Cephalophus natalensis – Natal Red Duiker

Sam Williams

Regional Red List status (2016)	Near Threatened B2ab(ii,v)*
National Red List status (2004)	Least Concern
Reasons for change	Non-genuine change: New information
Global Red List status (2016)	Least Concern
TOPS listing (NEMBA)	None
CITES listing	None
Endemic	No

*Watch-list Data

> Although standing only about 0.45 m high (Bowland 1997), the Natal Red Duiker has extraordinary jumping capabilities; two adults cleared a fence 1.6 m high and escaped from a 2.3 m walled enclosure by extending their forelegs over the wall and pulling themselves over (de Vos 1979).

Taxonomy

Cephalophus natalensis Smith 1834

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Cephalophus* - *natalensis*

Common names: Natal Red Duiker, Natal Duiker, Red Duiker (English), Rooiduiker (Afrikaans), Ipunzi ebovu (Ndebele), Mungulwi, Kutsoa (Sepedi), Phuthi e kgubedu (Sesotho), Umsumbi, Imphunzi, Umsumpe (Swati), Mhunti (Tsonga), Phithi, Tshipiti (Venda), Impunzi (Xhosa), Umsumpe, Umkhumbi (Zulu)

Taxonomic status: Species

Taxonomic notes: Although Harvey's Duiker (*C. harveyi*) has occasionally been included within *C. natalensis* (Grubb & Groves 2001; Grubb 2005), we consider these species distinct, following Kingdon (1982), East (1999), and Hoffman and Bowland (2013). Meester et al. (1986)

listed two subspecies, including *C. n. natalensis* from KwaZulu-Natal (KZN), eastern Mpumalanga and southern Mozambique, and *C. n. robertsi* Rothschild 1906 from Mozambique and the regions north of the Limpopo River (Skinner & Chimimba 2005).

Assessment Rationale

This species is restricted to forest patches within northeastern South Africa and Swaziland. They can occur at densities as high as 1 individual / ha. In KZN, there are an estimated 3,046–4,210 individuals in protected areas alone, with the largest subpopulation of 1,666–2,150 individuals occurring in iSimangaliso Wetland Park (2012–2014 counts; Ezemvelo KZN Wildlife unpubl. data). This subpopulation is inferred to have remained stable or increased over three generations (2000–2015), as the previous assessment (2004, using count data from 2002) estimated subpopulation size as 1,000 animals. While no other provincial subpopulation estimates are available, they are regularly recorded on camera traps in the Soutpansberg Mountains of Limpopo and the Mariepskop forests of Mpumalanga, including on private lands outside protected areas (S. Williams unpubl. data). Reintroductions are probably a successful conservation intervention for this species. For example, reintroduced individuals from the 1980/90s are still present in areas of southern KZN and are slowly moving into adjacent farmlands (Y. Ehlers-Smith unpubl. data). The estimated area of occupancy, using remaining (2013/14 land cover) forest patches within the extent of occurrence, is 1,800 km^2. This yields a total mature population size of 17,996–89,979 animals based on minimum and maximum densities. This may be an overestimate as not all patches are suitable or will be occupied.

As long as habitat is conserved through protected area expansion and biodiversity stewardship schemes, this species should continue to be stable within protected areas. However, suitable forest habitat continues to be lost in all areas of its range. For example, 20% of woodland cover was lost from 1990 to 2006 in the Soutpansberg Mountains region due to fuelwood extraction and pine/ Eucalyptus plantations; and, in just six years (2005–2011), 7.6% of KZN's natural habitat was lost (1.3% / annum), due primarily to agriculture expansion. Poaching pressure may also cause local declines. While the area of occupancy (AOO) of 1,800 km^2 may be an underestimate as it does not include thicket habitats, not all patches will be occupied due to poaching pressure. Thus, we list the species as Near Threatened B2ab(ii,v) due to inferred ongoing loss of suitable habitat and severe hunting pressure outside of protected areas. Suitable habitat is severely fragmented by land conversion and degradation. Further field surveys from across its range, especially outside protected areas, are needed to more accurately measure population size through more comprehensive density and occupancy data. Long-term monitoring should also be used to assess subpopulation trends, especially outside protected areas. This species should be reassessed as such data become available.
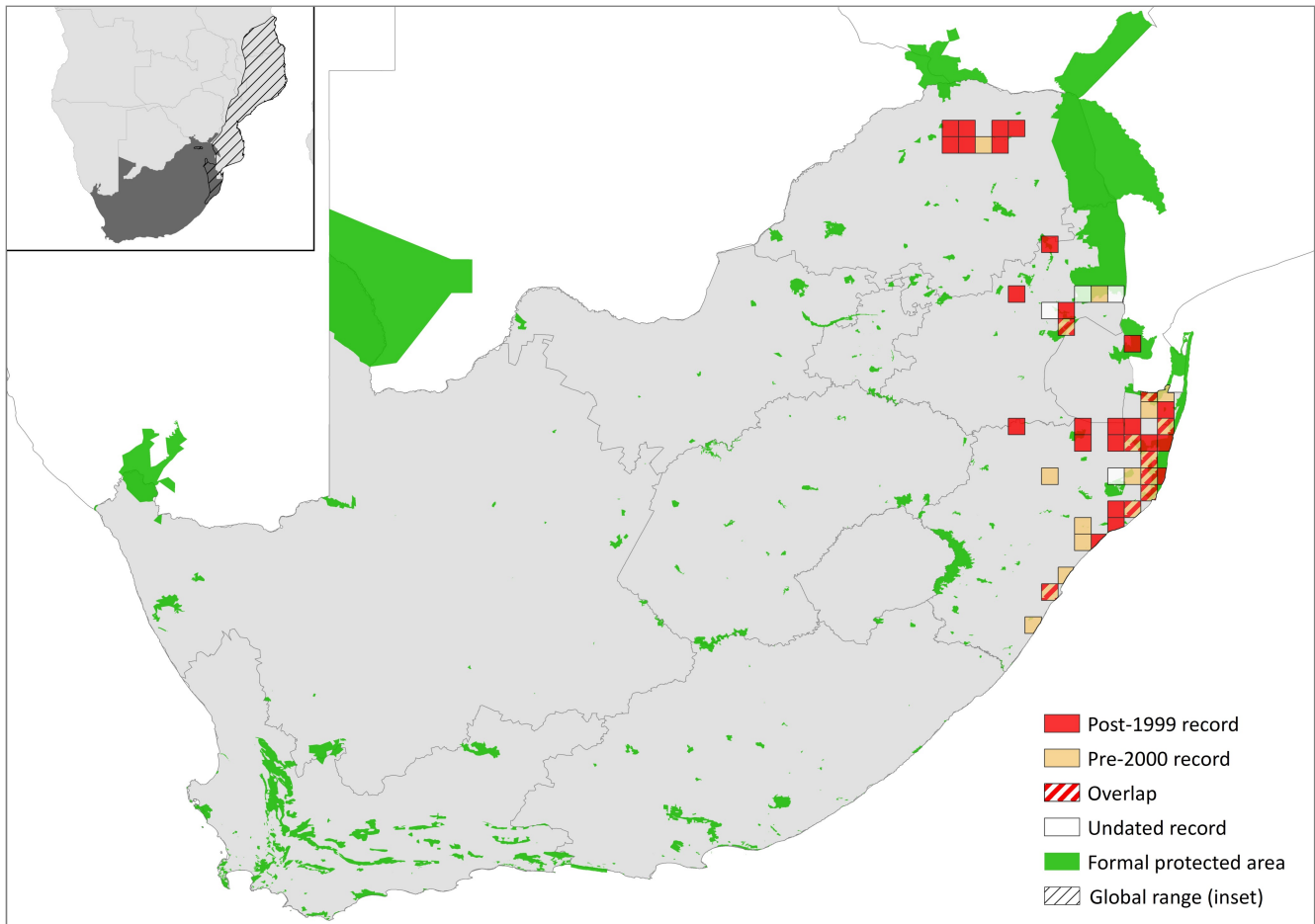
Figure 1. Distribution records for Natal Red Duiker (*Cephalophus natalensis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana	Absent	-
Lesotho	Absent	-
Mozambique	Extant	Native
Namibia	Absent	-
South Africa	Extant	Native
Swaziland	Extant	Native
Zimbabwe	Absent	-

Regional population effects: There are discrete subpopulations in Limpopo and Mpumalanga provinces. Although the KZN subpopulation occurs in highly fragmented forest patches, there are likely to be linkages and dispersal routes with Mozambique, such that the rescue effect is possible for KZN, but its rarity in southern Mozambique means no significant rescue effects are anticipated. Continued research into the dispersal capabilities and current distribution is required to confirm this assumption.

Distribution

The Natal Red Duiker formerly occurred widely in coastal and riverine forests and thickets, escarpments and montane forests from southeastern Tanzania southwards to northeastern KZN in South Africa (East 1999; Hoffmann & Bowland 2013), but currently has a disjunct distribution.

There are no confirmed records of this species from Zimbabwe or Zambia (IUCN SSC Antelope Specialist Group 2016). Although this species is restricted to specialised habitats of forests and dense thickets, and fragmentation of its distribution is a natural phenomenon, this species has experienced extensive range contraction as a result of habitat alteration (Skinner & Chimimba 2005). In Mozambique, this species has a discontinuous distribution north and south of the Zambezi River. There are occurrence records in a number of isolated inland areas towards the Maputo Elephant Game Reserve (Skinner & Chimimba 2005), but their current presence in southern Mozambique needs to be confirmed. Previous records of this species in Zambia and Malawi (East 1999; Skinner & Chimimba 2005) are now considered to belong to Harvey's Duiker (*Cephalophus harveyi*; Hoffmann & Bowland 2013).

Within the assessment region, the species occurs along the eastern regions of South Africa (Figure 1), from the far northern stretches of KZN along the coastal areas in forest and bushveld, as well as in forest fragments in Mpumalanga and Limpopo (Soutpansberg) provinces. Although no records are available, they occur in scattered pockets of riverine thickets and forests of the lowveld region in Swaziland (Monadjem 1998). Similarly, known subpopulations in South Africa are currently very fragmented due to the patchy nature of suitable habitat. Until recent times, their distribution extended as far south as Pondoland (Eastern Cape – southern KZN) (Fitzsimons 1920; du Plessis 1969; Figure 1), and expanded across much larger proportions of Limpopo and Mpumalanga (Skinner & Chimimba 2005). Within the extent of occurrence, there are an estimated 1,800 km² of suitable

forest habitat remaining in 2013/14 (GeoTerraImage 2015), which we construe as a proxy for AOO. This, however, may be an overestimate as they do not occur in southern Pondoland Scarp forests and probably do not occur in mistbelt forests (Y. Ehlers-Smith unpubl. data). In KZN, they are probably restricted to lowland coastal, dune and sand forests where there is a grassland-forest mosaic where they move between patches as they often feed on the edges of forests but will ruminate in dense cover (Y. Ehlers-Smith unpubl. data). Further habitat selection data are needed to more accurately estimate AOO.

In the late 1980s, several reintroductions had been made into their former range (Bourquin & van Rensburg 1984; Bowland 1990). For example, they were reintroduced to Mpenjati Nature Reserve, as well as San Lameer Golf Estate, a farm near Upper Melville and in Umzumbe during the late 1980s/early 1990s. While recent camera-trap surveys (2014–2016; Y. Ehlers-Smith unpubl. data) failed to detect Natal Red Duiker on Mpenjati, they appear to have radiated outwards as they have been photographed at low density in nearby farms (for example, forest patches on sugar cane farms) and villages (Y. Ehlers-Smith unpubl. data). The viability of these reintroductions are currently being assessed.

Population

The Natal Red Duiker is known to reach relatively high numbers in suitable habitats (Bowland 1997). For example, in St Lucia, KZN, this species was recorded at densities ranging from 1–2 animals / ha (Bowland 1990). However, in less favourable areas, such as smaller forest clumps, estimates of 0.2–0.4 animals / ha were recorded (Bowland 1990). Although a global population estimate of 42,000 was documented by East (1999), due to the cryptic nature of this species, this was expected to be an underestimate. Globally, the population trend of this species is believed to be declining. However, wildlife recovery across much of Mozambique is likely to include this species (East 1999; Hoffmann & Bowland 2013), although the Natal Red Duiker is still considered to be highly threatened in Mozambique, hampering potential dispersal into South Africa.

Within the assessment region, it is suspected that the population has declined significantly following large-scale decline in the habitat (through timber plantations and cane sugar crops) in the past but appears to have stabilised more recently (Rowe-Rowe 1994). However, mining in northern KZN has had a negative impact on local populations. The population is largely confined to extensive protected areas (for example, iSimangaliso Wetland Park; Ramesh et al. 2016) and is unlikely to decline in the future within these protected areas. There are suspected to be 6–9 major subpopulations although we are missing data from several regions in KZN, Limpopo and Mpumalanga. In 2004, it was estimated that there were four major subpopulations where the iSimangaliso Wetland Park contained 1,000 animals and Hluhluwe-iMfolozi Park contained 300 animals (Friedmann & Daly 2004). An assessment conducted between 2011 and 2012 estimated at least 4,210 individuals in seven formally protected areas in KZN, with 2,150 animals in the largest subpopulation in iSimangaliso Wetland Park and 1,200 in Mkhuze Game Reserve (Ezemvelo-KZN Wildlife unpubl. data). More recently (2013/14), there were estimated to be 3,046 animals on eight formally protected areas in KZN, the largest of which is iSimangaliso Wetland Park with

1,666 animals and 600 on Mkhuze Game Reserve (Ezemvelo-KZN Wildlife unpubl. data). Generation length is estimated as 5.2 years (Pacifici et al. 2013), yielding a three–generation period of 15.5 years (2000–2015). While no reliable long-term data are available to measure population trends over this period, estimates from 2004 and 2014 indicate that the major subpopulation in iSimangaliso Wetland Park has at least remained stable over approximately three generations. Overall, using the AOO estimate of 1,800 km^2 and maximum/minimum densities (20–100 animals / km^2), we estimate a population of 35,992–179,958 animals. As they mainly occur solitarily or a female with her offspring or in small groups (3–5 individuals) in loose association (Skinner & Chimimba 2005), we assume a *c.* 50% mature population structure, which yields 17,996–89,979 mature animals. Research to estimate population size in the southern extent of its range is underway (Y. Ehlers-Smith unpubl. data).

Individuals are still present in areas of reintroduction in southern KZN and are slowly moving into adjacent areas. For example, they were introduced in Mpenjati Reserve in the late 1980s/early 1990s, but have been found on a forest patch within a sugar cane farm as they have radiated outwards (Y. Ehlers-Smith unpubl. data). In the Soutpansberg region of the Limpopo Province, this species is common along the forested southern slopes (Power 2002) and are suspected to be numerous on private lands. However, in many areas, subpopulations outside of protected areas are suspected to be declining due to ongoing habitat loss, bushmeat hunting and illegal sport hunting with dogs. More research is necessary to determine population size and trends in such areas.

Current population trend: Declining from ongoing habitat loss.

Continuing decline in mature individuals: Yes, from severe hunting pressure outside of protected areas.

Number of mature individuals in population: 17,996–89,979

Number of mature individuals in largest subpopulation: There are currently 833–1,075 mature individuals present in iSimangaliso Wetland Park.

Number of subpopulations: At least 6–9 major subpopulations.

Severely fragmented: Yes. Suitable forest and thicket habitats are isolated from each due to habitat conversion and degradation.

Habitats and Ecology

Across their range, Natal Red Duikers occur within indigenous forests and dense thickets, including coastal, riverine, swamp and montane slope forests and forest clumps, as well as wooded ravines (Bowland 1997; Skinner & Chimimba 2005). They have been recorded at elevations of up to 200 m asl (Rowe-Rowe 1994). Natal Red Duikers occasionally wander into more open grasslands to forage, but will immediately return to the shelter of forested regions at any sign of disturbance (Bowland 1997).

Heinichen (1972) recorded predominantly shrubs, fruits and dry leaves in the diet of the Red Duiker, and noted that they frequently swallow whole fruits. Recently fallen fruits, flowers and leaves from the forest canopy constitute

Table 2. Use and trade summary for the Natal Red Duiker (*Cephalophus natalensis*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Illegal bushmeat hunting	Majority	Possibly increasing with settlement expansion.
Commercial use	Yes	International and national trophy hunting	Minority	Unknown
Harvest from wild population	Yes	Trophy hunting	All	Unknown
Harvest from ranched population	No	-	-	-
Harvest from captive population	No	-	-	-

a large proportion of their diet, and active browsing from live vegetation occurs less commonly (Bowland 1997), although they will browse on the fine stems of shrubs growing low to the ground (Skinner & Chimimba 2005). This species is considered a concentrate selector with specialised adaptations for efficient absorption, thus does not tolerate large quantities of fibre in its diet (Faurie & Perrin 1995).

Natal Red Duikers exhibit sedentary behaviour for a considerable portion of the day, and are most active around dawn and dusk (Bowland & Perrin 1995). This sedentary behaviour is a function of their small body size and ruminant digestive system (Bowland & Perrin 1995). Although core areas of habitat remain stable, home ranges vary temporally, and Natal Red Duikers are more active in higher quality habitats (Bowland & Perrin 1995). This species is not territorial and some individual home ranges overlap by up to 100%, however, occasionally individuals exhibit temporal separation (Bowland & Perrin 1995). They are solitary, and do not form lasting associations with one another, aside from females and their young (Bowland & Perrin 1995). This species is a non-seasonal breeder, producing a single lamb following a gestation period of approximately 210 days. A calving interval of 236 days (range = 222–273 days, n = 5; Spence 1991) has been estimated, which is similar to that of the Common (*Sylvicapra grimmia*) and Blue Duiker (*Philantomba monticola*) (Skinner & Chimimba 2005).

Ecosystem and cultural services: This is a flagship species for forest habitats and is a valuable seed disperser, feeding on fallen wild fruit and potentially browsing on the lower branches of *Grewia* spp. They are also important prey species for Leopards (*Panthera pardus*), as has been documented on the southern slopes of the Soutpansberg Mountains (Power 2002).

Use and Trade

Although this species is used for trophy hunting, trade is unlikely to have any effect on the population as long as permits are well regulated. This species is targeted by international trophy hunters, as one of the "Tiny 10" small antelope. It is also hunted as bushmeat extensively throughout its range and is common in bushmeat markets (IUCN SSC Antelope Specialist Group 2016), the effects of which may cause local declines or extinctions within the assessment region. In Mozambique, this species was recognised as a preferred species for illegal bushmeat hunting (de Boer & Baquete 1998).

Threats

Due to its strict habitat speciality, the Natal Red Duiker is vulnerable to habitat modification, and, as a result, has disappeared from much of its historic range. It has experienced extensive habitat loss, due to expanding development of property, subsistence agriculture and commercial timber plantations (Bowland 1997). Large proportions of their former habitat in the Limpopo and Mpumalanga provinces have been altered. In the inland tropical forest areas, large proportions of mesic natural forest have been cleared for plantations, and in the drier regions for agriculture, especially for sugar cane crops. Sand forest habitat continues to be lost west of False Bay Park, KZN, from pineapple crops (I. Rushworth pers. comm. 2016). Afforestation with exotic timber plantations and crop agriculture is continuing to reduce habitat for this species. The decline in habitat in the coastal forest of northern KZN has previously been estimated at being in excess of 70% (Mathias & Bourquin 1984). Expanding urban development along the KZN coastline is likely to become an increasing threat in the future, as much of this development is encroaching on suitable forest and dispersal routes of Natal Red Duiker habitats.

Table 3. Possible net effects of wildlife ranching on the Natal Red Duiker (*Cephalophus natalensis*) and subsequent management recommendations

Net effect	Positive
Data quality	Anecdotal
Rationale	Wildlife ranching and the private sector have generally had a positive effect on this species as it has been widely reintroduced onto private properties within its natural distribution range.
Management recommendation	Reintroductions into former ranges are kept as free-roaming herds .with a recommended minimum property size of 10 ha of suitable habitat / breeding pair/individual. Actual carrying capacity of each property may be higher due to high overlap in home ranges between individuals.

Table 4. Threats to the Natal Red Duiker (*Cephalophus natalensis*) 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	*2.1.2 Small-holder Farming*: habitat loss through sugar cane and pineapple crops. Current stresses *1.1 Ecosystem Conversion* and *1.2 Ecosystem Degradation*.	Jewitt et al. 2015	Indirect (land cover change from remote sensing)	Regional	Increasing
2	*1.1 Housing & Urban Areas*: habitat loss through urban coastal development. Current stresses *1.1 Ecosystem Conversion* and *1.2 Ecosystem Degradation.*	Jewitt et al. 2015	Indirect (land cover change from remote sensing)	Regional	Increasing; between 2005 and 2011, the built environment increased by 1.2% in KZN, particularly in rural areas.
3	*5.1.1 Hunting & Collecting Terrestrial Animals*: subsistence hunting for bushmeat. Current stress *2.1 Species Mortality*.	Grey-Ross et al. 2011	Indirect	Regional	Increasing
4	*5.3.3 Logging & Wood Harvesting*: fuelwood extraction leading to habitat loss and degradation. Current stress *1.2 Ecosystem Degradation*.	Munyati & Kabanda 2009	Indirect	Regional	Increasing
5	*2.2.2 Agro-industry Plantations*: habitat loss through timber plantations. Current stresses *1.1 Ecosystem Conversion* and *1.2 Ecosystem Degradation.*	Jewitt et al. 2015	Indirect (land cover change from remote sensing)	Regional	Stable

Additionally, this species is vulnerable to hunting pressure; as with the Blue Duiker (*Philantomba monticola*) hunting with dogs is a threat to all small antelope (*sensu* Grey-Ross et al. 2010). Informal or bushmeat hunting has the potential to cause local declines or extinctions too. There is suspected to be severe pressure from sport hunting with dogs and bushmeat hunting outside of protected areas; for example, in the Maputaland area of KZN (I. Rushworth pers. comm. 2016).

Ineffective management of livestock and game farms where overgrazing is common does not appear to have a major detrimental impact on Natal Red Duikers, as overgrazing tends to lead to an increase in the density of woody plants (bush thickening), which is actually beneficial to forest duikers that have a preference for shelter and browse resources.

Current habitat trend: Declining in area. In KZN, 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, in the Soutpansberg Mountains of Limpopo, 20% of woodland cover was lost from 1990 to 2006 due to fuelwood extraction and pine/Eucalyptus plantations (Munyati & Kabanda 2009).

Conservation

The Natal Red Duiker is present within a number of South Africa's protected areas, including iSimangaliso Wetland Park, Hluhluwe-iMfolozi Park, Ndumo Game Reserve, Enseleni Nature Reserve, Kenneth Stainbank Nature Reserve and Tembe Elephant Park in KZN (East 1999; Hoffmann & Bowland 2013), Blyde River Nature Reserve in Mpumalanga, Happy Rest Nature Reserve and Luvhondo Private Nature Reserve in Limpopo Province (S. Williams

unpubl. data). Much of the potential habitat alteration has already taken place and much of what habitat remains is currently protected in existing reserves. Some of the previous pressure that was exerted on the species may be reduced as some communities convert areas to conservation (for example, around Tembe Elephant Reserve). However, ongoing habitat loss and poaching pressure outside protected areas should be mitigated through further protected area expansion, both formally, such as through transfrontier areas (Smith et al. 2008), and through biodiversity stewardship programmes. Landowners should also create conservancies to sustain functioning and protected subpopulations of this species and to connect habitats, especially along the coast. As the species causes habitat degradation outside of its natural range, regulation of translocation is also required to prevent extralimital introduction. However, reintroduction into suitable areas within the natural range should be continued and documented to improve the reintroduction technique.

Recommendations for land managers and practitioners:

- Continued monitoring of the subpopulations within existing conservation areas.
- Enforcement of translocation regulations.

Research priorities: Current ongoing research by the University of KZN in collaboration with Ezemvelo KZN Wildlife includes the impacts of changing land-use on biodiversity, particularly mammals such as Natal Red Duiker, using camera trapping to investigate the metapopulation dynamics of forest mammals in the fragmented sub-tropical coastal forests of southern KZN.

- Recent population sizes and trends from KZN, Mpumalanga and Limpopo protected areas; and surveys to improve the understanding of population estimates of various subpopulations.
- Collate evidence for successful reintroductions to improve translocation success.

Table 5. Conservation interventions for the Natal Red Duiker (*Cephalophus natalensis*) 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	*1.1 Site/Area Protection*: conservancy formation to expand protected areas in suitable habitat.	-	Anecdotal	-	-	-
2	*1.2 Resource & Habitat Protection:* establish biodiversity stewardship areas and conservancies to conserve and connect habitat patches outside protected areas.	-	Anecdotal	-	-	-
3	*3.3.1 Species Reintroduction:* continue to reintroduce founder groups into areas of suitable habitat.	-	Anecdotal	-	-	-
4	*5.3 Private Sector Standards & Codes*: translocation regulation.	-	Anecdotal	-	-	-

- Occupancy and subpopulation trends on private lands.
- Further taxonomic work is needed to investigate the status of this species relative to Harvey's Red Duiker.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas.
- Create conservancies to connect habitat patches.
- Report illegal hunting to provincial conservation authorities.

Data Sources and Quality

Table 6. Information and interpretation qualifiers for the Natal Red Duiker (*Cephalophus natalensis*) assessment

Data sources	Field study (literature, unpublished), indirect information (literature, expert knowledge)
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Maximum/minimum values
Risk tolerance	Evidentiary

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Assessors and Reviewers
Yvette Ehlers-Smith[1], Sam Williams[2,3], Claire Relton[4], Matthew F. Child[4]

[1]University of KwaZulu-Natal, [2]Durham University, [3]University of Limpopo, [4]Endangered Wildlife Trust

Contributors
Ian Rushworth[1], Samantha Page-Nicholson[2]

[1]Ezemvelo KZN Wildlife, [2]Endangered Wildlife Trust

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