoirs. These should be covered by shade netting, planks or even old corrugated iron if at all possible. This will limit water loss due to evaporation, and prevent animals accessing these sites. Drownings can also be prevented by attaching a log, branch, pole or ladder to the side of the reservoir, and thus allow birds to sit and drink/bathe, but importantly also to clamber onto if their feathers become wet and waterlogged. Simply including a few rocks in standard drinking troughs will aid the escape of most small animals. Preventing animals dying in reservoirs is good practise to maintain water quality.

3.1 Challenge

Secondary poisoning and trapping

A major concern for BirdLife South Africa is the use of poison for problem animal control, due to the secondary impacts on birds and other biodiversity. Poison has a devastating effect on a range of target and non-target species, including endangered species (Santangeli *et al.* 2017). Vultures, raptors and corvids would all be influenced by this practise. Intentional poisoning of birds like Blue Crane is unacceptable and this has been identified as a threat to this species in the Karoo (Gibbons 2011).

Karoo Korhaan in gin trap

Poison use as a method of predator control is illegal for good reason: the wildlife bycatch is nearly unavoidable, and there are secondary environmental effects, e.g. poisoning of soil and water supplies. Unintentional bycatch can include pets and even people. While people clearly do not prefer to scavenge carcasses, this has been reported to occur in poorer communities, and as such the use of poison must be condemned and discouraged.

A further concern related to damage causing animal control is the use of generic gin-traps (known as 'ysters' or 'slagysters'), which do not target specific animals. While these can be deployed in a targeted manner, for example where a damage causing animal is known to occur, their use can also be haphazard. Gin-traps and body-grip traps are frequently placed along fence lines, especially mesh (or jackal-proof) fences where aardvark or other animals have dug under or pushed up the fence, creating wildlife corridors. Bycatch (or secondary trappings) observed at these locations include porcupine, baboon, steenbok, cape fox, bat-eared fox, scrub hare and Karoo Korhaan. Scavenging eagles can also get caught in gin traps.

3.2 Solution

Human-wildlife conflict issues

BirdLife South Africa recognises that damage causing animal control is a controversial and very emotive issue. Our organisation is also not currently qualified to provide evidence-based advice on this issue. However, we recognise that certain practises do have an influence on birds, and hence comment on these from the perspective of those interested in limiting consequences of their actions on bird communities. For more detailed information on 'Sensible solutions to living with wildlife' we recommend: **www.capenature.co.za/care-for-nature/conservation-in-action/biodiversity-compliance/wildlife-management/damage-causing-animals/**

During lambing season, ewes and their lambs can be protected in predator-proof cages, or through more intensive kraaling and monitoring. More regular patrols and increased human presence around

Free-flying Spotted Eagle Owl at Radical Raptors. Rehabilitated wildlife can provide valuable educational opportunities.

vulnerable flocks also lowers predation risk. Comprehensive and holistic damage causing animal management programmes that consider a variety of techniques are important for good land use for farmers, birds and biodiversity.

Kraaling, protection collars, livestock guarding animals, sirens, sensor activated lights and alarms, specific cage traps and the use of herdsmen should all be considered prior to deployment of non-target traps, such as gin traps or body traps, which can all catch birds, especially terrestrial birds of conservation concern like Ludwig's Bustard and Secretarybird.

If you do come across injured birds you can contact the following establishments:

African Bird of Prey Sanctuary
Tel: 031 785 4382
Raptor Rescue Hotline: 082 35 90 900
africanraptor.co.za

Owl Rescue Centre
Tel: 082 719 5463
www.owlrescuecentre.org.za

Vulpro
Tel: 082 808 5113
www.vulpro.com

4.1 Challenge

Climate change

Climate change is resulting in rapid warming of South Africa's arid environments and higher rates of extreme weather events, all of which take their toll on avifauna. At the same time, climate change, in association with telephone line infrastructure, has been given as the reason for the spread of Pied Crows into new areas (Cunningham *et al.* 2016). Observations and projections for warming across southern Africa's arid zone are alarming (Kruger and Sekele 2013). While many of the resident birds are physiologically and behaviourally adapted to dealing with short periods of extreme temperatures, prolonged periods of abnormal temperatures will hamper birds provisioning food to their chicks, foraging, compromise nesting activities, and ultimately reduce breeding success.

Certainly, what makes the Succulent Karoo special is not just the timing of rainfall, which occurs predominantly in winter, but also its predictability. Thus, the Succulent Karoo and its biota will be adversely impacted not just by the probability of decreasing rainfall (as predicted by climate change models), but also if rainfall becomes more erratic in the future. The affiliation of most of the Karoo endemic bird species seems to be tied somewhat to this biome: and as such climate change poses a serious future threat to the avifauna of the Karoo. Climate change is of course a shared threat in this landscape, as the reduction in rainfall has, and may continue to have, negative effects on livestock farming, particularly through periods of prolonged drought.

4.2 Solution

Combating climate change

Climate change is already having dire consequences on the planet, and everyone needs to do their bit. Luckily, many farmers are already doing their part by living off-grid, with solar power, wind turbines, and stoves for warmth. However, farming everywhere of course requires the use of diesel or petrol powered motors, and so consideration can be given on how to reduce these costs, and put a rand or two back into your own pocket for something else.

Different Karoo plants may be under threat from climate change

5.1 Challenge

Alien vegetation

The following alien invasive species or plant groups are notable in the Karoo: various members of the cactus family (often escaped ornamentals, but especially *Opuntia indica* (prickly pear)); *Prosopis glandulosa* or *Prosopis velutina* (Fabaceae, also known as mesquite); *Tamarix ramosissima* (salt cedar or pink tamarisk). Tamarisk has a superficial appearance to the indigenous *Tamarix usneoides* (wild tamarisk), where differences are only clear during the flowering season when the pink flowers of the pink tamarisk clearly differentiate this species from wild tamarisk. Satansbos (*Solanum elaeagnifolium*) is a huge problem in the eastern part of the Karoo. It is mostly found in lucerne, but is said to be spread by kudu and is now also found on hillsides.

Mesquite (*Prosopis glandulosa/ Prosopis velutina)*

On the other hand, prickly pear and mesquite are frequently encountered, with prickly pear common in the south-eastern Karoo, especially where the Karoo meets the Albany Thicket habitat types. This species is frequently encountered around settlements, due to its edible fruit, but also anywhere in the landscape where seeds are dispersed by a variety of fruit eating animals or people (Dean and Milton 2000). Jointed cactus was also observed frequently in this region. A variety of biological control measures have been introduced to slow the spread of *Opuntia* species, but manual removal of dense thickets may still be required in some cases.

By contrast, *Prosopis* can be dominant in the Bushmanland region. Prosopis can form very large trees, and the seed pods are edible for livestock and thus seeds can be quickly dispersed through the landscape by goats or sheep.

The trees are used by Sociable Weavers for making nests in otherwise tree-less landscapes, and are positively associated with the presence of several species, such as Pririt Batis, Black-chested Prinia, Southern Masked Weaver and Red-headed Finch. However, these trees form dense stands and impenetrable thickets, totally transforming dwarf shrub landscape and negatively impacting access to rangelands. There are several projects driven by the Department of Agriculture to assist farmers with dealing with Prosopis, but the fecundity and extent of this species means it will be a feature of the Karoo landscape for years to come. Comparisons of acacia and *Prosopis* dominated habitats suggest bird foraging guilds may respond differently to these vegetation types (Dean *et al.* 2002).

5.2 Solution

Alien vegetation eradication

As far as possible, all alien invasive species should be identified and eradicated, with the priority to clear the lightly infested areas first. This should be done in line with the legal requirements of every landowner to control invasive species on their property, and use the appropriate eradication methods for each species present. Assistance can be sought from various conservation agencies and government departments. The appropriate rehabilitation of the natural vegetation following alien plant eradication should be encouraged.

This will increase the quantity and quality of Karoo habitat available for the endemic and threatened birds.

All landholders should familiarise themselves with the Alien and Invasive Species Regulations promulgated in 2013, in terms of section 97(1) of the National Environmental management: Biodiversity Act 10 of 2004 and the Alien and Invasive Species lists in terms of section 66(1), 70(1)(a), 71(3) and 71A of the National Environmental management: Biodiversity Act 10.

For further information visit **www.invasives.org.za**

A landowner clearing alien wattle trees from a river course

6.1 Challenge

Fire

In the Nama Karoo, where grass becomes an increasingly dominant component of the vegetation cover, fire management needs careful thought. There is a lot of concern regarding fires, since they can cause loss of livestock, human fatalities and damage to infrastructure, and negligence in terms of fire management can result in litigation. With dry conditions accompanied by strong winds, fire can quickly get out of control. However, for grass dominated landscapes, fire is part of the ecological functioning of the landscape: it helps control bush encroachment and rejuvenates moribund veld (du Toit *et al.* 2015). For birds, aseasonal (spring or early summer) fires in the western half of the Karoo can threaten birds that are nesting, or large terrestrial birds (cranes, korhaans), especially very young birds that have limited or no flying abilities.

6.2 Solution

Appropriate fire management

Active fire management already forms a major component of the management of many farms. Fire regimes should mimic those required by the ecology of the natural veld wherever possible. Fire prevention activities should take the focus and ensure that all properties, including government, landholders and private individuals, have the necessary fire breaks and firefighting equipment. They should be registered with the local Fire Protection Association if possible and have full knowledge of any protocols related to reporting and fighting fires within their regions. Fire education programmes should also be conducted for all staff. In certain instances management authorities may also be required to conduct planned burns to maintain ecological functioning within the system. This must be done in full consultation with all of the necessary authorities and as determined by ecological specialists.

Working together

7.1 Challenge

Agricultural land conversion

Large-scale land conversion for agricultural purposes is normally observed in the Karoo in association with low-lying areas with access to irrigation, where the land is used for growing of pasture crops (e.g. lucerne/alfalfa), increasingly seed crops (e.g. onions) and also for the creation of orchards in some regions. This practise involves complete conversion of natural habitat to managed habitat, with major implications for vegetation.

7.2 Solution

BirdLife South Africa acknowledges the critical function of agriculture for ensuring food security and contributing to the country's economy. It is suggested that farming practices in the Karoo focus on livestock production, which is compatible with the birds and biodiversity of this arid environment. However, fortunately in the case of pasture crops, these areas are also often very productive in terms of bird species richness and biomass: African Pipit, Red-capped Lark, Egyptian Goose, Spur-winged Goose, South African Shelduck and, occasionally, Blue Crane are associated with these habitats.

8.1 Challenge

Pesticides

Intensive agriculture, especially for fruit, can often involve intensive insecticide spraying regimes. Impacts of pesticide use can extend far beyond the zone of application, especially for river ecosystems. However, in the arid Karoo regions, agricultural practises that require intensive pesticide use are limited, restricted to the fruit growing regions associated with the Orange River to the north and east, Olifants River to the south, and Fish River to the south east.

8.2 Solution

We acknowledge that it is sometimes necessary to use certain chemicals for managing the impacts of pests during agricultural production. However, these practises should be limited as far as possible, and must avoid contaminating water sources.

9.1 Challenge

Erosion and desertification

Given the arid nature of the Karoo landscape, with low vegetation cover and biomass, erosion and desertification have been hot topics for decades. The number of hectares required per LSU (Large Stock Unit) is upwards of 20, but over 100 for regions like the Tankwa and Richtersveld. Overstocking and artificially maintaining livestock numbers through water provision during drought periods results in devastating consequences for land condition, the 'downward spiral' of loss of vegetation, leading to loss of soil, and ultimately poor recovery of vegetation. The birds and other biodiversity of the region also rely on healthy vegetation to provide suitable habitat. The loss of vegetation and decline in veld quality can therefore have a knock-on impact on the biodiversity.

9.2 Solution

Maintaining healthy veld

The Karoo is dominated by agricultural land-uses, primarily livestock production for cattle and sheep. Recent research undertaken by BirdLife South Africa found that the presence of cattle and sheep on land seemed to have little impact on bird presence, although degraded landscapes did have lower species richness. Given that sheep farming is geared towards maintaining vegetation biomass and relies on rangeland (veld) in good condition, the farming community of the Karoo is a natural partner when it comes to bird conservation.

A few important factors must be kept in mind. The Karoo is a semi-desert. Therefore rainfall is low and unreliable, which means veld should be managed

Land degradation

as conservatively as possible. An ideal approach would be to rest certain parts of a farm to ensure reserves for the dry periods. Landholders should avoid over-stocking of veld to reduce areas of erosion which can lead to long-term desertification.

Livestock will generally utilise the most palatable plant species first, and favour these over other species. A continuous, high-density grazing system can therefore lead to the permanent loss of palatable species, as they are not given a chance to flower, set seed and recover. It is advisable to stock land at the appropriate carrying capacity and to ensure that different plots are given periods of rest to allow the palatable plant species a chance to adequately recover.

For grazing capacity guidelines you can visit the CapeFarmMapper website, and navigate to Resource Layers: Agriculture: Grazing Capacity 2018. **(gis.elsenburg.com/apps/cfm)**

There are also other sources of information available on livestock ecological best practise e.g. **www.azef.co.za/pdf/Grazing_Guidelines_Draft.pdf**

BirdLife South Africa has also produced guidelines which may be applicable for the eastern areas of the Karoo: "Bird-friendly burning and grazing best-practice for grasslands" at **www.birdlife.org.za/media-and-resources/grassland-best-practise-guidelines/**

Land restoration underway

10.1 Challenge

Plastic and other pollution

The problem of poor recycling infrastructure, waste management and plastic pollution has received much media attention. This is a big problem across South Africa and the world, but especially so around the small towns of the Karoo where municipal dumps are easily identified by the plastic distributed by strong winds in the surrounding landscape. Most farmsteads burn all their rubbish, which may have environmental consequences, especially regarding disposal of environmentally hazardous waste, like batteries.

10.2 Solution

Wherever possible, landholders are encouraged to utilise existing recycling schemes which may be found for various products. An opportunity exists for local municipalities, conservation organisations or private landholders to begin recycling initiatives, which can also provide employment for impoverished communities whilst improving the state of the local environment.

Kelp Gull entangled in plastic

Mountain Wheatear

Conclusion

The bird species, environmental threats and conservation actions described in this booklet are intended to provide an introduction for those interested in the conservation and ecology of this region. The booklet is not exhaustive, and interested readers should consult the reference list, further reading, and the various website links throughout the text, in order to learn more about these species and their conservation. The landholders and land managers of the Karoo region are the true custodians of the landscape and they are thanked for providing a space where our unique Karoo birds may flourish. Landholders and managers are also encouraged to apply the solutions described in this booklet, ultimately to the benefit of the birds and other biodiversity which call this region home.

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