



Kavango-Zambezi Transfrontier Conservation Area

Giraffe Conservation Strategy 2022-26

KAZA TFCA

A Strategy prepared by KAZA TFCA Partner States



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Executive Summary

This five-year Giraffe Conservation Strategy describes the collaborative integrated landscape-level approach to conserve globally important populations of giraffe across the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA). KAZA TFCA collectively supports an estimated 10% of remaining wild giraffe and the conservation of these iconic animals requires broad conservation initiatives across the KAZA network of public and private protected areas and community land, and multiple actors.

This strategy is the product of a participatory stakeholder workshop, which incorporated input from representatives of all partner states. Stakeholders convened in a virtual workshop on 14-15 June 2021 and followed the IUCN Species Survival Commission strategic planning structure. Goals and objectives for this strategy were developed through consensus of partner state representatives to incorporate diverse perspectives into its scope.

To provide foundational information on giraffe abundance and distribution trends, a desktop review was conducted, which incorporated data from peer-reviewed literature, grey literature, and expert communications to provide relevant historical contexts and contemporary baselines. These figures were enumerated by country to outline specific conservation threats and opportunities across each of the KAZA TFCA partner states. The review was supplemented during the workshop with inputs from the relevant agencies of the KAZA TFCA partner states.

This strategy represents a framework to achieve the goal of creating an environment to maximise ecological and economic opportunities for giraffe conservation in the KAZA TFCA landscape within the next five years. To attain this goal, three primary objectives were identified by the range partner states for advancing giraffe conservation in the KAZA TFCA: 1) To identify and reduce the risks and threats for giraffe sustainability; 2) To create opportunities to drive giraffe conservation in the KAZA TFCA landscape; and 3) To support co-existence with giraffe populations across the landscape.

Acknowledging the key knowledge gaps, the first step will be establishing unified systems and protocols for better assessing giraffe distribution, abundance, threats, and conservation priorities in all partner states. As these data are systematically collected, processes for integrating the best available data into a management planning framework to coordinate giraffe conservation activities across partner states will be developed. This strategy also reflects the importance of refining communication channels to better engage with communities and partner state representatives to ensure sustainable coexistence with giraffe across the KAZA TFCA.

The KAZA TFCA Giraffe Conservation Strategy 2022-26 can be found at:

<http://www.kavangozambezi.org>

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The compilation of the KAZA TFCA Giraffe Conservation Strategy 2022-26 was a collaborative effort, spearheaded by the Giraffe Conservation Foundation (GCF) and the KAZA Secretariat with input from all partner states, and local and international experts. The guidance, contribution, and support of Dr Clara Bocchino and her interpretation and translation team is acknowledged and highly appreciated. Throughout this process, consultations with stakeholders and partners in wildlife conservation and management were conducted to incorporate diverse perspectives in developing this comprehensive conservation strategy.

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The contribution by all partner states and the KAZA Secretariat is recognised.

Acronyms and abbreviations

List of abbreviations used throughout the report and their associated meanings.

CBNRM	Community-Based Natural Resource Management
CBC	Centre for Biodiversity & Conservation
CITES	Convention of International Trade in Endangered Species
CMS	Convention of Migratory Species
DWNP	Department of Wildlife and National Parks (Botswana)
GCF	Giraffe Conservation Foundation
GIS	Geographic Information System
GMA	Game Management Area
GPS	Global Positioning System
GTWG	Giraffe Technical Working Group
IUCN	International Union for Conservation of Nature
KAP	Knowledge, Attitude and Practices
KAZA TFCA	Kavango Zambezi Transfrontier Conservation Area
MEFT	Ministry of Environment, Forestry and Tourism (Namibia)
NGO	Non-Governmental Organisation
NP	National Park
PA	Protected Area
SADC	Southern African Development Community
TFCA	Transfrontier Conservation Area
ZAWA	Zambia Wildlife Authority

1. Introduction

1.1. Background

The Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) supports globally important giraffe populations. The network of public/private protected areas provides important habitat for an estimated 10% of all wild giraffe in Africa, and ~25% of all southern giraffe. Conserving these populations of giraffe requires a landscape-level approach to maintain access and connectivity to critical resources across the five partner states of the KAZA TFCA. Across key giraffe populations in the KAZA TFCA, recent abundance estimates suggest population declines, emphasizing the growing need for collaborative landscape-level conservation planning (Brown *et al.* 2021).

A key limitation to conservation of giraffe and their long-term sustainable future in the KAZA TFCA is the scant knowledge on their distribution, abundance, habitat needs as well as current and future conservation threats. To date, only limited long-term conservation research efforts have been conducted on giraffe throughout the area. While giraffe are currently 'relatively' common both inside and outside protected areas in the KAZA TFCA and their population in this area is one of few growing giraffe populations on the continent, their numbers are essentially unknown as neither accurate nor standardised estimates of abundance or population dynamics has ever been completed.

While KAZA TFCA partner states have a strong history of collaborative conservation planning to establish frameworks for landscape initiatives for targeted wildlife, having developed collaborative strategies for African wild dogs, carnivores, and elephants, there is no KAZA-wide landscape-level planning initiative for giraffe conservation. To address this gap, the Giraffe Conservation Foundation (GCF) and KAZA Secretariat committed to the development of a strategy through stakeholder engagement, incorporating diverse perspectives to identify knowledge gaps, key threats, challenges, and opportunities to advance giraffe conservation efforts. The strategy outlines interventions that are rooted in both science-based and participatory planning. It seeks to harmonize giraffe research and conservation efforts across the KAZA TFCA and ensure a sustainable future for viable populations of Southern giraffe in the KAZA landscape through sound ecosystem management, research, and outreach, contributing to people's livelihoods and fostering regional cooperation for development. Transboundary realities in KAZA dictate that the giraffe conservation strategy be supported by open communication and data sharing across partner states.

The development of the KAZA giraffe strategy is consistent with, and acts upon the guidance of, two recent international treaties resolutions and findings. In October 2017, giraffe were added to Appendix II of the Convention of Migratory Species (CMS) at the twelfth Conference of Parties (CoP) meeting in recognition of their transboundary movements throughout their range (CMS CoP12 2017). The CMS Appendix II listing calls for collaboration of all appropriate giraffe Range States, and for improved awareness and management of the plight of giraffe internationally. In August 2019, giraffe as a single species were added for the first time to Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) to regulate international trade of the species (CITES 2019).

1.2. Giraffe Conservation Status and Distribution in Africa

1.2.1. Taxonomy and Scientific Classification

The giraffe is the tallest and largest even-toed ruminant. It belongs to:

Kingdom:	Mammalia
Phylum:	Chordata
Order:	Artiodactyla
Family:	Giraffidae
Genus:	<i>Giraffa</i>

In 2016, the International Union for the Conservation of Nature (IUCN) completed the first detailed assessment of the conservation status of giraffe, revealing that they are in peril by listing them as *Vulnerable* on the IUCN Red List of Threatened Species™. Their plight was further emphasised when most of the IUCN recognised subspecies were assessed separately in 2018 – some as *Critically Endangered*. While this conservation status update further confirms the real threat to one of Africa’s most charismatic megafauna, it also highlights a confusing aspect of giraffe conservation: how many species/subspecies of giraffe are there? The IUCN currently recognises one species (*Giraffa camelopardalis*) and nine subspecies of giraffe (Muller *et al.* 2018) historically based on outdated assessments of their morphological features and geographic ranges (Coimbra *et al.* 2021; Winter *et al.* 2018; Fennessy *et al.* 2016). The subspecies are thus divided in Angolan giraffe (*G. c. angolensis*), Kordofan giraffe (*G. c. antiquorum*), Masai giraffe (*G. c. tippelskirchi*), Nubian giraffe (*G. c. camelopardalis*), reticulated giraffe (*G. c. reticulata*), Rothschild’s giraffe (*G. c. rothschildi*), South African giraffe (*G. c. giraffa*), Thornicroft’s giraffe (*G. c. thornicrofti*) and West African giraffe (*G. c. peralta*).

However, GCF together with their partner, the Senckenberg Biodiversity and Climate Research Centre (BiK-F), performed the first-ever comprehensive DNA sampling and analysis (genomic, nuclear, and mitochondrial) of all major natural populations of giraffe throughout their range in Africa, which has resulted in an updated understanding of giraffe taxonomy. This study revealed that there are four species of giraffe and likely six subspecies (Coimbra *et al.* 2021; Winter *et al.* 2018; Fennessy *et al.* 2016). The four species are Masai giraffe (*G. tippelskirchi*), northern giraffe (*G. camelopardalis*), reticulated giraffe (*G. reticulata*) and southern giraffe (*G. giraffa*). The northern giraffe has three subspecies: Nubian giraffe (*G. c. camelopardalis*), Kordofan giraffe (*G. c. antiquorum*) and West African giraffe (*G. c. peralta*). The southern giraffe has two subspecies: Angolan giraffe (*G. g. angolensis*) and South African giraffe (*G. g. giraffa*). Two of the former subspecies have been subsumed within other taxa as data support they are genetically identical: the Rothschild’s giraffe (*G. c. rothschildi*) is synonymous with the Nubian giraffe (*G. c. camelopardalis*) and the Luangwa (or Thornicroft’s) giraffe (*G. c. thornicrofti*) is likely a subspecies of the Masai giraffe (*G. c. tippelskirchi*) (Coimbra *et al.* 2021; Winter *et al.* 2018; Fennessy *et al.* 2016). Two of the former subspecies are raised to specific rank: *G. c. reticulata* is now the reticulated giraffe (*G. reticulata*) and *G. c. tippelskirchi* is now the Masai giraffe (*G. tippelskirchi*). Based on this research, the updated giraffe taxonomy of four species is used in the document.

The following species and subspecies of giraffe occur in the KAZA TFCA:

Species: Southern giraffe *Giraffa giraffa*

Subspecies: Angolan giraffe *Giraffa giraffa angolensis*

South African giraffe *Giraffa giraffa giraffa*

1.2.2. Geographical Distribution and Trends in Africa

Giraffe currently occur in 22 countries, forming a wide arc throughout sub-Saharan Africa from Niger to Central and East Africa down to Southern Africa (Brown et al. 2021; GCF 2021). Specifically, giraffe naturally occur in Angola, Botswana, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Ethiopia, Kenya, Mozambique, Namibia, Niger, Somalia, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. Extralimital populations have been introduced to Eswatini, Malawi, Rwanda, and Senegal (Brown et al. 2021).

Giraffe numbers in Africa are thought to have declined by approximately 30% in the last 30 years from a historic estimate of ~155,000 to ~117,000 individuals (GCF 2021). This decline has resulted in uplisting giraffe as one species from *Least Concern* to *Vulnerable* on the IUCN Red List of Threatened Species (Muller et al. 2018). In 2018/19 all subspecies (excluding the South African giraffe) were assessed for separate IUCN Red List standings, many for the first time. In evaluating the conservation status at the IUCN-described subspecies level, the diversity of giraffe conservation issues becomes more apparent. Some (sub)species are categorised as more imperilled, such as the Kordofan giraffe (*Critically Endangered*), Nubian and the subsumed Rothschild's giraffe (*Critically Endangered*), reticulated giraffe (*Endangered*), and Masai giraffe (*Endangered*). Other taxa exhibit a lesser conservation threat level, for example, the West African giraffe (*Vulnerable*) and the Luangwa (Thornicroft's) giraffe (*Vulnerable*). Conversely, other taxa, particularly those in southern Africa, are generally considered to be of lesser conservation concern; namely the Angolan giraffe (*Least Concern*) and the South African giraffe (*not assessed*).

1.2.3. Behaviour and Biology

Giraffe are predominantly browsers: their long legs and neck ensure utilisation of a food source beyond the reach of any other animals, except for African elephant. Despite this highly specialised adaptation, giraffe are extremely versatile and flourish in habitats with relatively few trees where, instead, they browse the tops of bushes and smaller trees (GCF 2021). Giraffe are highly mobile and some subspecies have demonstrated a capacity to move long distances in pursuit of sufficient forage or mating opportunities (Flanagan et al. 2016). To drink, giraffe spread their forelegs and/or bend their knees to lower their necks to reach the surface of water. However, despite their body mass, water is not a necessity as they can absorb preformed water from moisture in the plants they consume. Even when water is readily available, evidence shows that many giraffe do not drink regularly (Mitchell 2021).

Adult male giraffe are approximately 5.3 m tall, females approximately 4.3 m tall, and they weigh an average of 1,200 kg and 830 kg respectively. Females have a gestation period of about 15 months and deliver a single calf; twins are rare. Their social behaviour ranges from solitary to large, loosely associated herds. Herds often shift in composition, known as fission-fusion, by individuals or small groups readily merging with or splitting from the herd. It is estimated that giraffe can live up to 25 years in the wild; however, long-term research shows that this could be a conservative estimate (GCF 2021).

1.3. Status and Distribution of Giraffe in the KAZA TFCA

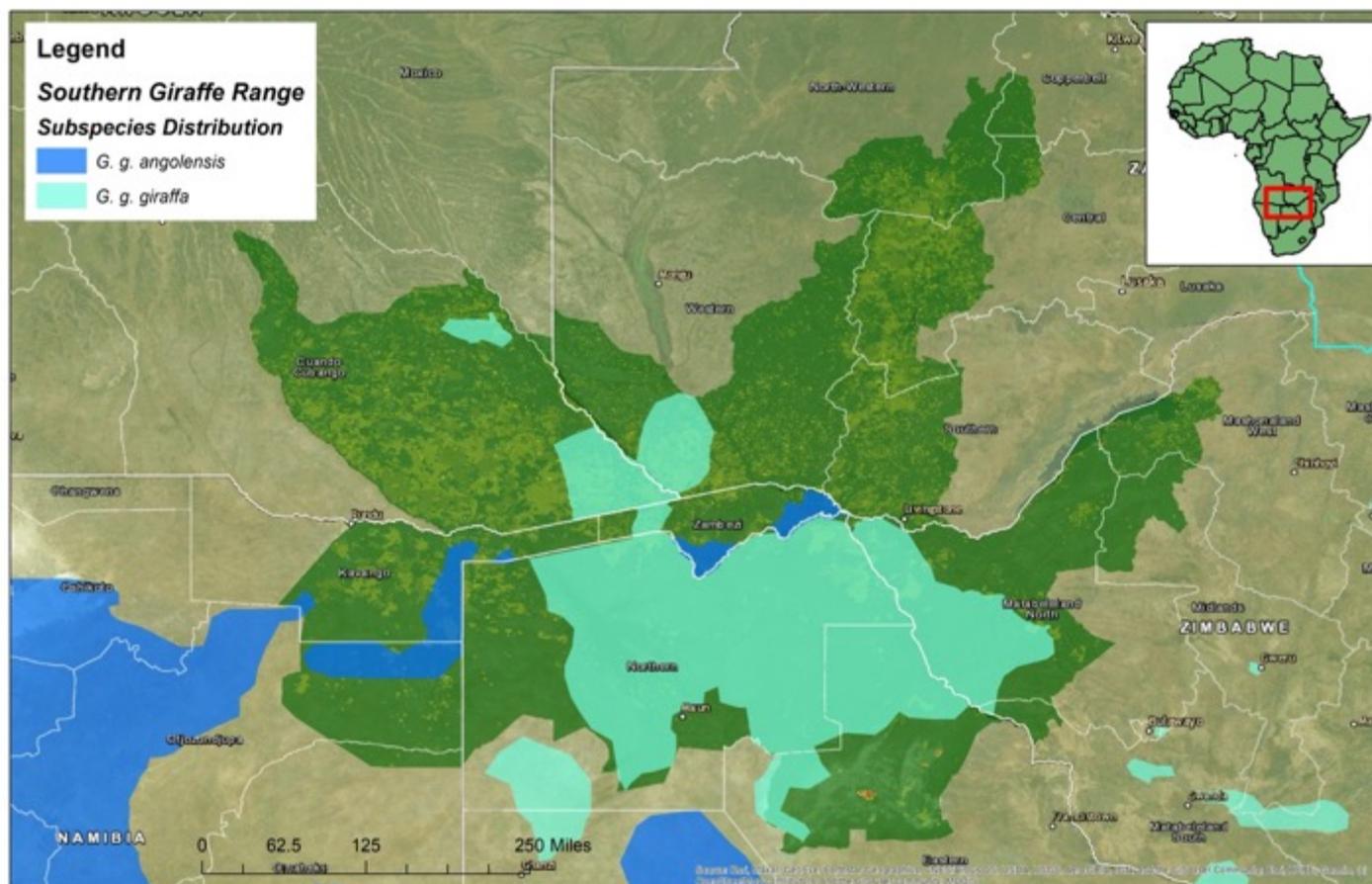


Figure 1: A distribution map of southern giraffe subspecies occurrence in the KAZA TFCA. Derived from Brown *et al.* 2021.

1.3.1. Taxonomic status of giraffe across the KAZA TFCA

Angola supports the South African and Angolan subspecies of giraffe. South African giraffe are found in Angola's Cuando Cubango Province where there is evidence of regular transboundary movements between Namibia's Bwabwata NP and the Luengue-Luiana and Mavinga NPs (Funston *et al.* 2017). There are also several South African giraffe in the Luengue-Luiana NP, a naturally re-populated area. This population is monitored by the Angolan Ministry of Environment (Angola Press 2018). Angolan giraffe were (re-)introduced to several private game farms in Angola from Namibia. There are also possibly some individuals on the western boundary of Luengue-Luiana NP.

In Botswana, Bock *et al.* (2014) reported that in the northern regions including Chobe NP, Moremi Game Reserve (GR), the Okavango Delta, Makgadikgadi Pans and Nxai Pan NPs, and outside of protected areas throughout Ngamiland, the South African giraffe were genetically different from the Angolan giraffe in the south. This distinction was further solidified with genetic analysis performed by Fennessy *et al.* (2016) and Winter *et al.* (2018). In the Botswana component of KAZA TFCA, Angolan giraffe are likely found in the unprotected (private) areas in the Ghanzi District, but further genetic analysis is required.

In Namibia, South African giraffe occur naturally in the Susuwe area of Bwabwata NP in the Zambezi Region. They move across transnational boundaries into southeast Angola and historically south into northern Botswana. Angolan giraffe naturally occur throughout Khaudum NP and surrounding conservancies, and were re-introduced into the Mahango Core Area of Bwabwata National Park. Additionally, Angolan giraffe were introduced into several conservancy areas across the eastern areas of the Zambezi Region, west of the Kwando River.

The giraffe in Sioma Ngwezi NP in south-west Zambia were historically of unknown taxonomic identity, but recent studies indicate they are South African giraffe (Winter *et al.* 2018). This means that in Zambia, South African giraffe reside in Sioma Ngwezi and Mosi-oa-Tunya NPs located in the southwest (including on the Zambezi Sun and Avani properties at Victoria Falls). An extralimital population of Angolan giraffe was introduced to Simalaha Community Conservancy in southwestern Zambia from Namibia.

In Zimbabwe, it is assumed that all giraffe in the KAZA TFCA are South African giraffe. Ongoing genetic sampling and future analysis will evaluate this hypothesis. As part of a preliminary assessment, Angolan giraffe (or hybrids) appear to be in the central and southern areas of Zimbabwe, outside of the KAZA TFCA (GCF pers. comm.).

1.3.2. Giraffe population in Angola

Historic

Giraffe formerly occurred across the savannas of southern Angola (East 1999). According to Crawford-Cabral & Verissimo (2005), the historic distribution of the species presented a discontinuous range with two, reputedly separated, populations. Initially, Crawford-Cabral & Verissimo (2005) documented one of these populations, the eastern-most, to possibly represent the (sub)species *G. c. infumata*. However, Dagg's (1971) review of giraffe (sub)speciation showed that *G. c. infumata* was in fact synonymous with the Angolan giraffe, *G. g. angolensis*. Based on the recent genetic findings of Fennessy *et al.* (2016) and Winter *et al.* (2018) and further supported by Coimbra *et al.* (2021), it is likely that Crawford-Cabral & Verissimo (2005) and Dagg's (1971) review were both inaccurate in that the giraffe in eastern Angola were the South African giraffe subspecies (*G. g. giraffa*) which naturally move into and out of the area from neighbouring Namibia and Botswana. This new study suggests both subspecies (Angolan and South African) historically existed in Angola (Fennessy *et al.* 2016). The Okavango, Cuito and Kwando Rivers all acted as barriers for east-west movements of giraffe in Angola and the neighbouring countries. The eastern population occurred between the Cuito and Kwando Rivers, with larger numbers of records from the southeast corner of the former Mucusso GR (Crawford-Cabral & Verissimo 2005).

Dagg (1962) reported that giraffe were relatively abundant between Mucusso and Luiana areas in the south-east. In the late 1960s, a few hundred giraffe reportedly survived in the Mucusso area in the south-east (East 1999). By the mid-1970s, giraffe populations had severely declined in numbers, with only approximately 50 individuals remaining in the Mucusso GR (Crawford-Cabral & Verissimo 2005). By the early 1980s, giraffe had largely disappeared and by the late 1990s giraffe were assumed locally extinct in Angola (East 1999).

Current

There is limited data available on the current giraffe population numbers and range in Angola, especially for areas in the KAZA TFCA. The most recent giraffe population estimates come from a predator and prey study conducted by Panthera in 2017 throughout the Luengue-Luiana and Mavinga NPs (Funston *et al.* 2017). There are also several South African giraffe in the Luengue-Luiana NP which re-populated the area naturally. This population is closely monitored by the Angolan

Ministry of Environment (Angola Press 2018). The South African giraffe population is currently estimated at <200 individuals throughout the Angolan part of the KAZA TFCA (Marais *et al.* 2018; Funston *et al.* 2017).

Summary

The most recent giraffe population survey, performed in 2017, estimated <200 individuals in total throughout the KAZA TFCA part of Angola. A better understanding of Angola's giraffe population numbers as well as the transboundary movements between the Angolan parks and Namibia's Bwabwata NP is key to better manage them. Key conservation research will aid understanding these movements, particularly using GPS satellite tags.

1.3.3. Giraffe populations in Botswana

Historic

Giraffe formerly occurred abundantly throughout the savannas of northern and central Botswana (East 1999), and rock paintings of giraffe in the Tsodilo Hills suggest that giraffe occurred in the far northwest. Krumbeigel (1939) proposed that Angolan giraffe occurred historically in Botswana, as well as what was known as *G. c capensis* (now the South African giraffe *G. g. giraffa*) at the time. Bryden (1891) suggested that giraffe were found heading from Shoshong to Lake Ngami, first encountered "in the bush and forest-region beyond Kanne (present day Tlabala)" in a waterless tract, likely referring to the Kalahari bush. He noted that between the Boteti River and halfway to Lake Ngami, the local leader, Khama (III), restricted hunting of giraffe to him and his people. Furthermore, he described their distribution stretching north from "Khama's country" to Victoria Falls, and west towards Chobe and Mababe Rivers, as well as north of Lake Ngami in "Moremi's country", and down south from the Boteti into the central Kalahari. However, Bryden (1891) also mentioned that giraffe no longer occurred westward of Lake Ngami, stating that Namaqua hunters "were too active". Overall, this description of the distribution in 1891 roughly encompassed Botswana north of the Boteti River, and parts of the central Kalahari, and that hunting of giraffe was abundant and remarked on their rapid decline. Sidney (1965) reported that they were "fairly plentiful in the Ngamiland and Chobe districts" and also occurred south of "Lake Makarikari" (this probably refers to the Makgadikgadi Pans).

Since 1979, the Department of Wildlife and National Parks (DWNP) has sporadically conducted aerial surveys of parts of Botswana to estimate the population sizes of large mammals and ostrich. The DWNP consider the estimates from aerial surveys before 1989 to be less reliable or incompatible with estimates from 1989 onward due to discrepancies in the estimation methodology (Murray 1997). The aerial surveys did not standardise the strata that were flown, and the whole country was not surveyed until 2003.

Between 1989 and 1991, Statistics Botswana (2015) estimated the entire giraffe population in Botswana at 11,706. In 1990, there were an estimated 9,312 giraffe in Botswana (Government of Botswana 2002). In 1996, the first aerial survey included all districts and protected areas. Following the historical trends observed, the majority of giraffe were South African giraffe counted in Ngamiland (10,608) and the Okavango Delta (7,627). South African giraffe were also relatively abundant in Chobe District (1,236), including 666 in Chobe NP. In 1998, giraffe still occupied a substantial part of their former range, with the largest numbers in the northern region. According to East (1999), there was an estimated stable population of 5,100 giraffe in protected areas, 30 on private lands, and a stable or increasing population size of 6,570 in other areas. Despite lacking estimates for districts or protected areas, East (1999) claimed that giraffe were still common throughout the north of the country, with high numbers of South African giraffe in Chobe NP, Makgadikgadi Pans and Nxai Pan NPs, Moremi GR and the Okavango Delta in general. The biggest proportion of giraffe were found outside of protected areas, and the largest numbers occurred in the Okavango Delta (Statistics Botswana 2015).

In 2002, the National Wildlife Aerial Survey (DWNP 2002) included an explicit representation of the strata that were surveyed and showed that South African giraffe occurred throughout the north of the country (except for the farmlands to the west of the Okavango Delta) in Ngamiland, Ghanzi, to Chobe along the north-eastern border with Zimbabwe. The 2003 and 2004 surveys indicated the same (DWNP 2003 & 2004). In 2006, 1,379 giraffe were estimated in Chobe District, 6,763 in Ngamiland, and 129 in Makgadikgadi Pans and Nxai Pan NPs (DWNP 2006): data was absent for the other districts. A statistically significant annual giraffe population decrease of 10% in the Okavango Delta was noted since 1993, with a 36% decrease in Moremi GR since 2004.

Current

In 2010, Elephants without Borders/DWNP conducted an aerial survey of the north of the country (Chase 2011b). South African giraffe were observed throughout the north of the country, with the majority (3,676) occurring in Ngamiland. An estimated 1,075 South African giraffe resided in Moremi GR, 3,676 in Ngamiland, and 1,245 in Chobe District including 770 in Chobe NP. The overall population in Ngamiland showed a slight decline since 1993, whilst those in Makgadikgadi Pans and Nxai Pan NPs, and Chobe District were stable.

In 2012, the DWNP survey highlighted similar results to Chase (2011a): South African giraffe populations had significantly decreased in Chobe NP, decreased slightly in Makgadikgadi Pans NP and increased in Moremi GR and Nxai Pan NP (DWNP 2012). This survey was the most comprehensive to date in terms of area covered in Botswana, and showed that South African giraffe occurred throughout the north of the country (with the exception of the farmlands to the west of the Okavango Delta) with 1,075 in Chobe including 545 in Chobe NP, and 5,041 in Ngamiland including 1,047 in Moremi NP, 92 in Makgadikgadi Pans and Nxai Pan NPs, and an unknown number eastwards towards and along the Zimbabwean border.

Another aerial survey was performed in 2014 by Elephants Without Borders and DWNP for multiple species across northern Botswana in Moremi GR and Ngamiland, Chobe District, and a portion of Central District (Chase *et al.* 2015). In Ngamiland, South African giraffe were reported to have decreased since the 1990s, with an all-time low of 3,676 in 2010, but the 2014 survey indicated an increase (Chase 2015). Abundance estimates for Moremi GR and Ngamiland were 1,353 and 6,532, respectively. Furthermore, the giraffe populations in Chobe District including the Chobe NP also showed increases, with an estimated 1,427 and 849 individuals, respectively (Chase 2015). This survey found giraffe as far east as the Zimbabwean border and the Tuli Block (Chase 2015).

The most recent giraffe population estimates are based off the 2018 aerial survey conducted by Elephants Without Borders and DWNP across northern Botswana during the dry season. These surveys covered the same areas surveyed in 2014 (Chase *et al.* 2018). A total population estimate of 8,343 was made for giraffe in northern Botswana, covering the Chobe, Central, and Ngamiland Districts, and therefore presumably all South African giraffe (Chase *et al.* 2018). It was noted that the slight decline seen from the 2014 survey results was non-significant and the giraffe population remains stable (Chase *et al.* 2018).

Summary

The last country-wide survey of giraffe in northern Botswana occurred in 2018 estimating a total of 8,343 individuals (Chase *et al.* 2018). Based on the data from northern Botswana from the most recent aerial survey (Chase *et al.* 2018), it is estimated that around 8,000 South African giraffe occur in the region of Botswana encompassed by the KAZA TFCA. Based on data since 1989, it is estimated that populations within the protected areas are stable or increasing in recent years after an initial decline. Currently, it is unknown if giraffe move transboundary between Botswana and Namibia, and

as such a better understanding of this is key to better manage them. Key conservation research will aid understanding these movements, particularly using GPS satellite tags.

1.3.4. Giraffe populations in Namibia

Historic

Although the first recorded accounts of giraffe in Namibia date to the travels of Captain Hendrik Hop, who ventured north of the Orange River in 1761 (Scheepers 1990), giraffe have likely roamed Namibia for hundreds of thousands of years or more. Petroglyphs, rock paintings and engravings of giraffe adorn many rock faces throughout the country, and their importance as a ceremonial animal for the early inhabitants has also been reported (Fennessy 2004; Sherr 1997).

According to Skinner and Chimimba (2005) giraffe formerly occurred in the north-eastern parts of Namibia, ranging south to about 20° south on the Botswana border westwards. Lydekker (1904) reported that the Kunene and Kavango Rivers form a natural barrier between the Angolan and Namibian giraffe populations, thus effectively separating the ranges of *G. c. angolensis*, *G. c. infumata* (east) and *G. c. capensis* (south, the latter synonymous with *G. c. giraffa*). However, Dagg's (1971) review showed that *G. c. infumata* was in fact synonymous with *G. c. angolensis*, while both Dagg & Foster (1982) and Seymour (2001) identified that *G. c. angolensis* range extends south and eastwards to the Kwando River, Zambezi Region, Namibia.

Shortridge (1934) observed giraffe ranging throughout the former South West Africa (now Namibia), including east of the Kavango River. Furthermore, Shortridge (1934) postulated that less than 100 giraffe occurred across the Zambezi Region (formerly Caprivi) Region. Records of giraffe distribution in Namibia in the mid-1950s to mid-1960s correlate with those of Shortridge (1934). At the time, giraffe were still widespread and occurred northwards to the Okavango River, and eastwards into the Zambezi Region (Dagg 1962; Bigalke 1958; Sidney 1956).

Aerial surveys of north-eastern Namibia were conducted in 2004 (Kolberg 2004; Stander 2004a). The surveys covered an area of 55,247 km² and estimated a population of 883 giraffe (Kolberg 2004; Stander 2004a). Of these, 419 occurred in Khaudum Game Park, 101 in N̄a-Jaqna Conservancy, 89 in Nyae Nyae Conservancy and 40 in Bwabwata NP (21 in Mahango Core Area and 19 in Susuwe, (Kolberg 2004; Stander 2004a). An aerial wildlife census of the Caprivi River systems in northeast Namibia was also conducted in 2004 (Stander 2004b). During this total count, which concentrated on the water bodies and floodplains of the Zambezi and Kavango perennial river systems (Kavango, Kwandu, Linyanti, Chobe and Zambezi Rivers), 21 giraffe were recorded: eight occurred in the Linyanti/Chobe survey stratum and 13 in Nkasa Rupara (formerly Mamili) NP (Stander 2004b). Another survey of north-eastern Namibia (not including Mangetti NP) was conducted in 2008 (Kolberg 2008): 118 giraffe were counted in Khaudum Game Park, two giraffe in East Caprivi, one in Kavango, two in Mahango Core Area, 12 in N̄a Jaqna Conservancy, seven in Nyae Nyae Conservancy and one in Susuwe (Kolberg 2008). However, estimates were not calculated for these areas as the number of observations were too low and considered a possible undercount (Kolberg 2008). It is important to note that recent genetic research has shown that the giraffe in the Susuwe area of Bwabwata NP are South African giraffe, while all other giraffe in Namibia's portion of KAZA TFCA are Angolan giraffe (Coimbra *et al.* 2021; Winter *et al.* 2018; Fennessy *et al.* 2016).

Current

In 2013, aerial surveys of wildlife and domestic livestock of the Caprivi were conducted. A total area of 16,733 km² was sampled, which included Bwabwata, Mudumu and Nkasa Rupara NPs, as well as adjacent areas (Craig & Gibson 2013). An estimated 324 giraffe populated the region, of which 100 individuals were estimated to occur across Eastern Zambezi

North, Eastern Zambezi South, Linyanti, Buffalo/Mahango, Kwando and Susuwe areas (Craig & Gibson 2013). The species were introduced to some conservancies, but they are not numerous and appear to be concentrated in protected areas (Craig & Gibson 2013). In the same year, an aerial sample count of Khaudum NP estimated a giraffe population of 698 individuals (K. /Uiseb pers comm.). A total aerial count of wildlife in Mangetti NP in 2014 enumerated fourteen giraffe (K. /Uiseb pers. comm.). In 2019, an aerial survey conducted by C. Craig and D. Gibson estimated 403 giraffe in the Zambezi Region, including ~100 South African giraffe in Bwabwata NP, and 838 giraffe in the Khaudum NP-Tsumkwe areas. A total of 1,241 giraffe were estimated for the KAZA TFCA component excluding Mangetti NP (K. /Uiseb pers. comm.)

Summary

KAZA associated areas in north eastern Namibia support large, stable populations of both subspecies of southern giraffe. The Kavango East Regions support approximately 750 Angolan giraffe, and Kavango West supports approximately 20 Angolan giraffe. The Khaudum NP and surrounding conservancies support approximately 838 Angolan giraffe. The Zambezi region support approximately 50 Angolan giraffe and 100 South African giraffe. A better understanding of Bwabwata NP's giraffe population numbers as well as the transboundary movements between Namibia's Bwabwata NP and both Angola's parks to the north and Botswana's parks to the south is key to better manage them. Key conservation research will aid understanding these movements, particularly using GPS satellite tags. Additionally, it is recommended to keep the populations of Angolan and South African giraffe separate and to take their distribution in Namibia and the KAZA TFCA into consideration for future translocations.

1.3.5. Giraffe populations in Zambia

Historic

At the end of the 19th century, giraffe in Zambia were limited to two isolated regions: one in Barotseland, and the other in the Luangwa Valley (Sidney 1965). Previously it was doubted that giraffe historically existed in any other parts of the country (Sidney 1965; Ansell 1952), however, evidence indicates that giraffe were present (migratory) in Kafue NP from a letter sent by Mr J. Loewen to Mr P. de. V. Moss in 1974, who reported seeing three giraffe within the park. However, much debate still surrounds the anecdotal records of giraffe in this region (Lines *et al.* 2018). More investigation is required to confirm the historical presence of giraffe within the Kafue NP and neighbouring areas.

The South African giraffe population in Barotseland (western Zambia) roamed the western parts of the region, between the Zambezi and Mashu Rivers in the 1960s (Dagg 1962). Referred to as Barotse giraffe (*G. c. infumata*), at the time, these animals occurred on the Silwana Plain and on the borders of the Mashu River in west Barotseland (Sidney 1965). In 1952, the Carp Expedition estimated that there were between 150 and 200 individuals in the region (Sidney 1965). In 1965, the estimated number of giraffe in Barotseland remained the same at 150-200 individuals (Sidney 1965). According to East (1999) only a small number of these giraffe (taxonomically lumped in with the 'Southern giraffe' at the time) survived in south-western Zambia by the late 1990s, all inhabiting Sioma Ngwezi NP.

In 2004 and 2005, aerial surveys of Sioma Ngwezi NP estimated 211 giraffe in the area (Chase & Griffin 2009). In 2008, an aerial survey of Mosi-oa-Tunya NP, Kazungula and the Sioma Complex (which comprises Sioma Ngwezi NP and West Zambezi GMA) was conducted. During this survey, 161 giraffe were estimated in the Lower West Zambezi and 420 in Sioma Ngwezi NP, while 11 giraffe were observed in Mosi-oa-Tunya NP, giving a total of 581 giraffe for the region (Simukonda 2009). Uncertainty remains with regards to the origin of the giraffe population in Mosi-oa-Tunya although they were likely a (re-)introduced population (M. Nyirenda pers. comm., F. Willems pers. comm.). Anecdotal sources from the former Zambia Wildlife Authority (ZAWA) suggest that they could have come from Sioma Ngwezi NP, while others

indicate they may be from north-eastern Zimbabwe (M. Nyirenda pers. comm.). However, both are now proven to be South African giraffe (Winter *et al.* 2018; Fennessy *et al.* 2016).

Current

An aerial survey of elephant and other wildlife in Sioma Ngwezi NP was conducted in 2013 (Chase *et al.* 2013). A total of 232 giraffe were estimated: 44 in Sioma Ngwezi NP West and 188 in Sioma Ngwezi NP East (Chase *et al.* 2013). The giraffe population in Sioma Ngwezi NP has remained stable, with an estimate of about 200 individuals noted in the park in 2020 (Pelc 2020). A maximum of 250 giraffe is currently estimated in the park (S. Mayes pers. comm.).

The giraffe population in Mosi-oa-Tunya NP has grown slowly, increasing to 13 individuals by 2015 and now numbering a maximum of 30 individuals as of 2020 (J. Katampi pers. comm.).

In 2015 as part of a larger conservation effort to re-establish a giraffe population in Simalaha Community Conservancy, PPF reintroduced an extralimital population of eight Angolan giraffe from the Salambala Conservancy in the Zambezi Region of Namibia (PPF 2013). This population has been doing well and has since increased to 35 individuals (G. Homer pers. comm.).

Summary

An estimated population of <280 South African giraffe resides in southwestern Zambia, approximately in Sioma Ngwezi NP, 30 giraffe in Mosi-oa-Tunya NP, 20 on properties neighbouring/close to Mosi-oa-Tunya NP, and 35 Angolan giraffe as an extra limital population in Simalaha Community Conservancy, and four on the property of Zambezi Sun (J. Katampi pers. comm.).

1.3.6. Giraffe populations in Zimbabwe

Historic

Historically, giraffe were found throughout Zimbabwe, however, available data on giraffe historical numbers and range is relatively limited, especially for areas in the KAZA TFCA. Zimbabwe's highest concentrations of giraffe have historically been reported in parks, wildlife estates and on private land. According to the African Antelope Database 1998 (East 1998), giraffe were estimated at a total of 26,276: with 14,651 giraffe in Hwange NP (1996), 3,295 in the Matetsi SA Complex (1995), 561 in Kazuma Pan NP (1995), 543 in Zambezi NP (1995), and 2,344 in forestry areas (1995). More recent giraffe data is based on aerial survey reports gathered during independent surveys in various areas in Zimbabwe.

In 2001 the first of such surveys was undertaken and giraffe numbers in northwest Matabeleland (including Hwange NP, Zambezi NP, Kazuma Pan NP, Matetsi Safari Area and Deka Safari Area) were estimated at 3,437 (Lenton 2007; Dunham *et al.* 2002b; Dunham 2001). In the Sebungwe Region and the Zambezi Valley (Chizarira & Matusadonha NPs, Chete & Chirisa Safari Area, and Binga, Gokwe and Nyaminyami communal areas), no giraffe were recorded (Mackie 2002).

Current

Data on numbers and range of giraffe in Zimbabwe remains limited, although it appears numbers continue to be declining across the country. The most recent aerial survey (2014) from across Zimbabwe was undertaken with the support of the Great Elephant Census, with 1,568 giraffe estimated for north west Matabeleland (which includes Hwange National Park, Zambesi National Park, Kazuma Pan National Park, Matetsi Safari Area and Deka Safari Area) (Dunham *et al.* 2015). This estimate is currently the best we have for the population in the Zimbabwe component of the KAZA TFCA.

Communications with several other private reserves and ranches in Zimbabwe, outside of the KAZA TFCA, reveal a mix of population increases and declines. As an example, the Buby Valley Conservancy estimates of giraffe numbers in 2012 were 6,000-8,000 (P. Trethown pers. comm.), and today are estimated at 3,000 individuals (B. Leatham pers. comm.). Additional estimates for giraffe in other private and public land in Zimbabwe, including Drummond, Nottingham, Matobo National Park and Tuli Safari Area estimate a minimum of ~500 giraffe (P. Fick pers. comm.).

Summary

In total, there is an estimated minimum of 1,568 South African giraffe in Zimbabwean part of the KAZA TFCA. This shows a drastic decline in giraffe numbers in the KAZA area of Zimbabwe over the past few decades, as observed throughout Zimbabwe. Increased surveys and assessments are required to better understand the current situation, along with ongoing efforts to decipher the county's giraffe taxonomic status as historical and recent translocations may have involved a mix of the two subspecies of the Southern giraffe.

Table 1: Summary of current population estimates for both subspecies in the KAZA TFCA associated areas for all partner states.

Subspecies	Country	Area	Population Estimate
Angolan giraffe (<i>G. g. angolensis</i>)	Namibia	Kavango East Region	750
		Kavango West Region	20
		Khaudum NP and conservancies	838
		Zambezi	50
	Zambia	Simalaha Community Conservancy	35
		Zambezi Sun Property	4
Total Angolan giraffe in KAZA TFCA			1,697
South African giraffe (<i>G. g. giraffa</i>)	Angola	Luengue-Luiana and Mavinga NP	<200
	Botswana	Northern Botswana including Chobe District and NP, Moremi Game Reserve Okavango Delta, Ngamiland	8,000
	Namibia	Bwabwata NP	100
	Zambia	Sioma Ngwezi NP	250
		Mosi-oa-Tunya NP	30
	Zimbabwe	Northwest Matebeleland	1,568
	Total South African giraffe in KAZA TFCA		
TOTAL GIRAFFE IN KAZA TFCA			11,845

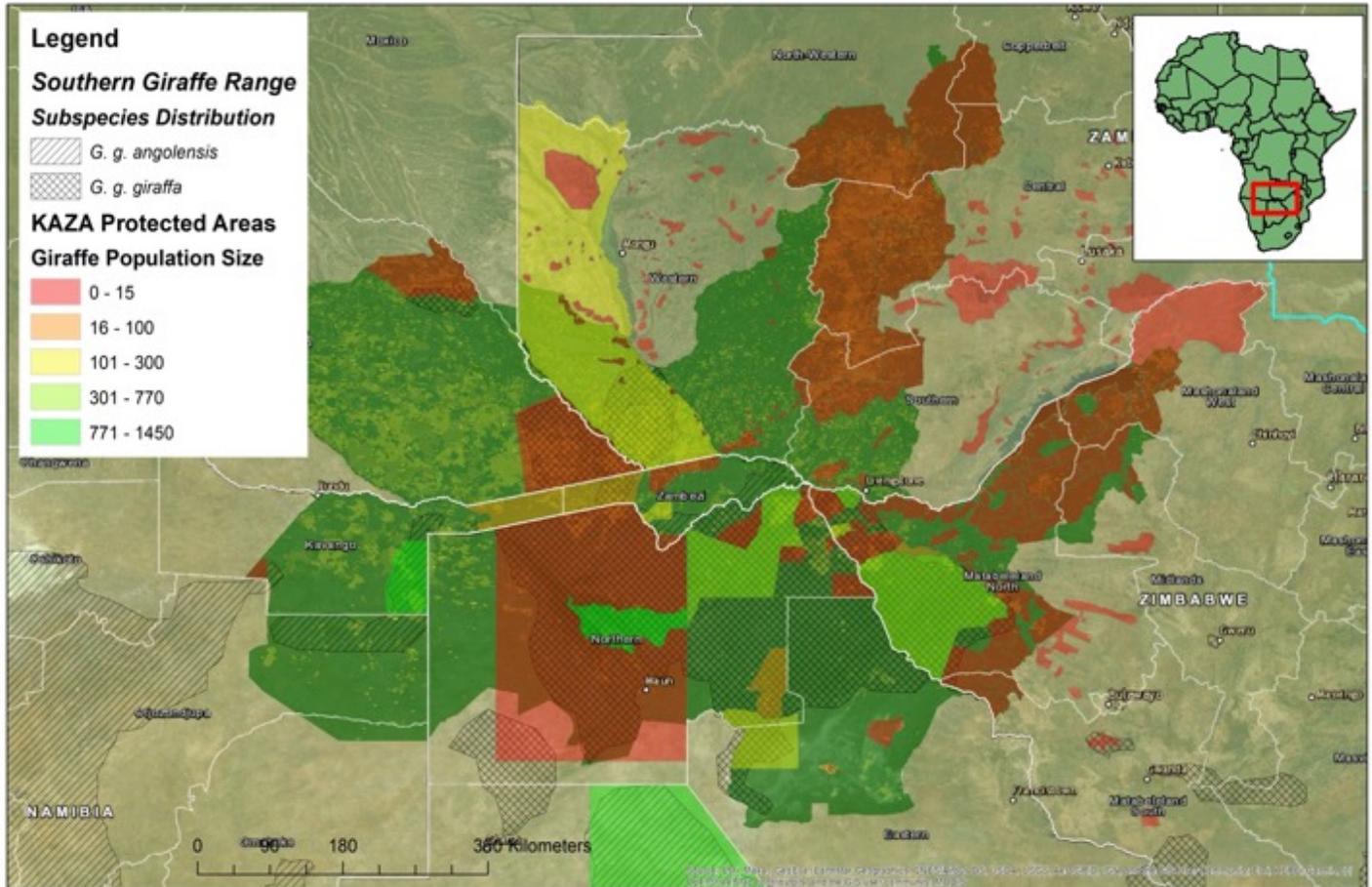


Figure 2: Map of abundance estimates of southern giraffe subspecies in the KAZA TFCA protected areas.

2. Strategies, Policy and Legal Framework for the Conservation of Giraffe in the KAZA TFCA

2.1. KAZA TFCA Species Conservation Strategies and Action Plans

The KAZA TFCA encompasses globally significant habitat for a wide range of taxa. As such, the KAZA TFCA and its partner states have developed a series of conservation strategies and action plans for key species of conservation priority including:

- *Conservation Strategy and Action Plan for the African Wild Dog (Lycaon pictus) in the Kavango Zambezi Transfrontier Conservation Area (March 2014 – March 2019)*
- *The Kavango Zambezi Transfrontier Conservation Area Carnivore Conservation Strategy (2018-2022).*
- *The Strategic Planning Framework for the Conservation and Management of the Elephants in the Kavango Zambezi Transfrontier Conservation Area.*

Acknowledging the value of landscape-level conservation programmes for large-bodied and wide-ranging species of conservation concern, these action plans developed a series of strategic initiatives to address gaps in knowledge, to streamline dataflow across management authorities and conservation practitioners in the partner states, and to translate

the results of these studies into meaningful conservation action for the focal species. In evaluating the core elements of these various strategies, key shared themes emerged – see below and built into the strategic objectives. In developing the giraffe strategy, the importance of unifying the incorporating existing strategies and maximizing the utility of efforts to advance the shared visions of these diverse conservation strategies and action plans was discussed.

Identifying and Addressing Gaps in Knowledge with Targeted Studies and Streamlined Data Sharing

To effectively design conservation strategies and assess conservation outcomes, it is essential to collect baseline data on distribution and abundance of the target species and implement efficient monitoring programmes for these focal metrics. These studies benefit from coordinated systematic survey protocols across partner states. Additionally, to inform management actions across the different management authorities in the partner states, it is important to develop unified frameworks, data sharing agreements, and data sharing infrastructure to be efficient and transparent.

Facilitating Landscape Level Connectivity

Among the greatest conservation opportunities afforded by the KAZA TFCA, is the vast landscape and diversity of habitats that it supports. Hosting a network of connected core habitats and facilitating connectivity of highly mobile species across the KAZA TFCA can promote enhanced conservation outcomes. Considering the significant differences in the life history and ecology of different species, connectivity is an inherently taxa-specific metric. However, there is potential for considerable overlap in connectivity models for different species (Brennan *et al.* 2020). As such, identifying key habitat features and landscape characteristics that facilitate connectivity for a wide range of individual species – including giraffe – is a critical component to maximising the conservation utility of landscape-level corridor design.

Promoting Community Engagement and Local Livelihoods

A universal objective and outcome for conservation strategies and action plans in the KAZA TFCA is supporting co-existence with wildlife through promoting relevant local and policy measures. KAZA Partner States, through Community Based Natural Resources Management (CBNRM) have a shared objective of promoting local communities' acceptance of wildlife as a competitive and beneficial land use option. CBNRM therefore entails wide ranging community engagement initiatives including support to local governance, natural resources management, enterprise development and promoting alternative livelihoods. Integrating community engagement infrastructure and ecotourism development plans into conservation strategies promotes greater local valuation of wildlife, which increases the likelihood of positive conservation outcomes for all species on the landscapes.

Supporting Law Enforcement

A common threat to wildlife in the KAZA TFCA is illegal human activity in critical wildlife habitat. These threats can be manifested in the illegal killing of wildlife for bushmeat or retaliation for crop raiding, or the illegal degradation of landscapes through unmanaged grazing or unsustainable fuelwood harvesting. Although policies and laws may exist to limit these threats and promote alternatives, the effectiveness of these policies is contingent on a sufficient level of enforcement. As such, supporting anti-poaching patrols and law-enforcement capacity will enhance conservation outcomes for multiple species of conservation concern. Illegal wildlife trade at local, regional and international levels is another direct threat to particular species whose combatting requires measures beyond the typical law enforcement approach and which would benefit from a coordinated and collaborative approach at landscape or regional level.

2.2. Country Laws

Within the five countries that make up the KAZA TFCA, giraffe are afforded different conservation statuses by national legislation.

In Angola, giraffe are awarded full protection by the Combined Executive Decree No. 201/16 of 26 April 2016 (Governo de Angola 2016) issued by the Ministry of Agriculture and the Ministry of Finances. This decree was approved to provide an updated list of species (including giraffe) that cannot be hunted in the country and those that can be hunted during the hunting season require an appropriate license. The Angolan Red List published in 2018 considers the Angolan giraffe an Endangered species (Ministério do Ambiente 2018).

In Botswana, giraffe have been classified as a protected animal under Section 17 of The Wildlife Conservation and National Parks Act 1992 (Government of Botswana 1992). This legislation allows for the hunting and capture of giraffe under special circumstance and through a permit granted by the Director of the DWNP within wildlife management areas. As of January 2014, new legislation made hunting laws more stringent and banned the hunting of all protected animals, with some exceptions allowing hunting under special permits (for disease control, property protection, research, etc.) on privately owned land (Government of Botswana 2014).

In Namibia, giraffe are one of ten species that are classified by the Ministry of Environment, Forestry & Tourism (MEFT) as specially protected under Schedule 3 of No.4 of 1975 Nature Conservation Ordinance (Republic of Namibia 1975). This classification does not limit hunting of giraffe, but rather requires hunters to obtain specific hunting permits from the Namibian Government before a licence is granted.

In Zambia, the Department of National Parks and Wildlife (DNPW), a department of the Ministry of Tourism and Arts, and formerly ZAWA, is mandated under the Zambia Wildlife Act No. 14 of 2015 to manage and conserve the country’s wildlife and under this act, the hunting of giraffe in Zambia is illegal (FAO 2021). However, GMAs in Zambia were established by government for sustainable use of wildlife and to control the hunting of game and protected animals through a licensing and monitoring system (FAO 2021).

In Zimbabwe, Section 38 of the Parks and Wildlife Act of 1975, highlights that giraffe are not a protected species and as such hunting, the removal of animals and animal products from a safari area, as well as the sale of animals and animal products are permitted (Government of Zimbabwe 1996). However, this is controlled and monitored by ZimParks through a quota system based on ecological assessments to ensure sustainability. Various types of quotas issued are: concession area hunts (areas leased out to safari operators), and citizen hunts (also utilised through the bag system and sold by auction to citizens only) which are categorised as sport hunting, capture and translocation (Muir 1992).

Table 2: Summary of conservation legislation in KAZA TFCA Partner States.

Partner State	Applicable law/s	Position on giraffe hunting
Angola	Combined Executive Decree No. 201/16 of 26 April 2016	Giraffe are awarded full protection in the country and cannot be hunted.
Botswana	The Wildlife Conservation and National Parks Act 1992 (Government of Botswana 1992)	Hunting and capture of giraffe is only permitted under special circumstance and must be granted by the Director of the DWNP.
Namibia	Schedule 3 of No.4 of 1975 Nature Conservation Ordinance	Hunting of giraffe is legal with a special permit obtained from the government.
Zambia	Zambia Wildlife Act No. 14 of 2015	The hunting of giraffe is illegal in Zambia.
Zimbabwe	Section 38 of the Parks and Wildlife Act of 1975	Giraffe are not a protected species but offtake is regulated based on scientific basis for quota allocation.

2.3. International Laws

Each partner state government's constitution sets out the principles of the foreign policy objective for their country, such as (a) promotion of the national interest, (b) respect for international law and treaty obligations, (c) peaceful coexistence and nonalignment, (d) settlement of international disputes by peaceful means, and (e) opposition to all forms of domination, racism and other forms of oppression and exploitation.

Each of the KAZA range states are signatories to several international conventions, treaties and agreements relating to wildlife. These are in line with each respective foreign policy which may obligate the States to conserve wildlife and protected areas, and to promote sustainable development of wildlife resources. The international laws that are most direct and of immediate importance for the conservation of wildlife, of which KAZA range states are partner states, include the following:

2.3.1. Convention on Biological Diversity (CBD) of 1992

This convention obliges partner states to establish a system of protected areas; develop guidelines for the selection, establishment, and management of protected areas; promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; and promote the integration of sustainable utilisation of natural resources in national strategies. Each KAZA TFCA range state has signed and ratified (year provided) the CBD: Angola (1998), Botswana (1995), Namibia (1997), Zambia (1993) and Zimbabwe (1994).

2.3.2. Convention on International Trade in Endangered Species of wild fauna and flora (CITES) of 1973

This convention obliges partner states to regulate international trade in endangered species of fauna and flora through international cooperation. Each of the KAZA TFCA range states is a contracting party to CITES: Angola (2013), Botswana (1977), Namibia (1991), Zambia (1980) and Zimbabwe (1981). Each government has a nominated Ministry (Department) responsible for wildlife, in which the Management Authority of CITES resides. The CITES CoP18 approved the listing of giraffe in Appendix II in August 2019.

2.3.3. Convention on Migratory Species (CMS) of 1979

This convention obligates each partner state to conserve migratory species of wildlife across their migratory range. It requires partners to cooperate with other states that form part of the migratory range of wildlife resources found or migrating through each country. Angola (2006) and Zimbabwe (2012) are both party to the CMS, whilst Botswana, Namibia and Zambia are non-party to the Convention. In October 2017, giraffe were listed in Appendix II of the CMS.

2.3.4. Ramsar Convention of 1971

Parties to the Ramsar Convention are expected to demonstrate their commitments to wetland management through three 'pillars' of action: wise – or sustainable – use of wetlands; identification of internationally important wetlands for inclusion in the Ramsar List; and the international cooperation and sharing of information and expertise. Angola,

Botswana, Namibia, Zambia, and Zimbabwe ratified the Ramsar Convention in 2021, 1997, 1995, 1991 and 2013, respectively.

3. Threats

Three major direct threats have been identified to affect giraffe and their habitat across the KAZA TFCA: habitat destruction and/or fragmentation (often caused by human encroachment, deforestation, and infrastructure development), illegal hunting (poaching, including loss of wildlife due to economic instability), and climate change. The presence and severity of these threats varies from country to country.

3.1. Habitat loss and fragmentation

The overexploitation of resources and loss of habitat remain major threats to biodiversity in Angola (Kuedikuenda & Xavier 2009; Russo *et al.* 2003). There is excessive human pressure on natural resources in areas where large numbers of internally displaced people have settled (Russo *et al.* 2003). Most of the population lives below the poverty line and depends on natural resources for their livelihoods. Logging for firewood, charcoal, wood production, and uncontrolled bush burning have and continue to lead to biodiversity loss and environmental degradation (Sheeman & Yong 2010; Kuedikuenda & Xavier 2009). Today, the impact of anthropogenic activities is notable in all national parks across Angola (Kuedikuenda & Xavier 2009; USAID 2008). Although the level of disturbance has not been fully evaluated, available evidence suggests wildlife populations have declined considerably and there is an urgent need to collect data on the status of the country's biodiversity (Kuedikuenda & Xavier 2009; NFRA 2009; USAID 2008).

Increasing population and growing cattle production in Botswana has largely resulted in new farms encroaching on the habitat of giraffe and other wildlife. More than half of Botswana's households own livestock, and it is estimated that 45.9% of the land (as of 2014) is used for agriculture (The World Bank 2016). This habitat encroachment has the potential to lead to increased human-wildlife conflict. For example, in other countries, perceived damages related to crop raiding by giraffe residing in agricultural areas resulted in negative attitudes of local farming community partners (Leroy *et al.* 2009).

Another source of habitat fragmentation in Botswana is the veterinary fence line, which divides the country into northern and southern sections. This veterinary fence line was initially erected to prevent the spread of foot and mouth disease from wild animals to livestock. Giraffe habitat use is influenced by seasonal availability of forage (McQualter *et al.* 2016), and as such fences might prevent their natural movement in heterogeneous environments. Furthermore, animals can become entangled in fences (Albertson 2010) and die from dehydration (Darkoh & Mbaiwa 2014), or fall victim to predators that use the fence for hunting.

In Namibia, there is increasing pressure on terrestrial habitats and resources (water, forests, and wildlife) from a growing human population experiencing increasing unemployment, poverty (especially in the rural areas) and the impacts of disease (UNCBD 2010; USAID 2010). Poverty in Namibia's rural areas is linked to deforestation and land degradation (USAID 2010). Poor families use wood fuel, rely on wild foods (particularly during times of drought), and depend heavily on unpredictable rain-fed crops and livestock for their livelihoods (USAID 2010). The controls on wood harvesting and selling of wood products in Namibia are inadequate and, as a result, high rates of deforestation are damaging wooded areas (UNCBD 2010; USAID 2010). The biggest losses of natural woodland have occurred from clearing of land for crop cultivation, cutting of trees for firewood and construction, and the frequent burning of trees because of veld fires in the north east (USAID 2010). This results in the degradation and destruction of wildlife habitat and food resources that is vital

for the survival of large mammals such as giraffe. Griffin (1999) wrote that giraffe in Namibia are likely to become endangered if present threatening factors such as overexploitation, intensive destruction and fragmentation of habitat or other environmental disturbances persist.

In Zambia, uncoordinated landuse, especially for agriculture and settlement, both inside the park (by legally settled communities) and in the surrounding GMAs, is contributing to habitat loss and fragmentation, as well as human wildlife conflict. For example, Sioma Ngwezi NP is highly susceptible to bush fires during the late dry season when neighbouring farmers burn their fields, thereby affecting the distribution and abundance of wildlife outside and inside the park (Chase & Griffin 2009).

National parks in Zimbabwe are increasingly being encroached upon by neighbouring communities and their agricultural developments (Dunham *et al.* 2001-2013). With erratic subsistence farming settlements of people on large areas of ranch land, giraffe along with other wildlife are disappearing (P. Johnstone pers. comm.). For giraffe in Zimbabwe, human encroachment and the associated poaching, habitat degradation and fragmentation are the biggest direct threats.

3.2. Illegal Hunting (Poaching)

Illegal hunting (poaching) is one of the most severe threats to giraffe and other wildlife across Africa (Lindsey *et al.* 2012). Angola was ravaged by protracted armed conflicts for more than four decades: 14 years of liberation struggle (1961-1974) were followed by 27 years of civil war (1975-2002; CIA 2019; Russo *et al.* 2003). These extended periods of war have not only caused great suffering to people, but also severely impacted wildlife (The Wild Foundation 2013; Kumleben 1996). The widespread presence of landmines caused injury and death to humans, livestock, and wildlife alike and restricted access to land throughout much of the country (Russo *et al.* 2003). Bushmeat provided a critical source of food for the poor and illegal hunting reached alarming proportions (The Wild Foundation 2013; NFRA 2009). Although most of Angola's natural habitats remained relatively intact, wildlife populations were severely overexploited to the point of depletion, especially in the Cuando Cubango Province (Kuedikuenda & Xavier 2009; NFRA 2009; USAID 2008; Russo *et al.* 2003; Kumleben 1996), and giraffe were assumed to have gone extinct in the country (East 1999).

In Botswana, giraffe are illegally hunted for their meat (Rogan *et al.* 2015), bones (Barbee 2015) and for body parts such as their hide, ears and tails (Muller 2008). Statistics Botswana (2015) reported that incidences of poaching increased from 2009 to 2013, with Rogan *et al.* (2015) estimating an annual average 98 giraffe are killed for the illegal bushmeat market. Despite the stringent laws about bushmeat hunting, poachers are rarely deterred as penalties are often far less severe than the profit of hunting e.g. reduced fines, suspended sentences, or no fine or prison sentence despite conviction (Rogan *et al.* 2015; Barnett 1997). Coupled with the fact that firearms are relatively easily accessible on the black market, there is little disincentive to deter poachers from hunting giraffe and other wildlife. Some poachers evade conviction all together: for example, during a 30-month period starting from 2009, 64 suspects were arrested for poaching in the NG26 Concession in northern Botswana but not one was convicted (Lindsey *et al.* 2012).

Once an area teeming with biodiversity, wildlife populations in Zambia's Sioma Ngwezi NP were decimated during the conflicts which have characterised the history of the region (PPF 2013). The 25-year long Angolan Civil War and illegal hunting devastated wildlife populations in neighbouring Sioma Ngwezi NP (Chase & Griffin 2009; APN 2003; East 1999). The park's proximity to the Luengue Luiana NP across the border in south-east Angola, the base of military operations for UNITA, exposed the wildlife of the park to extensive illegal hunting (Chase & Griffin 2009). Refugees also depended heavily on bushmeat to survive, and poaching is difficult to control in these areas (WCS 2014; Chase & Griffin 2009). According to

a 2003 report by the African Parks Network (APN), the destruction of wildlife in Sioma Ngwezi NP was far greater than originally realised (APN 2003).

3.3. Illegal Trade

Throughout the KAZA TFCA, illegal local and regional trade in giraffe and giraffe products poses a currently unknown risk to giraffe. The threat of illegal trade in giraffe and their products is relatively unknown, not only within the KAZA TFCA but across Africa. This threat requires further evaluation as increased numbers of giraffe bones have recently been observed as carved items at local tourism markets in Namibia, yet no assessments have been undertaken across the KAZA TFCA. If necessary, explicit interventions will need to be developed to cater for this threat.

3.4. Climate Change

Climate is another important factor that directly affects wildlife population numbers across Africa. The KAZA TFCA is situated within an arid area part of the continent, characterised by wide expanses of desert/sandy environment and high temperatures. However, there are also significant waterbodies in the form of rivers, floodplains, and wetlands whose annual inundation character provides key habitat for various wildlife species. These water resources are not evenly distributed, e.g. Hwange NP and Sioma Ngwezi NP are without perennial rivers running through them, creating a key stress as wildlife have to either cover large distances to rivers or rely on artificial water resources as in the case of Hwange. Potential changes in water regime, timing, quantity, and quality because of extreme weather events can have far reaching impacts for the survival of wildlife – determines various factors including breeding patterns and productivity of range lands, for example.

Taking into consideration that the various climate models predict reduced precipitation and rainfall along with higher temperatures in the KAZA TFCA, it is critical that measures to enhance resilience of species are investigated and implemented while at the same time advocating for hydrological connectivity of critical freshwater ecosystems and resources such as those in the Angolan highlands whose flows remain ever so critical for the Okavango delta, for example.

In Botswana, the country experienced a 20-year drought that started in the early 1980s and this offers a possible explanation for the decrease of multiple wildlife species, including giraffe in the northern Ngamiland and Moremi GR (Chase *et al.* 2015; Gifford 2013). The Okavango Delta is sensitive to drought and relies on rainfall in Angola, and to a lesser extent Namibia and Botswana, to supply the floodplains. The average rainfall and flood levels in the Okavango Delta continued to drop during the 1990s with the lowest annual flood level in 1996 (since recording started in the 1920s). Surprisingly, Chase *et al.* (2015) found that giraffe populations in Ngamiland were lower in years with greater flows, possibly a result of displacement. Further research may help understand more.

The cumulative impacts of higher temperatures and evaporation rates combined with lower rainfall, all resulting from climate change, are predicted to result in increasing aridification across most of Namibia, lower primary production of rangelands and reduced carrying capacity for wildlife, including giraffe (USAID 2010).

In Zambia, climate projections include more varied rainfall, increased temperatures, and more extreme weather patterns (intense floods and droughts) (USAID 2016a). Similar can be predicted for Zimbabwe, with more prolonged extreme weather events (floods, droughts, cyclones) likely to impact the country (USAID 2016b). Further research is necessary to fully understand the threat this poses directly to giraffe country by country.

4. Vision, Goal and Strategic Objectives

4.1. Purpose and Process

The conservation and management of the giraffe in the KAZA TFCA is critical for their survival as the landscape provides important habitat for the species. Relatively little is understood about giraffe populations in the KAZA TFCA and as such, surveys and monitoring, as well as identifying and mitigating threats, are key priorities to the species' long-term survival and persistence in the wild. These ongoing efforts will form the basis of subsequent conservation initiatives and will provide valuable baselines for measuring the success of these activities.

Preparation for the strategy began with the initial identification of key stakeholders (both at individual and institutional levels) for consultation. The stakeholders identified included all KAZA partner state wildlife authorities; KAZA Secretariat; local, regional, and international conservation experts from academic and research institutions; and non-governmental organisations. In preparation for the stakeholder workshop, background information on the giraffe ecology, distribution, abundance, conservation threats, and pertinent legislation for KAZA related conservation were compiled from primary and secondary data by the Giraffe Conservation Foundation and shared.

An online consultative stakeholder workshop was conducted from 14-15 June 2021. The workshop followed a modified process established for strategic planning by the IUCN Species Survival Commission, with contributions from all the KAZA Partner States to better understand the current trends, opportunities for and threats to giraffe conservation in each country.

The strategy was adopted by the KAZA Ministers' Committee on XXXX and now focus on the long-term Vision, Goal, and Strategic Objectives and Priority Actions to achieve it.

4.2. Vision

A sustainable future for viable populations of Southern giraffe in the KAZA landscape through sound ecosystem management, research, and outreach, promoting co-existence, contributing to people's livelihoods, and fostering regional cooperation and development.

4.3. Goal

To create an enabling environment to maximise ecological and economic opportunities for giraffe conservation in the KAZA landscape.

4.4. Strategic Objectives

Objective 1: To identify and address the risks and threats to giraffe across the KAZA TFCA landscape.

Objective 2: To create opportunities to drive giraffe conservation in the KAZA landscape.

Objective 3: To support co-existence with giraffe populations across the KAZA landscape.

Objective 4: To support harmonisation of policies taking into consideration giraffe conservation and management

4.5. Strategic Activities

Many strategic activities highlighted are cross-cutting to the four Strategic Objectives and as such not specifically clustered.

4.5.1. Strategic Activity 1: Research and knowledge creation (first country component and then KAZA landscape)

- Undertake a historical assessment of giraffe range and comparative analysis of current population to identify hotspots.
- Undertake a situation analysis of giraffe population including all stress/threats and mitigation recommendations.

4.5.2. Strategic Activity 2: Giraffe conservation management planning

- Re-establish (augment) the range of giraffe populations where locally extinct.
- Support the management of existing giraffe populations (including management of small populations).
- Equip and support law enforcement efforts.

4.5.3. Strategic Activity 3: Capacity building and awareness

- Assess local community knowledge, attitude, and perceptions (KAP study) towards giraffe for coexistence and introduction (CBC).
- Conduct targeted workshops and courses on giraffe conservation and management for field veterinarians and ecologists (incl. protocols for data collection).
- Develop and implement community awareness campaigns for giraffe conservation and coexistence.

4.5.4. Strategic Activity 4: Harmonisation of policies

- Compile and assess national and regional wildlife and conservation policies of partner state countries relevant to giraffe.
- Recommend areas of harmonising.

4.6. Priority Actions

Short term (1-2 years)	Medium-term (3-4 years)	Long-term (5+ years)
Identify, collect and collate environmental data for assessing giraffe spatial ecology, population dynamics, and feeding and behaviour ecology	Create awareness raising and capacity building programmes (i.e. capacity building for ecologists and veterinarians, awareness with stakeholders, etc.) (ongoing action)	Create awareness raising and capacity building programmes (i.e. capacity building for ecologists and veterinarians, awareness with stakeholders, etc.) (ongoing action)

Short term (1-2 years)	Medium-term (3-4 years)	Long-term (5+ years)
Establish Giraffe Conservation Working Group/Taskforce to annually review the strategy	Identify opportunities for community benefits (accruing)	Monitor population performance for both isolated and connected giraffe populations
Use GPS satellite technology to assess local and transboundary movement patterns of giraffe	Create capacity building opportunities for rangers (ongoing action)	Develop KAZA giraffe policy for the region and for input into CITES reviews
Conduct population surveys – opportunity exists with ongoing elephant aerial surveys (ongoing action) Incorporate giraffe population surveys into already established large mammal surveys	Address threats identified by assessments at appropriate scale	Address threats identified by assessments at appropriate scale
Document historic and emerging giraffe diseases and establish management protocols	Fundraise collectively to facilitate the implementation of the strategy's activities	Fundraise collectively to facilitate the implementation of the strategy's activities
Undertake taxonomic/genetic assessment and characterisation of giraffe (sub)species		
Support law enforcement activities and adequately equip rangers/ community scouts (ongoing action)		
Undertake legal assessments of giraffe conservation efforts at a country level		
Assess habitat suitability and connectivity for giraffe		
Assess Knowledge, Attitude and Practices (KAP) of a community related to giraffe		
Create awareness at country /government level (e.g. World Giraffe Day 21 June)		
Assess impact of giraffe re-introductions in KAZA		
Establish protocols for data collection and data sharing around giraffe		
Address threats to giraffe identified by assessments at appropriate scale		
Gain approval of the strategy through the KAZA structures		
Fundraise collectively to facilitate the implementation of the strategy's activities		

5. Implementation of the KAZA TFCA Giraffe Conservation Strategy 2022-26

The KAZA TFCA Giraffe Conservation Strategy is a living framework document, and the implementation of actions is key to achieving the strategic objectives. Therefore, there is a need for a broad structure to oversee this implementation and to monitor progress. Once the strategy is completed and approved, it will be officially launched through the KAZA Secretariat. The KAZA Conservation Working Group will oversee the implementation of the Strategy. It is therefore recommended that this implementation will be included into their programme and that the KAZA Conservation Working Group should seek additional support and/or advice from relevant stakeholders and partners, if and when required. The Working Group should consider creating a taskforce for an annual review of the progress and the strategy itself.

6. Conclusion

The emphasis of this KAZA TFCA Giraffe Conservation Strategy 2021-25 is on the implementation of the identified short-term strategic actions to realise the strategic objectives and goal. Prior to this Strategy, all giraffe activities were being implemented in an *ad hoc* manner. With this Strategy in place, the implementation of giraffe conservation activities throughout the landscape should be better streamlined and will require additional resources. For too long giraffe and their habitats have attracted little attention, but now with this Strategy there is an opportunity to increase focus and support, for the benefit of the species and the habitat it requires/uses. The fact that KAZA partner states and development partners are conservation-oriented affords the hope that they will engage with and implement this Strategy, thereby increasing the profile and value of giraffe in the landscape.

The future and survival of giraffe in the KAZA TFCA cannot depend on the partner states' efforts alone. Importantly, the communities that neighbour and/or live within key giraffe range areas will always play a critical role in their conservation. Local communities are invaluable partners, and this Strategy proposes incentives to encourage them to participate in the conservation of giraffe to achieve larger and more viable populations across various ranges in KAZA.

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8. Appendices

Appendix I: Attendees list for the consultative workshop for the development of the KAZA TFCA Giraffe Conservation Strategy, 14-15 June 2021

Appendix II: Conceptual Framework of the KAZA TFCA Giraffe Conservation Strategy

