KORI BUSTARD | *Ardeotis kori*

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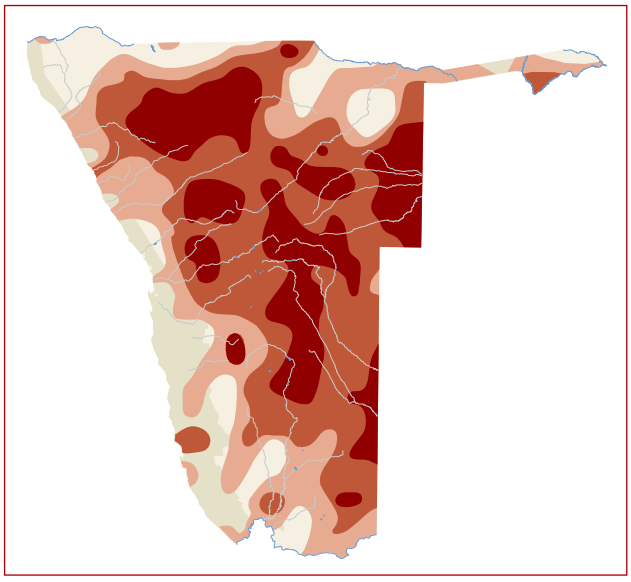

Conservation Status:	Near Threatened
Southern African Range:	Namibia, Botswana, South Africa, Mozambique
Area of Occupancy:	721,000 km^2
Population Estimate:	Approximately 5,000 to 10,000 individuals
Population Trend:	Uncertain, probably declining
Habitat:	Open grassland with scattered trees, absent from closed-canopy woodland and largely excluded from bush-encroached thorn savannah
Threats:	Collisions with overhead lines, habitat loss and fragmentation, poison, illegal hunting, predation

DISTRIBUTION AND ABUNDANCE

There are two subspecies of Kori Bustard; these are possibly distinct species (Youth 2002, Osborne & Osborne 2003). The southern African population of *Ardeotis kori kori* is disjunct from the 'Somali Kori' *A. k. struthiunculus,* found in north-eastern Africa. The distribution of the former is centred on Namibia, Botswana, South Africa and Zimbabwe, extending into southern Angola, marginally into south-western Zambia, and southern Mozambique (Allan 1997l). Namibia and Botswana are strongholds for this species; the dry grasslands and open woodlands of the Kalahari represent typical and the most preferred habitat. In Namibia, it is found throughout the country, occupying an area of 721,000 km^2, but is less frequent in the dry west and mostly absent from the Namib (Allan 1997l). However, it has been recorded in the Namib, as far west as the coast, in areas where suitable grassy conditions occur ephemerally (Allan 1997l). Suitable habitat occurs in north-central Namibia, but it is largely absent from this area outside of Etosha National Park, probably due to the density of rural settlements. In Namibia's protected areas, it is common in the Etosha National Park; this is possibly where it reaches its highest density worldwide (Osborne & Osborne 1998).

This bustard is fairly sedentary, as long as there is sufficient food in an area. Females tend to stay relatively near to their natal area, not moving more than six kilometres away (Osborne & Osborne 2003). However, males tend to congregate on open plains for breeding, and then disperse after the breeding season. Movements of up to 150 km have been recorded (Osborne & Osborne 2000, 2003).

No attempt has been made previously to quantify the Namibian or entire southern African population. Throughout its range, the Kori Bustard is uncommon to locally common, but is generally declining in range and

abundance (Urban *et al.* 1986, Allan & Osborne 2005). Osborne & Osborne (2003) estimated about 2,000 Kori Bustards in Etosha National Park during reproductively good years. In more typical, drier years, Etosha National Park probably holds about 1,000 birds and the Namibian population is thus roughly estimated to consist of 5,000 to 10,000 individuals.

ECOLOGY

The Kori Bustard inhabits semi-arid to arid savannah and grassland, usually near the cover of bushes and trees (Dale 1990, Allan & Osborne 2005). It is also found in modified habitats such as lucerne and wheat fields, and firebreaks (del Hoyo *et al.* 1996, TO Osborne, JR Pallett pers. obs.). It occurs singly or in groups; group size averages 1.7 birds (DG Allan unpubl. data). Birds may cluster around water holes, and loose aggregations of up to 30 birds may occur on open plains. Groups usually comprise birds of the same sex; the groups are not cohesive, but may function as temporary defence against predators (Osborne & Osborne 1999).

Kori Bustards are sexually dimorphic, with males (10 to 15 kg) being much larger than females (5.5 to 7 kg). Age at first breeding has been recorded as three years in females (Osborne & Osborne 2003), and from three to 11 years in zoo-kept male and female birds (Hallager 2000). Breeding males display in open lek areas where they can signal visually and acoustically to other males (Osborne & Osborne 1998). The nest is a shallow scrape in the ground, in woodland or low-tree savannah (trees one to five metres high, Osborne & Osborne 2003). Between November and March, one or two eggs are laid and take 23 days to hatch. Incubation and chick rearing are performed entirely by the female.

Displaying and subsequent breeding appears to be triggered by rain. Out of seven years of monitoring in Etosha National Park, there was almost no breeding in four years of below average rains. In years with rainfall exceeding 400 mm, more than 40% of clutches contained two eggs, and females had better breeding success (Osborne & Osborne 2004). Records from zoos keeping Kori Bustards show that 77% of clutches contain only one egg; 20% contain two eggs, and larger clutches up to four eggs make up the remainder (Hallager 2010). The limiting factor for breeding is probably body fat: in years with little vegetation growth (and presumably less insect food), females do not have enough reserves for egg-laying and incubation. In years when rain, even abundant rain, is late in the season, insect food may be available, but by then males have stopped displaying, so breeding activity is low (Osborne & Osborne 2003). With very little or no breeding during relatively dry years, and mortality factors reasonably constant, the Kori Bustard population must fluctuate significantly.

Their diet includes a wide range of animals and plants, including insects, reptiles, small rodents, birds, carrion, seeds, berries and roots, as well as resin from *Acacia* trees (Osborne & Osborne 1999, Allan & Osborne 2005). Armoured crickets *Acanthoplus discoidalis* and *Hodotermes* termites have been specified as preferred foods (Osborne & Osborne 2003).

THREATS

Collision with overhead power lines is a major threat (Allan & Osborne 2005, Shaw 2013). In southern Namibia, surveys of power lines in the Keetmanshoop area over one year revealed a mortality rate of about 0.1 Kori Bustard / year / km (JR Pallett unpubl. data), which can be corrected to 0.15 Kori Bustards / year / km of power line after factoring in various limitations of the monitoring method (Schutgens 2012). Given that there are more than 6,000 km of tall power lines (132 kV and higher) in the Namibian range of Kori Bustards, at least 900 individuals are estimated to die annually on these lines. Smaller lines (such as distribution lines and telephone lines) also cause collisions, but at lower rates; however, there are many more lines of these types. About 2,000 individuals are roughly estimated to be killed on power lines in Namibia every year. In South Africa, Shaw (2013) estimated that 720 Kori Bustards die every year on transmission lines alone in the Nama Karoo. Martin & Shaw (2010) demonstrated that bustards have restricted forward vision, which may explain their high susceptibility to collisions, and the apparent lack of mitigation effectiveness of marking these lines (see below) (Martin 2011, Ralston 2014).

Bush encroachment has been shown to be linked with a loss of bird species associated with open savannah (Sirami *et al.* 2009). The gradual expansion of the total bush-encroached area in Namibia over the past 50 years (Mendelsohn & el Obeid 2005), combined with the increase in woody cover reported throughout southern African savannahs (Sirami *et al.* 2009), is a likely contribution to the decline in the overall Kori Bustard population in southern Africa. In addition, the availability of suitable savannah areas is reduced by an expanding human population that is causing gradual loss of open habitat, and through fragmentation by infrastructure such as roads, fences and power lines.

Chemical control of locust plagues may affect Kori Bustard populations (Barnes 2000a), either from the direct toxic effect of eating poisoned locusts, or from the secondary impact of a reduced prey abundance, which could lower their sporadic breeding output in the years they do breed.

Another cause of the decline of this species is illegal hunting for bushmeat. Although Osborne & Osborne (2004) considered that this is probably minor because Kori Bustards are not considered palatable, there is clear evidence from power line monitoring that whole fresh carcasses are removed by people, presumably for food (JR Pallett unpubl. data). Names such as 'Christmas turkey'(Osborne & Osborne 2001) and 'Kalahari Kentucky' (Barnes 2000a) show that they are favoured food. The fact that Kori Bustards are 45 times more likely to be seen in protected areas than in unprotected areas in Botswana (Herremans 1998) also shows that hunting or other forms of disturbance constitute a threat.

In protected areas with the full range of predators present, predation has been recorded by black-backed jackal, caracal, leopard and lion, with birds mostly taken at night while sleeping (Osborne & Osborne 1999). Kori Bustards have also been recorded being attacked in daylight by large raptors such as Martial Eagles *Polemaetus bellicosus* and Verreaux's Eagles (Black Eagles) *Aquila verreauxii* (e.g. Fraser 1982, N Proust pers. comm.). Predation-related mortality of chicks and juvenile birds is 80% (Osborne & Osborne 2003).

CONSERVATION STATUS

The species was listed as globally *Near Threatened* in 2013, due to a decreasing population over much of its range (IUCN 2014); and has been listed as *Near Threatened* in South Africa (Taylor *et al*. in press). Its slow breeding rate is probably responsible for numbers staying small after excessive mortalities and, together with the main threats listed above, contributes to the species' decline.

Assigning a local threat category is hindered by a lack of population estimates (Senyatso *et al.* 2012), and there may be a steady, pervasive, but virtually undetected decline in the abundance of Kori Bustards due to the factors described above. The status of the Botswana population is unclear: while the bird is reportedly widespread in that country, and open Kalahari woodland is its preferred habitat, there is concern that it has retreated into protected areas (Tyler 2005). Reporting rates for Kori Bustards in Botswana, even within protected areas (Herremans 1993, in Allan 1997l), are much lower than those for Etosha National Park. It is therefore possible that Namibia's concentration of Kori Bustards in Etosha National Park is the main stronghold for the southern African subspecies. Given the importance of the Namibian population and its potential decline, the Kori Bustard is therefore considered *Near Threatened* locally, in line with its global threat status. The Kori Bustard is included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and should be accorded *Specially Protected* status under any updated or future Namibian Parks and Wildlife legislation.

ACTIONS

Research is urgently needed, in collaboration with power utilities, on effective and economical mitigation against power line collisions. Mitigation of collisions in South Africa and elsewhere has thus far relied on making power lines (particularly the thinner 'earth wire' that is strung higher than the main conductors) more visible by attaching devices such as spheres, flappers, spiral-shaped 'pigtails' and plastic 'flags'. However, their effectiveness in reducing bustard collisions has been relatively low (Anderson 2002, Shaw 2013).

Experimentation to solve this problem has many factors that confound whether a reduction in collision rate can be clearly attributed to the mitigation device (Shaw 2013, Schutgens 2012). Therefore, marking experiments and monitoring need to be carefully planned and continued over a period of at least five years, to collect adequate data. A study on the impact of power lines on Ludwig's Bustards *Neotis ludwigii* in South Africa recommended that all newly erected power lines in the range of this species should be fitted with bird diverters (Shaw 2013). This mitigation strategy is also recommended here. To test its efficiency, devices should be fitted to new power lines in areas where Kori Bustards occur, in a pattern that alternates experimentally marked sections with control sections that are left unmarked. Linked with this, the mortality rate on the marked and unmarked sections should be monitored on a regular and ongoing basis, to contribute to the database (see below) for effectiveness of the mitigation strategy.

Reporting of collisions of bustards and other large birds is helpful for identifying collision 'hot spots', which, in turn, can inform future decisions about marking lines or other mitigation strategies. Compilation of power line conflicts is co-ordinated by the NamPower/NNF Strategic Partnership http://www.nnf.org.na/project/nampowernnf-partnership/13/5/5.html and is made public through their newsletter and the Environmental Information Service (power lines and birds assessment tool on www.the-eis.com).

The Kori Bustard should retain its protected status and hunting of this species should not be allowed. Known nesting areas in Etosha National Park should remain undisturbed, and the current fire regime maintained to prevent bush encroachment. Thinning of bush-encroached areas will favour Kori Bustards, and will likely facilitate a recovery in overall biodiversity and species abundance. Efforts should be made to raise awareness about the biology of and threats to the bird.