Ourebia ourebi ourebi – Oribi


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Regional Red List status (2016)	**Endangered C2a(ii)***
National Red List status (2004)	Endangered C2a(ii)
Reasons for change	No change
Global Red List status (2016)	
Ourebia ourebi	Least Concern
TOPS listing (NEMBA) (2007)	Endangered
CITES listing	None
Endemic	
Ourebia ourebi	No
Ourebia ourebi ourebi	Near

*Conservation Dependent

> The grass is rich and matted, you cannot see the soil. It holds the rain and the mist, and they seep into the ground, feeding the streams in every kloof. It is well-tended, and not too many cattle feed upon it; not too many fires burn it: laying bare the soil. Stand unshod upon it, for the ground is holy, being even as it came from the Creator. Keep it, guard it, for it keeps men, guards men, cares for men.
> Destroy it and man is destroyed
> (Alan Paton 1977).

Taxonomy

Ourebia ourebi ourebi (Zimmermann 1783)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Ourebia* - *ourebi* - *ourebi*

Common names: Oribi (English), Oorbietjie (Afrikaans), Insinza (Ndebele), Phuduhudu-kgamane (Setswana), iWula (Zulu)

Taxonomic status: Subspecies

Taxonomic notes: The common name may be derived from the Khoikhoi name *orabi* (Skinner & Chimimba 2005). Apparent regional differences in body size and colouration have led to 13 Oribi subspecies being suggested (Ansell 1972). However, to date no genetic work has been done to confirm whether these different populations are in fact different subspecies (Brashares & Arcese 2013). Nevertheless, the latest look at these different populations suggests 12 possible subspecies (Brashares & Arcese 2013). These include: *O. o. ourebi, O. o. hastata, O. o. rutila, O. o. cottoni, O. o. masakensis, O. o. aequatoria, O. o. kenyae, O. o. haggardi, O. o. gallarum, O. o. montana, O. o. gosling* and *O. o. quadriscopa*. Of these, *O. o. haggardi,* which is found in Kenya and Somalia, is the only population geographically isolated from the rest of the subspecies (Brashares & Arcese 2013). Sadly, *O. o. keniae* from Mount Kenya is now extinct (Hillman et al. 1988).

Generally, three subspecies are recognised in southern Africa (Skinner & Chimimba 2005; Brashares & Arcese 2013) with *O. o. ourebi* (Zimmermann, 1783) occurring in South African, and southern and central Mozambique. A recent genetic study (van Vuuren et al. in prep.) has found that there is a high genetic variability within the South Africa Oribi population, and thus the population is healthy. Moreover, the genetic evidence indicates that all Oribi in South Africa belong to a single (panmictic) population. Thus, suggestions of geographic genetic differences north and south of the Tugela River are unfounded.

Assessment Rationale

This charismatic subspecies is patchily distributed in grasslands in the eastern half of the country, requiring both short grass for food and long grass for food and shelter. Based on available protected area data and survey returns from private landowners across the country, there are a minimum estimated total of 1,859–2,169 mature individuals (assuming a 60–70% mature population structure). The minimum estimate of the total number of mature individuals is likely an underestimate, due to unreturned surveys, but not significantly so as the Oribi Working Group obtained a good return rate in their most recent 2013 survey. The largest subpopulation in Maloti-Drakensberg Transfrontier Park, KwaZulu-Natal Province, has in the past been considered a single subpopulation of around 400 individuals. Yet, numbers have been declining (from 496 to 375) for the past five years (2010–2015). Moreover, recent spatial data suggest that this subpopulation is more likely a combination of four separate subpopulations, between which movement of individuals is unlikely. Thus it is unlikely that any subpopulation has > 250 mature individuals.

Overall, the national population is estimated to have declined by *c*. 13% over three generations (1996–2014), using data from a sample of formally protected areas (N = 14) across its range with sufficient long-term data. Corroborating this, survey data from private lands (N = 74) in KwaZulu-Natal Province found that between 1999 and 2013, 37% of subpopulations are increasing, 46% are declining and 17% are stable (Patel 2015). Thus, there is a clear continuing decline in the number of mature

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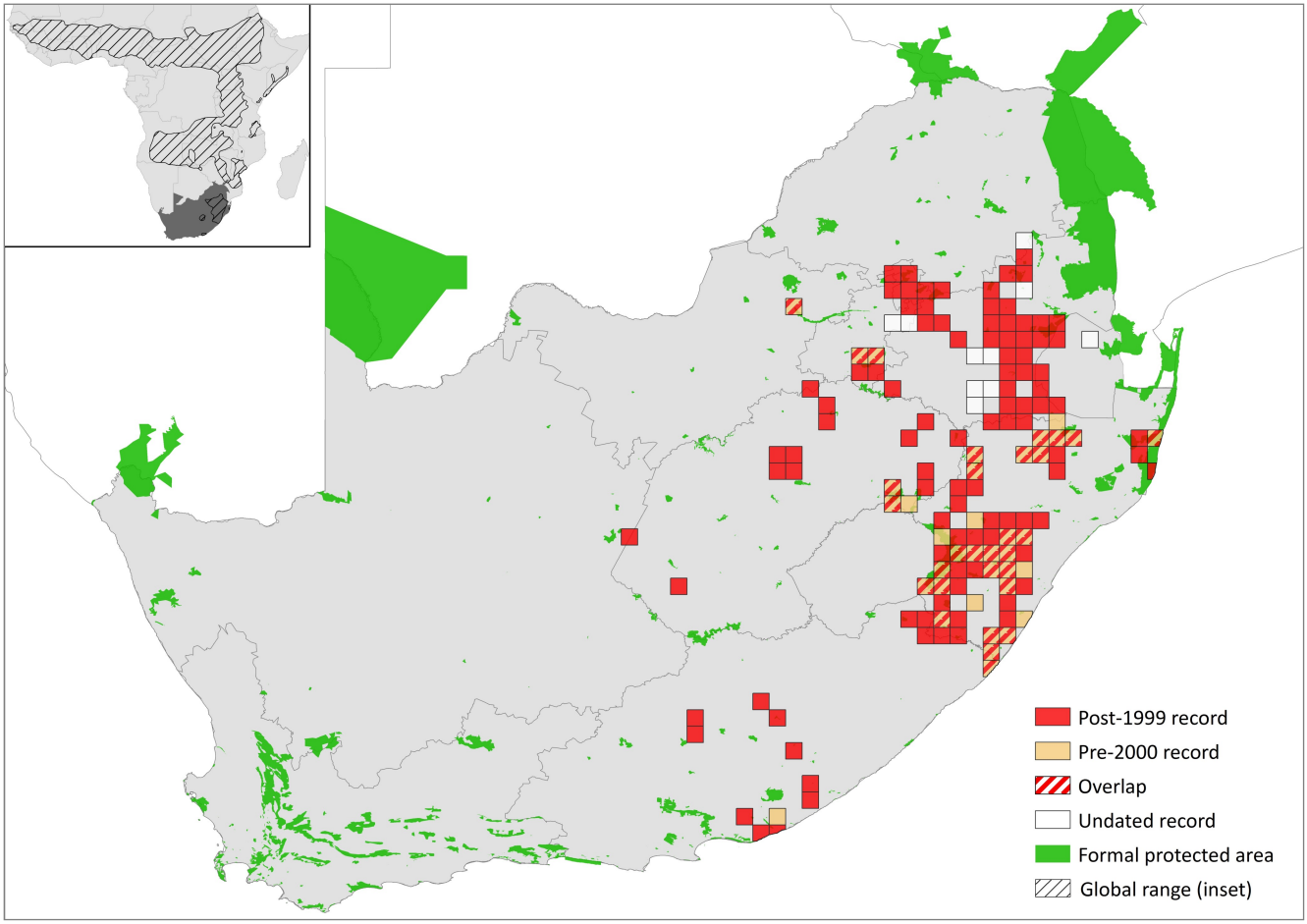

Figure 1. Distribution records for Oribi (*Ourebia ourebi ourebi*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana		
O. ourebi	Extant	Native
O. o. ourebi	Absent	-
Lesotho	Possibly extant	Native
Mozambique	Extant	Native
Namibia		
O. ourebi	Extant	Native
O. o. ourebi	Absent	-
South Africa	Extant	Native
Swaziland	Extant	Native
Zimbabwe		
O. ourebi	Extant	Native
O. o. ourebi	Absent	-

individuals within the assessment region. Correlating with the ongoing decline are data indicating intensifying threats, especially from illegal hunting, which has increased recently from 73 reports in 2001 to 113 reports in 2013. Illegal hunting with dogs has also evolved from small-scale activities into large organised gambling syndicates that are thought to be significantly more destructive to biodiversity. This threat, combined with ongoing grassland habitat loss, fragmentation and poor management is likely to further threaten Oribi in the future.

Given the estimated continuing decline in the population, an estimated mature population size of < 2,500 mature individuals, and the largest subpopulations having < 250 mature individuals with these also declining, we list Oribi as Endangered C2a(i). However, if the number of mature individuals in the larger subpopulations increase to > 250 individuals, then the species would qualify for Vulnerable C2a(i) and thus should be reassessed. Key interventions include combatting illegal hunting through education and enforcement; implementing a managed metapopulation strategy; and continuing to promote stewardship activities in grassland areas, using Oribi as a key flagship subspecies.

Regional population effects: The subspecies' range is not continuous across southern Africa (Skinner & Chimimba 2005; Brashares & Arcese 2013). There is no known immigration or dispersal from outside the region and hence no rescue effect.

Distribution

Across Africa, Oribi have a patchy distribution ranging from Senegal to Ethiopia and Eritrea and south through eastern and western Africa to Angola and the Eastern Cape of South Africa (East 1999; Carpaneto & Fusari 2000; Fischer & Linsenmair 2001; Goldspink et al. 2002; Tekalign & Bekele 2011; Brashares & Arcese 2013; Djagoun et al. 2013; Wilfred & MacColl 2014). The Oribi still occurs widely within its former distribution but its populations are becoming increasingly fragmented as it is gradually eliminated from moderately to densely settled areas, and with changing land uses (Everett et al. 1991; Rowe-Rowe et al. 1992; Wilfred & MacColl 2014).

The subspecies *O. o. ourebi* (Zimmermann 1783) occurs throughout the southern part of its African range (i.e. South Africa, and central and southern Mozambique), while *O. o. hastata* (Peters 1852) is found in northern Mozambique, and eastern and southeastern Zimbabwe, while *O. o. rutila* (Blaine 1922) occurs in northeastern Botswana, northwestern Zimbabwe and northeastern Namibia (Skinner & Chimimba 2005). In South Africa, their current range is probably similar to their historical range, occurring extensively in grasslands in Mpumalanga, Eastern Cape and KwaZulu-Natal provinces (see Howard & Marchant 1984 for information on distribution in KwaZulu-Natal), with a few subpopulations in southern and northeastern Free State, and southern Limpopo (Skinner & Chimimba 2005; Little & Magwaza 2014; Figure 1). There is one subpopulation on formally protected land in North West Province (Kgaswane Nature Reserve) and it is unclear whether this area represented part of their historical range (Power 2014). Another subpopulation was discovered near Parys in the Vredefort Dome Granite Grasslands, an area where they formerly occurred (Power 2014). They are far more widely distributed in the Eastern Cape Province (for example, the former Transkei) than available data suggest (Figure 1), and future assessments should collate data from this region to make the distribution map more accurate. They may marginally occur in Lesotho (Lynch 1994), as habitat is connected with the largest subpopulation in the Maloti-Drakensberg Transfrontier Park. They also occur in the highveld and Lubombo regions of Swaziland (Monadjem 1998). Introductions have predominantly been within the distributional range (Ezemvelo KwaZulu-Natal Wildlife unpubl. data). However, a few have been introduced into out of range areas (Marchant 1996).

Population

Oribi density depends on veld management and range quality (Skinner & Chimimba 2005, Stears 2015), and, at seven study sites at midland elevation in KwaZulu-Natal, density ranged from 4–18 animals / km^2 (Everett et al. 1991). Similarly, outside of the assessment region, Oribi can be locally common in suitable habitats at densities of 2–10 animals / km^2, but have been recorded at densities up to 45 animals / km^2 in exceptionally productive tropical grasslands and treeless floodplains (Brashares & Arcese 2013 and references therein). However, densities estimated from ground counts range from 0.1–0.4 animals / km^2 in areas where the species is uncommon or depleted (East 1999).

The total minimum count for 2013–2015, based on both protected area game count records and survey returns from private landowners from across its range, is 3,098 individuals (Table 2). This yields a minimum observed total of 1,859–2,169 mature individuals (assuming a 60–70% mature population structure). We assume this proportion of adults in the population as adult Oribi tend to be solitary, move in male-female breeding pairs, or in groups comprised of a single male and one or two females plus their offspring (Skinner & Chimimba 2005; Humphrey 2006). Moreover, as males tend to breed with one female (Skinner & Chimimba 2005) young most likely make up around one third (*c.* 33%) of the population.

Population estimates are confounded by inconsistent survey returns due to the difficulties of communicating with all landowners throughout the Oribi's range. For example, from 2001 to 2005, survey results estimated the Oribi population in the region to be between 2,017 and 2,992 individuals (Oribi Working Group unpubl. data). In 2007, the population was estimated to have declined to 1,500 individuals (including young) (Oribi Working Group unpubl. data). However, this was likely due to poor survey returns (Patel 2015). In 2011, greater survey effort was made resulting in a population estimate of ~ 2,100 individuals (44 of which were juveniles). In 2012 and 2013, even greater focus was put into the survey, resulting in population estimates of 2,574 and 2,932 respectively (Oribi Working Group unpubl. data). Comparing similar response rates from 2001 (291 respondents) to 2012 (249 respondents), a decrease from 2,992 to 2,574 individuals was recorded. However, even if the current population estimate was under by 500 animals (which itself is an overestimation; A. Shrader & I. Little pers. comm. 2016) the total number of mature individuals would only be between 2,159 and 2,519.

Most of the of the population (63%) exists on private land and can be considered wild and free-roaming (Oribi Working Group unpubl. data). Intensive captive breeding have been unsuccessful due to spatial requirements associated with male territoriality. While most subpopulations are small (< 50 individuals), there are a

Table 2. Summary of minimum population size estimates for Oribi (*Ourebia ourebi ourebi*) based on provincial game counts and survey returns from private landowners (Oribi Working Group data)

Province	Type	No of reserves/properties (2009, 2014)	Count total (2013–2015)
Eastern Cape	Formally protected + private	83	1,155
Free State	Formally protected	2	11
Free State	Private	5	143
Gauteng	Formally protected	1	13
KwaZulu-Natal	Formally protected	26	848
KwaZulu-Natal	Private	74	581
Limpopo	Formally protected	1	8
Mpumalanga	Formally protected	3	63
Mpumalanga	Private	35	274
North West	Formally protected	1	2
Total	**All**	**231**	**3,098**

few that are between 100 and 200 individuals. For example, both Chelmsford Nature Reserve and Maloti-Drakensberg Transfrontier Park have relatively large robust subpopulations 222 (in 2012, Ezemvelo KwaZulu-Natal Wildlife unpubl. data) and 416 individuals (in 2013; Krüger & van der Westhuizen 2014), respectively. However, the Maloti-Drakensberg Transfrontier Park subpopulation is more likely a combination of four separate subpopulations (Ezemvelo KZN Wildlife unpubli. data). However, numbers in the Maloti-Drakensberg have been declining for the past five years (from 496 to 375 individuals between 2010 and 2015; Ezemvelo KZN Wildlife unpubl. data). Furthermore, recent spatial data suggest that this subpopulation is more likely a combination of four separate subpopulations (pertaining to Kamberg, Highmoor, Giant's Castle and Garden Castle) between which movement of individuals is unlikely (Ezemvelo–KZN Wildlife unpubl. data). Recent counts in Chelmsford Nature Reserve may also be a cause for concern, as the subpopulation declined to 96 in 2013, although this might be partially due to an Oribi capture operation that had taken place that year (removing 15 individuals to iSimangaliso Wetland Park) as noise and disturbance of the operation may have caused them to disperse onto neighbouring farms (P. Ngwenya pers. comm. 2016). Overall, then, no subpopulation is likely to harbour > 250 mature individuals.

While most subpopulations are suspected to be stable (N = 152), more are declining (N = 20) than increasing (N = 10) and 16 subpopulations have uncertain trends (Little & Magwaza 2014). However, these data are a rough indication rather than a robust sample because most of the landowners or managers did not feel confident enough to indicate their population trends (Oribi Working Group unpubl. data). Corroborating this, an independent study found that, between 1999 and 2013, of the 74% of subpopulations on private land in KwaZulu-Natal Province, 36% were increasing, 49% were decreasing and 15% are stable (similar declines on private land were noted in Marchant 2000). Of the remaining 26% of subpopulations in formally protected areas 42% were increasing, 38% were decreasing and 19% are stable (Patel 2015). Overall, 37% of all subpopulations were found to be increasing, 46% decreasing and 17% stable. For example, there was only one individual counted in Golden Gate Highlands National Park in 2010 (Ferreira et al. 2013). Outside protected areas, the population trend is gradually declining in many parts of the range as human densities increase and settlement expands, although its populations are stable in some thinly settled, unprotected regions where hunting pressures are relatively low (Patel 2015).

Generation length has been calculated to range between 3.5 and 6 years using the equation $G = FR + z * RL$ (IUCN Standards and Petitions Subcommittee 2014). This estimate is wide due to the poor life history data available for the species. For example, we only have data on age of first reproduction (~ 10 months for females; Cade 1966; Adamczak 1999) and age of last reproduction (8–13 years; Mentis 1972). Reproductive period (*RL*) was determined by subtracting age at first reproduction (*FR*) from age of last reproduction, resulting in a range of breeding periods of 7–12 years. As we do not know the ratio between survivorship and fecundity, *z* is set at 0.5. As age of first reproduction (*FR*) is less than a year, we have inserted 0 into the formula. Using these values, the formula generates a range for the generation of between 3.5 years (G = 0 + 0.5 * 7) and 6 years (G = 0 + 0.5 * 12). The upper estimate of 6 years is similar to the 5.9 years calculated by Pacifici et al. (2013). Rounding up the lower estimate yields a generation length of 4–6 years, which translates to a three-generation window of 2002–2014 or 1996–2014. Analysing a sample of formally protected areas across the Oribi's range (N = 14) that have adequate long-term data over the time period, reveals a population reduction of *c*. 13% (1996–2014) or a population increase of *c*. 6% (2002–2014).

Current population trend: Declining, based on available long-term data.

Continuing decline in mature individuals: Yes, based on survey returns concerning snaring and illegal hunting with domestic dogs.

Number of mature individuals in population: 1,859–2,169

Number of mature individuals in largest subpopulation: 222 in Chelmsford Nature Reserve, KZN (2012 count).

Number of subpopulations: At least 231

Severely fragmented: Yes, most subpopulations confined to fenced areas (predominantly standard livestock fencing, thus permeable for Oribi). However, due to distances between subpopulations, active translocation is required. Habitat is further fragmented through afforestation, agriculture, game fencing, residential and commercial development and poor livestock farming.

Habitats and Ecology

Oribi inhabit savannah woodlands, floodplains and other open grasslands, from around sea level to about 2,200 m sl (Mpumalanga Province). They reach their highest density on floodplains and moist tropical grasslands, especially in association with large grazers. They prefer open grassland in good condition containing a mosaic of both short grass for feeding and long grass for feeding and shelter (Rowe-Rowe 1994; Perrin & Everett 1999, Stears 2015). However, within these grasslands they avoid feeding within and close to woodland patches even if these patches are small (for example, 2–6 m in diameter; Stears and Shrader 2015). Within grasslands, they are selective feeders that focus primarily on green leaves and thus maintain high quality intake year-round. For example, they have been found to select patches of *Themeda triandra* grass (Shackleton & Walker 1985). Grass makes up most of their diet, with only a minor intake of forbs recorded during the wet season (Reilly et al. 1990, Stears 2015). Key grass species include, *Themeda triandra*, *Hyparrhenia hirta*, *Panicum natalense* and *Andropogon chinensis* (Viljoen 1982; Shackleton & Walker 1985; Everett et al. 1992, Stears 2015). Within the assessment region, they are thus primarily found in the Grassland Biome, in vegetation types such as Northern KwaZulu-Natal Moist Grassland, Income Sandy Grassland, and Midlands Mistbelt Grassland (Mucina & Rutherford 2006). However, to a lesser degree, they may also be found in the more open, grass-dominated habitats of the Savannah Biome (for example, Northern Zululand Sourveld).

After burns, Oribi focus their foraging on the high quality green flush on the burnt areas (Oliver et al. 1978; Everett et al. 1991, Stears 2015). By feeding on the green flush found on these burns, Oribi are able to increase both their crude protein and metabolisable energy intake (i.e. nutritional intake) during the nutritionally limited dry season (Stears 2015). This highlights the importance of

Table 3. Use and trade summary for the Oribi (*Ourebia ourebi ourebi*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Illegal bushmeat hunting.	Miniority	Increasing
Commercial use	Yes	Trophy hunting, live sales.	Minority	Trophy hunting is stable, live sales increasing.
Harvest from wild population	Yes	Trophy hunting, illegal bushmeat hunting, organised illegal hunts (gambling).	74% (this includes private farmlands/ non-protected areas)	Trophy hunting stable, illegal bushmeat hunting may be increasing, organised illegal hunts increasing.
Harvest from ranched population	Yes	Trophy hunting and illegal bushmeat poaching, organised illegal hunts (gambling).	21% (estimated from survey returns)	Trophy hunting stable, illegal bushmeat hunting may be increasing, organised illegal hunts increasing.
Harvest from captive population	Yes	Production for live sales/trophy hunting.	Minimal (< 5%)	-

regrowth on fire breaks and burnt grasslands as a key food resource during the winter months (Shackleton & Walker 1985; Marchant et al. 2005; Stears 2015). They also use artificially managed or altered habitat such as hayfields, post-burn areas, and grasslands used by cattle (Rowe-Rowe 1994; Perrin & Everett 1999; Skinner & Chimimba 2005). They normally consist of solitary adults, adult pairs or groups of 1–6 comprising a male and 1–2 females and their offspring (Skinner & Chimimba 2005 and references therein). Home ranges of adult males in KwaZulu-Natal range from 0.05 to 0.47 km^2 (Skinner & Chimimba 2005). The lower estimate compares to estimated home range size of 0.03 km^2 in Mpumalanga (Viljoen 1982).

Ecosystem and cultural services: The Oribi is a flagship species for highlighting the value of grasslands and threats to them and is often employed in extending stewardship practices. In South Africa, 60% of grasslands have been irreversibly transformed, with only 2.4% being conserved (Carbutt & Martindale 2014). It is important to conserve the remaining natural grasslands.

Use and Trade

Trade is fairly well controlled. Introductions and translocations to new areas are generally from subpopulations found in areas likely to be transformed rendering habitat no longer suitable, and translocations are performed under the auspices of the local conservation authorities (Patel 2015). The larger protected subpopulations, however, are also sometimes used to found new subpopulations (Grey-Ross et al. 2009; Patel 2015). These translocations are carried out under permit of the provincial nature conservation agency. Few subpopulations are kept under captive circumstances within their natural range (< 5% of properties) (Grey-Ross et al. 2009).

A small number of mature males are hunted each year. For example, at least eight mature rams were permitted for trophy hunting during the course of 2013 (Ezemvelo KwaZulu-Natal Wildlife unpubl. data). However, as not all permits are utilised, the total number hunted was likely less. These individuals are likely not breeding and thus not contributing to population growth. As a result, they comprise a very small proportion of the total population and thus the removal can be considered sustainable. Future trends are unlikely to change. Hunting permits for mature rams in KwaZulu-Natal are done in terms of the National Environmental Management: Biodiversity Act, (No. 10 of 2004) and the Natal Nature Conservation Ordinance (No. 15 of 1974).

Change in the extent and quality of habitat is primarily due to land transformation and poor farming practices (Carbutt & Martindale 2014).

Threats

In Africa, the species has been eliminated from substantial parts of its former range by the spread of agricultural settlement, livestock and increased illegal hunting. For example, in the Comoé National Park in Côte d'Ivoire, Oribi experienced a decline of around 92% between 1978 and 1998 primarily due to illegal hunting (poaching) (Fischer & Linsenmair 2001). There are also increased levels of illegal hunting in other parts of Africa (Carpaneto & Fusari 2000; Goldspink et al. 2002; Wilfred & MacColl 2014), including the assessment region (Little & Magwaza 2014). Most provincial subpopulations have declined due to illegal hunting (for example, uncontrolled hunting with dogs) and poor land use, which has resulted in few remaining viable subpopulations. Within the assessment region, the threats are as follows:

1. **Habitat destruction (loss and fragmentation):** Grasslands are lost to commercial forestry activities, intensive commercial farming, grassland degradation due to overstocking, poor fire management, erosion and mining (Little et al. 2013; Carbutt & Martindale 2014). As a grassland specialist that does not occur elsewhere, the loss of grasslands on flat to undulating terrain is a threat to its survival. There is also an emergence of unresolved land claims and changes in ownership, which may reduce potential suitable habitat via changes in land use and/or degradation through a lack of active management.
2. **Over-utilisation due to illegal hunting:** Illegal hunting with dogs is considered the major current and intensifying threat across the country (Marchant 2000; Little & Magwaza 2014). For example, there was an approximate threefold increase (from 25 to 113) in the reported number of incidents from 2011 to 2013 (Little & Magwaza 2014). This level of removal is resulting in the decline and, in extreme instances, the local extinction of subpopulations on private land. In most cases, landowners are powerless to stop these hunts due to the likelihood of retribution by hunters. As a

Table 4. Threats to the Oribi (*Ourebia ourebi ourebi*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the scientific literature	Data quality	Scale of study	Current trend
1	*5.1.1 Hunting & Collecting Terrestrial Animals*: illegal sport hunting with dogs and bushmeat hunting.	Marchant 2000	Attitudinal	Regional	Increasing: reports of illegal poaching increased from 25 to 113 (2011–2013).
		Grey-Ross et al. 2010	Attitudinal	Regional	
		Little & Magwaza 2014	Attitudinal	National	
2	*2.2.2 Agro-industry Plantations*: habitat loss from forestry plantations.	Jewitt et al. 2015	Indirect (remote sensing)	Regional	Increasing: natural habitat being lost at 1.2% / annum.
3	*2.1.3 Agro-industry Farming*: habitat loss from crop agriculture expansion.	Jewitt et al. 2015	Indirect (remote sensing)	Regional	Increasing: natural habitat being lost at 1.2% / annum.
4	*2.3.3 Agro-industry Grazing, Ranching or Farming*: habitat loss from livestock agricultural expansion. Current stress *1.2 Ecosystem Degradation*: habitat degradation from overgrazing and incorrect fire management.	Carbutt & Martindale 2014	Indirect	Regional	Increasing
		Jewitt et al. 2015	Indirect (remote sensing)	Regional	Increasing: natural habitat being lost at 1.2% / annum.
5	*1.1 Housing & Urban Areas*: habitat loss from human settlement expansion. Current stresses *1.3 Indirect Ecosystem Effects* and *2.1 Species Mortality*: fragmentation of habitat and increased poaching rates.	GeoTerraImage 2015	Indirect (remote sensing)	Regional	Increasing: rural settlements increased by 1–38% from 2000–2013.
6	*5.1.2 Hunting & Collecting Terrestrial Animals*: incidental capture in snares laid out for other species.	Grey-Ross et al. 2010	Attitudinal	Regional	Increasing
7	*7.1 Fire & Fire Suppression*: inappropriate burning regimes may reduce habitat quality.	-	Anecdotal	-	Increasing
8	*3.2 Mining & Quarrying*: habitat loss from mining expansion.	Jewitt et al. 2015	Indirect (remote sensing)	Regional	Increasing: natural habitat being lost at 1.2% / annum.

result, these illegal hunts are being conducted at unsustainable levels, both for subsistence and gambling (Grey-Ross et al. 2010; Little & Magwaza 2014). Furthermore, some recent illegal dog hunting has evolved into large organised gambling syndicates which are considerably more destructive than the local sport or food hunting of the past (Little & Magwaza 2014). Given increased unemployment, low minimum wage and removal of ration provision, the frequency of illegal hunting is likely to increase (Grey-Ross et al. 2010). Incidental trapping with snares also poses a severe threat. This threat mainly affects non-protected areas, especially small subpopulations on private lands susceptible to edge effects, but may increasingly affect protected areas (Wittemyer et al. 2008).

3. **Inappropriate management:** In many areas where populations are present, current farm management practices (for example, fences, poor burning practices, poor veld management, domestic dogs) do not allow coexistence at optimal levels with other livestock and game. Moreover, changes in management practices due to land claims may further decrease appropriate/available habitat (Carbutt & Martindale 2014).

4. **Poor law enforcement:** South Africa currently has advanced environmental legislation. However, the enforcement of this legislation has been poor as a result of budgetary constraints and focus on more charismatic species such as rhino (*Diceros bicornis and Ceratotherium simim simum*), and continues to affect grassland-dependent species. Although the Oribi is formally protected in the provinces where it occurs, the lack of funds may result in insufficient law enforcement and no coordinated national conservation effort. The growing gambling industry which uses dogs to hunt indigenous wildlife seems to have strong political backing and efforts to address this have frequently been thwarted with “cultural rights” being offered as a justification. This, along with widespread ignorance among police officers across the range about the illegality of dog hunting has made it very difficult to address. Furthermore, most Oribi subpopulations occur on private farmland where law enforcement is difficult. However, a recent partnership between the Endangered Wildlife Trust (EWT) and the South African Community Action Network (SA CAN) is working to rectify these issues.

5. **Lack of awareness:** The lack of awareness of the status, threats and legal repercussions of killing Oribi prevents effective implementation of interventions (Grey-Ross et al. 2010; Little & Magwaza 2014). Concurrently, the lack of understanding of the value of grasslands in general is hindering conservation progress. Grassland ecosystems are currently the most important and yet the most underrated and highly degraded ecosystem in South Africa (Carbutt & Martindale 2014). A far better understanding and

appreciation of grasslands is required, which will benefit grassland-dependent species.

6. **Lack of coordination/cooperative management:** a coordinated national approach to Oribi conservation is required to avoid duplicated efforts and wasted funding. At present, this is being done through the Oribi Working Group, but broader involvement is required.

Current habitat trend: Declining in area and quality. Their preferred grassland habitat is highly fragmented and much habitat has been lost to afforestation in KwaZulu-Natal and Mpumalanga, including conversion to pasture for intensive livestock farming, agricultural conversion, housing and commercial development. In KwaZulu-Natal Province alone there was a 20.4% loss of natural habitat from 1994 to 2011, with an average loss of 1.2% per annum (Jewitt et al. 2015). Worryingly, in just six years (2005–2011), 7.6% (7,217 km^2) of natural habitat was lost (1.3% per annum), due primarily to agriculture (5.2% increase; 4,962 km^2), but also plantations, built environments and settlements, mines and dams (Jewitt et al. 2015). Similarly, rural settlements have expanded in Oribi core provinces by 1–39% between 2000 and 2013 (GeoTerraImage 2015), which is inferred to be increasing rates of illegal hunting. Additionally, poor veld management, burning regimes and frequency of burning may affect habitat quality. Shifts in grazing practices and land use also contribute to changes in quality (for example, increased stocking rate can reduce grass cover and thus habitat quality). Moreover, higher stocking rates of domestic animals (for example, cattle) can lead to direct and delayed competition with Oribi during the dry season, resulting in reduced nutritional intake (Stears 2015). In certain protected areas, competition from other large herbivores such as Blesbok (*Damaliscus pygargus phillipsi*) may also reduce habitat quality. There is however, a possibility that bulk grazers may facilitate Oribi by stimulating high quality grass regrowth (Skinner & Chimimba 2005; Stears 2015). One potential threat that has not been explored is a potential increased woody cover due to higher levels of CO_2 as a result of global climate change (Curtis & Wang 1998). If this takes place, it would reduce available grasslands for Oribi as they do not like to feed in or near woodland patches (Stears & Shrader 2015).

Conservation

Oribi occur in several protected areas where human population densities are low, such as Golden Gate Highlands National Park (but see Ferreira et al. 2013) and Maloti-Drakensberg Transfrontier Park. Conservationists must urgently combat the ongoing illegal hunting and emerging threat of organised dog hunting as a gambling practice through education and enforcement (Grey-Ross et al. 2010); and through substitution of the activity through alternative recreational activities, such as dog racing (chasing electronic rabbits; A. Marchant pers. comm. 2016). Stewardship is essential for conservation

Table 5. Conservation interventions for the Oribi (*Ourebia ourebi ourebi*) ranked in order of effectiveness with corresponding evidence (based on IUCN action categories, with regional context)

Rank	Intervention description	Evidence in the scientific literature	Data quality	Scale of evidence	Demonstrated impact	Current conservation projects
1	*5.4 Compliance & Enforcement*: increased prosecution of illegal hunting.	-	Anecdotal	-	-	Oribi Working Group and SA CAN
2	*6.2 Linked Enterprises & Livelihood Alternatives*: substitute dog hunting with alternative recreational activities and/or substitute bushmeat hunting for sustainable forms of game meat.	-	Anecdotal	-	-	Ezemvelo KwaZulu Natal Wildlife
3	*1.1 Site/Area Protection*: protected area expansion of grassland habitats.	-	Anecdotal	-	-	Ezemvelo KwaZulu Natal Wildlife
4	*1.2 Resource & Habitat Protection*: biodiversity stewardship schemes to protect grasslands and Oribi source subpopulations.	-	Empirical	Local	Housing estates can conserve small Oribi subpopulations.	Oribi Working Group
5	*2.1 Site/Area Management*: utilise anti-poaching patrols on private lands.	-	Anecdotal	-	-	Oribi Working Group and SA CAN
6	*2.3 Habitat & Natural Process Restoration*: encourage landowners to employ ecological burning and stocking regimes.	-	Anecdotal	-	-	Oribi Working Group
7	*3.3.1 Species Reintroduction*: continue to create new subpopulations under a metapopulation framework.	Patel 2015	Empirical	Local	80% reintroduction failure rate to date.	Oribi Working Group
		Little & Magwaza 2014	Attitudinal	National	63% of population exists on private land.	
8	*4.3 Awareness & Communications*: raise awareness of Oribi conservation in local communities.	-	Anecdotal	-	-	Oribi Working Group

too, with incentives to maintain subpopulations on private property, particularly as a flagship species for the dwindling Grassland Biome (Carbutt & Martindale 2014). Improved education and awareness around the legal implications and consequences of illegal hunting with dogs within local communities and law enforcement officials is also needed.

Current actions within the assessment region include habitat management, monitoring, public awareness, intensive public education programmes and South African Police Service (SAPS) training to address illegal hunting issues, Oribi Custodian Programme, revision of burning regimes in some areas (for example, fire breaks and use of mosaic burning), summer mowing of grass, use of cattle to generate heterogeneity of grass height, and strengthening of the annual Oribi census to increase landowner participation across the different provinces (Marchant et al. 2005; Coverdale et al. 2006). A partnership between the EWT and the South African Community Action Network (SA CAN) is working towards educating the SAPS and arresting illegal hunters. SA CAN is a specialist rural crimes network and is a key partnership in the battle against illegal hunting with dogs.

Such interventions should be continued and combined with the movement of populations where detrimental habitat change is inevitable. Founder subpopulations could be stocked without any other Oribi present at release sites (Bothma et al. 2010). Moreover, prior to release it is important that specific criteria be considered to determine whether the release site is suitable (see Pérez et al. 2012). For Oribi, key factors include initial population size, the amount of suitable habitat, and the stocking rates of other grazers (Patel 2015). Translocation of subpopulations from unsuitable habitats should follow a metapopulation plan, with suitable reintroduction areas being identified from areas within the Oribi's natural distribution. Conservationists must also comment on and attempt to prevent applications for development based on Oribi presence and/or habitat suitability for Oribi conservation. Finally, the formal proclamation of key habitats through the biodiversity stewardship schemes should continue.

Recommendations for land managers and practitioners: The mission of the Oribi Working Group is to promote the long-term survival of Oribi in their natural grassland habitat through initiating and coordinating provincial conservation programmes. These include: education and awareness, habitat conservation, research and monitoring, subpopulation management, database management and forming partnerships with stakeholders. The Oribi Working Group consists of members from the EWT, Ezemvelo KZN Wildlife (EKZNW), NCT Forestry Cooperative Limited, Wildlands Conservation Trust, the University of KwaZulu-Natal (UKZN), and private landowners.

- There is an Oribi Conservation Plan (Marchant et al. 2005) and an Oribi population and habitat viability assessment document (Coverdale et al. 2006), which should be used by landowners to assess and improve habitat quality for Oribi subpopulations. A metapopulation plan should be developed to guide translocations. Currently, the population is not managed as a metapopulation, however, there have been ten translocations over the past 13 years (Patel 2015).


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- The major data deficiency is the inconsistency of the survey effort and difficulty of actually counting this species, which prevents accurate estimates of long-term trends for the population. The Oribi Working Group coordinates a national annual survey that includes both provincial protected areas and private landowners. This, however, relies on private landowners to voluntarily conduct their own counts and then submit their data to the Oribi Working Group. Within KwaZulu-Natal, subpopulations are monitored within state protected areas and the species has been included as part of the annual survey conducted for provincial CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) reporting purposes.
- The Oribi Working Group is developing programmes and projects to address management and conservation issues.

Research priorities:

- Population dynamics studies, especially impacts of illegal hunting. A study was recently completed that focussed on the population dynamics of Oribi in KwaZulu-Natal (Patel 2015), particularly investigating translocation success. However, a further assessment of the regional population is needed. There was also a project that investigated the foraging ecology and habitat use and whether cattle compete with or facilitate Oribi (Stears 2015; Stears & Shrader 2015). Further studies are needed on Oribi movement, dispersal (particularly of young males) and habitat use in response to burning and mowing.
- Competition between Oribi and short grass grazers such as Blesbok and Black Wildebeest (*Connochaetes gnou*), and domestic animals such as sheep.
- Success of prior translocations and the effects of a translocation policy that limits impacts on core subpopulations and ensures successful establishment/survival in new location. To date, no studies have been conducted to explore the impact that the removal of individuals has on the wild, free-ranging core populations (for example, Chelmsford Nature Reserve). However, one study looked into the success of the ten translocations that have taken place since 2004 in KwaZulu-Natal (Patel 2015).
- A taxonomic study has just been completed (van Vuuren et al. in prep.) that assessed the genetic variation of the South African population, and explored the degree to which genetic differences

were geographically driven. However, a genetic study exploring the proposed subspecies is still required.

- Impact of predation on fragmented populations.
- Role of grassland corridors, and how they should be designed (for example, what should the minimum width and maximum length of a corridor be to ensure it will be used, since they do not appear to undertake long distance movements).
- Life history data needed for life table population modelling (e.g. age-specific mortality and fecundity, calf survival) to better estimate mature individual population size and population trends.

Encouraged citizen actions:

- All illegal hunting activity or any hunting with dogs needs to be reported in order to determine trends in this threat and result in mitigation. Immediate reporting to the South African-Community Action Network (SA CAN) (for immediate action, Contact SOS line 08 616 72226) and follow up reporting to the chairman of the Oribi Working Group is required.
- Citizens and landowners participate each year in the annual census. Greater and more consistent participation would improve understanding of population trends and improve conservation efforts.
- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas, to increase the accuracy of the distribution map.
- Landowners should form conservancies to create more suitable available and connected habitat, as well as to co-manage the threat of illegal dog hunting.

Data Sources and Quality

Table 6. Information and interpretation qualifiers for the Oribi (*Ourebia ourebi ourebi*) assessment

Data sources	Field survey (unpublished), indirect information (literature, unpublished)
Data quality (max)	Estimated
Data quality (min)	Inferred
Uncertainty resolution	Best estimate
Risk tolerance	Evidentiary

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Details of the methods used to make this assessment can be found in *Mammal Red List 2016: Introduction and Methodology.*