## Akagera National Park Giraffe Conservation Action Plan

## 2024-2029









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## EXECUTIVE SUMMARY

The Akagera National Park Giraffe Conservation Action Plan in the Republic of Rwanda 2024-2029 is the country's first iteration of such an action plan and forms a framework to guide giraffe conservation and management in Rwanda over the next five years. The Giraffe Conservation Action Plan identifies clear objectives, actions, and indicators that should be addressed to achieve the vision and meet the goals of this plan.



## ACKNOWLEDGEMENTS

The compilation of the Akagera National Park Giraffe Conservation Action Plan 2024-2029 was a collaborative effort, spearheaded by African Parks Network (AP) and the Giraffe Conservation Foundation (GCF). The guidance, contributions, and support received during the process are acknowledged and highly appreciated. During the development of this Action Plan, consultations with stakeholders and partners in wildlife conservation and management were conducted.

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## ACRONYMS AND ABBREVIATIONS

AMC	Akagera Management Company
ANP C&R	Akagera National Park Conservation and Research
ANPLE	Akagera National Park Law Enforcement
AP	African Parks
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention of Migratory Species
GCF	Giraffe Conservation Foundation
IUCN	International Union for Conservation of Nature
NP	National Park
SECR	Spatially Explicit Capture-Recapture

## INTRODUCTION

### GIRAFFE CONSERVATION STATUS AND DISTRIBUTION IN AFRICA

Giraffe (*Giraffa spp.*) are the tallest living land animal and the largest ruminant in the world. Giraffe are sexually dimorphic, social animals that live in loose, fission-fusion, non-territorial open herds ranging in size from a few individuals to more than one hundred. Giraffe inhabit a large variety of habitats from semiarid, subtropical savannahs to arid desert environments, and browse on a wide range of trees and shrubs (Muller *et al.*, 2018; O'Connor et al., 2019; Brown *et al.* 2021). Giraffe play important ecological roles through seed dispersal, pollination, and stimulating the growth of new forage (Dutoit, 1990; Miller, 1996). They are highly mobile, and some (sub)species move long distances in pursuit of sufficient forage or mating opportunities, especially in arid landscapes (Brown et al., 2023).

Historically, giraffe ranged throughout sub-Saharan Africa in open savannahs, shrublands, and dry forests; however, their range is estimated to have reduced by 90% in the last three hundred years (Figure 1) (Muller *et al.*, 2018; O'Connor *et al.*, 2019; Brown *et al.*, 2021). Today, this range across 21 countries remains largely fragmented, and giraffe are found mostly in national parks and reserves, conservancies and private ranches, and surrounding community land. Giraffe range throughout the northern and southern savannah regions and open woodlands, predominantly avoiding dense forest and desert environments, with a distinctive broad strip of moist miombo woodland separating their southern and northern range (Muller *et al.*, 2018; O'Connor *et al.*, 2019; Brown *et al.*, 2021). The average home range of giraffe in Africa is 356.4 km<sup>2</sup> but estimates vary considerably across ecological and anthropogenic disturbance gradients with giraffe exhibiting smaller home ranges in more ecologically productive areas and in areas where human impact is relatively higher (Brown *et al.*, 2023).

The combined global population for all four species of giraffe is estimated at 117,000 individuals remaining in the wild. This figure represents a considerable decline from the estimated >150,000 in the 1990s (Brown et al., 2021) and has resulted in the uplisting of giraffe as one species from Least Concern to Vulnerable on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (Muller et al., 2018). Between 2018 and 2019, all the IUCN recognised subspecies (excluding the South African giraffe) were assessed for separate Red List classifications - many for the first time. Some (sub)species were categorised as more imperiled, such as the Kordofan giraffe G. c. antiquorum (Critically Endangered) (Fennessy & Marais, 2018), Nubian G. c. camelopardalis and subsumed Rothschild's G. c. rothschildi giraffe (Critically Endangered) (Fennessy et al., 2018; Wube et al., 2018), reticulated giraffe G. reticulata (Endangered) (Muneza et al., 2018), and Masai giraffe G. tippelskirchi (Endangered) (Bolger et al., 2019). Other taxa exhibited lesser conservation threat levels, such as the West African giraffe G. c. peralta (Vulnerable) (Fennessy et al., 2017) and the Luangwa giraffe G. t. thornicrofti (Vulnerable) (Bercovitch et al., 2018). Conversely, giraffe in southern Africa are generally considered to be of lower conservation concern. Subsequent studies have re-evaluated giraffe taxonomy using genomic data (Fennessy et al., 2016; Winter et al., 2018; Coimbra et al., 2021, 2023) and these resulting taxonomic shifts have dramatic influences on the conservation status of these newly described species (Brown et al., 2021).

The rapid decline in many giraffe populations and the reduction in the species' geographic range is widely attributed to habitat loss, land degradation, climate change, and poaching, all of which have significantly altered and reduced the geographic range of giraffe throughout Africa (Muller *et al.*, 2018; O'Connor *et al.*, 2019; Brown *et al.*, 2021). Consequently, giraffe populations are in critical need of strategic conservation action to ensure long-term viability.



Historical giraffe range (ca. 1700s)

**Figure 1:** Current distribution of giraffe throughout their natural range in Africa (Source: Giraffe Conservation Foundation, 2023)

### Status and Distribution of Giraffe in Rwanda

### Taxonomic Status of Giraffe in Rwanda

The following (sub)species of giraffe are found in Rwanda, along with their IUCN Red List status:

- Giraffe: Giraffa camelopardalis Vulnerable (Muller et al. 2018)
- Masai giraffe Giraffa camelopardalis tippelskirchi Endangered (Bolger et al., 2019)

Given the geographic origins of the founder population in Kenya, the taxonomic status of giraffe in Akagera National Park (NP) is unambiguously Masai giraffe. Recent genome-level analyses indicate that giraffe (*Giraffa spp.*) comprise four distinct species (Fennessy *et al.*, 2016; Winter *et al.*, 2018; Coimbra *et al.*, 2021, 2023). Masai giraffe (*G. tippelskirchi*) are thought to consist of both the nominotypical subspecies (*G. t. tippelskirchi*) and the Luangwa giraffe (*G. t. thornicrofti*) (formerly the Thornicroft's giraffe) of Zambia's Luangwa Valley (Coimbra *et al.*, 2021). The Masai giraffe is widely distributed in southern Kenya, Tanzania, and a (re)introduced population in Akagera NP, Rwanda (O'Connor *et al.*, 2019; Brown *et al.*, 2021) (Figure 2).



**Figure 2:** Left: A photograph of a Masai giraffe. Right: A map of the current distribution of Masai giraffe (*G. tippelskirchi*) (Brown *et al.*, 2021).

Evidence for giraffe abundance and distribution in Rwanda before 1986 is absent in the primary literature (Spinage *et al.*, 1972). However, given the current distribution of Masai giraffe in the nearby Burigi-Chato NP, western Tanzania, and the biogeographical barriers between historic native populations of other giraffe species - Kordofan giraffe (*G. c. antiquorum*) in Garamba NP, Democratic Republic of Congo and Nubian giraffe (*G. c. camelopardalis*) in Murchison Falls NP, Uganda - it is likely that any potential historical populations of giraffe in Rwanda consisted of Masai giraffe (Brown *et al.*, 2021).

An updated status assessment of Masai giraffe as a species indicated global estimates of approximately 45,000 native giraffe with 15,800 in Kenya, 28,850 in Tanzania, 650 in Zambia, and the small currently recognized extralimital population in Rwanda (Brown et al., 2021).

### BACKGROUND

### Akagera National Park History

Akagera NP is situated in the northeast of Rwanda, along the border with Tanzania. Akagera NP has been subject to constant human pressure since it was established as a national park in 1934. Once continuous with the Mutara Domain de Chasse (hunting area) to the west of the park, the total area under management covered approximately 2,700 km<sup>2</sup> (Vande weghe, 1990; Lamprey, 2002).

The park was reduced in size to 1,122 km<sup>2</sup> in 1997 to allow more space for resettlement following the 1994 Genocide Against the Tutsi. The influx of refugees back into Rwanda had one of the largest direct effects on Akagera NP (Moodley *et al.*, 2011). Along with the returning refugees, more than 30,000 head of cattle entered the park for illicit grazing causing major damage to the plant base and soil (Lamprey 2002). Human-wildlife conflict led to immense declines in wildlife populations with most species declining by 50-80% (Lamprey, 2002). Black rhinoceros (*Diceros bicornis michaeli*), and lion (*Panthera leo*) were extirpated during this period.

Since the challenges in the 1990s, Rwanda has experienced consistent positive growth as a nation over the past two decades. The government has prioritized environmental restoration as outlined in the Rwandan Constitution. The Rwanda Development Board made historic strides for conservation when they entered into a management agreement with the conservation organization African Parks (AP) Network in 2009, establishing the Akagera Management Company (AMC) to manage the day-to-day activities within Akagera NP.

Law enforcement and infrastructure greatly improved in the early days of AMC's management. A 120 km carnivore-proof fence was erected along the northern and western boundaries to reduce human-wildlife conflict between adjacent villages and wildlife, and to improve security. Community relations have been prioritized, with a focus on bringing the benefits of conservation to adjacent community members. Tourism has grown immensely as the habitat and wildlife populations have begun to recover and revenue has increased. There is no human occupation in the park other than for management and tourism activities.

### Akagera National Park Ecology

Akagera NP is located at the southern extent of the Victoria Basin forest-savanna mosaic ecoregion (Figure 3). The park represents the only protected savannah in Rwanda and the largest protected wetland in Central Africa. This ecoregion is characterised by tropical climates with bimodally distributed annual rainfall patterns, with rainfall averaging 750mm per year. In Akagera NP, these rainfall patterns support a series of lakes, swamps, and seasonal wetlands along the eastern extent of the park that account for approximately one-third of the park area. The western terrestrial portions of Akagera NP are typified by Acacia (*Vachellia*) and Combretum savannah/woodland mosaics along lakeshores and wetland peripheries, extending up to a maximum elevation of 1,825 m along the Mubari Range in the central spine of the park (Figure 3).

Akagera NP is home to eleven antelope species; the most abundant of which are impala (*Aepyceros melampus*), Defassa waterbuck (*Kobus ellipsiprymnus*), and topi (*Damaliscus lunatus*). The park also supports sizeable populations of Cape buffalo (*Syncerus caffer*), plains zebra (*Equus quagga*), African savannah elephant (*Loxodonta africana*), and Masai giraffe. Lion (Panthera leo)(reintroduced in 2015), leopard (*Panthera pardus*), and spotted hyena (*Crocuta crocuta*) are the only large carnivores in the park, all of which are present at relatively high densities. Black rhinoceros (*Diceros bicornis*) were reintroduced in 2017, and white rhinoceros (*Ceratotherium simum*) were introduced in 2021. The park also supports several primate species and numerous smaller mammals. There are over 900 plant species and 450 bird species in the park.



**Figure 3:** Map of Akagera NP and its land cover types in the context of its location in Rwanda and within Africa.

### Legal Framework for Giraffe Conservation in Rwanda

#### **National Laws and Policies**

#### The Constitution of Rwanda

Rwanda's constitution explicitly accounts for the safeguarding of the environment. Under Article 53, the Constitution states that "Everyone has the duty to protect, safeguard and promote the environment. The State ensures the protection of the environment. A law determines modalities for protecting, conserving, and promoting the environment." This framework establishes constitutional authority for subsequent legislation pertaining to the conservation of Rwanda's natural resources and environmental preservation.

#### Wildlife Policy and Wildlife Act

The Wildlife Policy provides a framework for supporting wildlife research and conservation, acknowledging wildlife to be "a national heritage" and a "cornerstone of Rwanda's tourism sector". Giraffe have protected status under the Rwanda Wildlife Policy (2013) and the Rwanda Wildlife Act. Under these provisions, Masai giraffe are considered a protected species and no hunting is permitted.

#### **Rwanda Environmental Policy**

The Rwanda Environmental Policy provides specific protections for Rwanda's biodiversity - with a special acknowledgment of wildlife - recognizing this biodiversity as a major source of foreign income through ecotourism ventures and a critical component of national heritage. In section 4.1.g the policy acknowledges that "there is a dearth of comprehensive studies detailing Rwanda's Biodiversity".

Furthermore, section 5 outlines the strategic goal "to ensure that wildlife inside and outside protected areas are managed within a comprehensive national conservation plan."

#### International Laws

According to Article 168 of the Constitution, all international treaties and agreements that have been ratified or approved by the government of Rwanda "have the force of law as national legislation in accordance with the hierarchy of laws provided for under the first paragraph of Article 95 of this Constitution". Rwanda is a State Party and signatory to several international conventions, treaties, and agreements relating to wildlife and environmental conservation. These international agreements are in line with Rwanda's foreign policy and the Constitution, which obligate the State 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 Rwanda is a member state, include the following:

#### Convention on Biological Diversity (CBD) of 1992

This convention, ratified by Rwanda in 1996, obliges member 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, including giraffe, in natural surroundings; and promote the integration of sustainable utilisation of natural resources in national strategies.

#### Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973

This convention obliges member states to regulate international trade in endangered species of fauna and flora through international cooperation. As the Management Authority of CITES, the listing of giraffe in Appendix II by the CITES CoP18 in August 2018 further mandates the Rwandan CITES management authorities to regulate trade in giraffe and giraffe products.

#### East African Community Protocol on Environment and Natural Resources

The East African Community Protocol on Environment and Natural Resources obligates Rwanda as one of the Partner States of the East African Community to sustainably conserve wildlife resources in collaboration with local communities. The protocol requires Rwanda to cooperate in the management of transboundary wildlife resources and the promotion of social and economic incentives for conservation and to conclude agreements aimed at conserving transboundary wildlife resources.

#### **Convention of Migratory Species**

In October 2017, giraffe were listed on Appendix II of the Convention of Migratory Species (CMS) (CMS COP12, 2017). While giraffe are protected across most of their range, protection under CMS aims to facilitate increased collaboration across conservation range States and improve awareness and management of their plight internationally. 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.



### STATUS REVIEW

### HISTORIC GIRAFFE ABUNDANCE AND DISTRIBUTION

The historical trends of abundance and distribution of Masai giraffe in Rwanda are not well documented. Although evidence of giraffe in Rwanda is conspicuously lacking from the literature in the 19th and early 20th centuries, there were documented observations of giraffe across the border in Uganda on the shores of Lake Edward near the present-day location of Queen Elizabeth NP during the Emin Pasha relief expedition of the late 1800's (Brown et al., 2019). However, giraffe were locally extirpated from this area before the park was gazetted in the early 1950s. Spinage (2003) credits their extirpation to the spreading impacts of the rinderpest epidemic, to which giraffe were notably susceptible. The current distribution of Masai giraffe in Burigi-Chato NP of western Tanzania, relatively close to the Rwandan border, and the historical distribution of giraffe in southwestern Uganda coupled with the lack of significant biogeographical barriers suggest it is feasible that Masai giraffe historically occurred in Rwandan savannah systems.



**Figure 4:** Historical giraffe abundance population trends in Akagera NP, Rwanda prior to photographic surveys. Estimates are primarily derived from aerial surveys. Black points represent complete counts fitted with a polynomial function and reported with 95% confidence intervals. The red points represent abundance estimates derived from spatially explicit capture-recapture models with 95% confidence intervals (Brown & Bantlin, 2023).

Giraffe were (re)introduced to Rwanda in 1986 when six Masai giraffe (two male and four female) were translocated from the Lake Magadi area of Kenya to the southern sections of Akagera NP (East, 1999). These giraffe were initially released into a boma on the Rurama Peninsula but eventually escaped to the southern plain of Nyamwashama. Subsequently, they primarily remained on the Nyamwashama Plain, except when flooding forced them to the hills of Sabasengo and Rwisirabo. The first calf was born in March 1988, and a second calf was born in July 1989 (Vande weghe, 1990). Around the same time, one of the founder adult males was killed in an apparent poaching incident (Vande weghe, 1990). In 1994, the population was estimated at 20 individuals (East, 1999). Subsequent periodic aerial surveys documented a gradual increase in giraffe abundance (Supplemental Table 1) with a recent aerial total count observing 81 individuals in 2023 (MacPhearson & Bantlin, 2023) (Figure 4).

### CURRENT GIRAFFE ABUNDANCE AND DISTRIBUTION

To estimate the current abundance and distribution of Masai giraffe in Akagera NP, the Giraffe Conservation Foundation (GCF) and AP conducted individual-based photographic surveys in February 2022 and July 2023. In 2022, 78 unique individuals were observed, and spatially explicit capture-recapture (SECR) models estimated the abundance to be 109.3 individuals (SE = 14.7) (Brown & Bantlin, 2022). In 2023, 85 unique individuals were observed and SECR models estimated the abundance to be 161.4 individuals (SE = 26.6) (Brown & Bantlin, 2023). Over the two years of surveys and documented incidental encounters, there were a combined total of 113 uniquely identified giraffe. Over the two survey events, the greatest densities of giraffe were in the northern Kilala Plain, with lower density estimates in the southern savannahs and peninsulas, namely Nyampiki Peninsula (Brown & Bantlin, 2023) (Figure 5).



**Figure 5:** Realized giraffe density in March 2022 and July 2023. Density estimates were calculated with spatially explicit capture-recapture models derived from individual-based photographic surveys. During both survey events, the highest densities of giraffe were found in the northern Kilala Plains (Brown & Bantlin, 2022, 2023).

These population estimates represent a substantial increase from recently reported aerial survey estimates. This increase in abundance estimates combined with a comprehensive enumeration of population age and sex structure (Figure 6), suggests that the population has continued to increase in the 35+ years since it was (re)established.



**Figure 6:** Age and sex composition of individual giraffe in the Akagera NP, Rwanda. Results are from the 2023 individual-based photographic surveys (Brown & Bantlin, 2023).

### THREATS

The giraffe population in Akagera NP has experienced continual growth since its (re)establishment in 1986. Over this period, there have been few documented cases of poaching (Vande weghe, 1990), and no significant reports of predation or disease impacting the giraffe populations. However, given the relatively small population confined to a single protected area, the population remains at risk for demographic stochasticity and catastrophic events.

During the Action Plan development, the identified key threats were classified as current or potential threats. Current threats include habitat loss and fragmentation, climate change, inbreeding, and disease. Using the Conservation Standards threat rating process (Supplemental Table 2), the scope, severity, irreversibility, magnitude, and overall threat rating was assigned to each of the seven threats (Table 1). During this process, habitat loss was ranked the greatest threat for giraffe in Rwanda, although the risk was considered low, the scope, severity, and irreversibility were considered high.

Threat	Level	Rationale
Poaching	Low	No evidence of giraffe poaching in Akagera NP.
Habitat Change / Climate Change	Unknown	Akagera NP is not projected to experience significant changes in bioclimatic conditions under most climate change scenarios. If climate change shifts flood patterns or vegetation communities, however, it could dramatically impact available giraffe habitat.
Habitat Loss	Medium	Under current management, wildlife protection is strictly enforced within Akagera NP boundaries. However, if future legislation impacts boundary area/size, then these policy changes would impact available habitat for giraffe in Rwanda.
Disease	Low / Data Deficient	Threat and severity are largely unknown. Pizzle rot, Giraffe Skin Disease, Rift Valley Fever, Tuberculosis (although none inside the park), and Brucellosis are potential risks but are poorly understood. High cattle density outside the park potentially increases risks for zoonotic transmission.
Inbreeding	Medium / Data Deficient	Inbreeding due to a low genetic diversity is a potential threat given the small founder population numbers but with healthy juveniles and expected age-class ratios, there is no reason to accept it as an immediate threat.
Predation (adults)	Low	There is only one recorded incidence of lion predation. No evidence of lion claw marks or scarring on giraffe to suggest that they are a regularly targeted prey species.
Predation (calves)	Low /Data Deficient	Predation on calves in Akagera NP is not well documented. Continued individual-based surveys can provide better insights into calf survival.

**Table 1:** The rating of threats impacting giraffe in Rwanda identified during the National GiraffeConservation Action Plan consultation based on the Conservation Standards.

Threat	Level	Rationale
Management Changes	Low	AP is projected to maintain Akagera NP management until 2030.
Demographic Stochasticity	Medium	The small population is still at risk for negative impacts of demographic stochasticity and catastrophic events.
Changes in Community Attitudes	Low	Akagera NP is surrounded by a high density of human settlements but park management is actively engaged with community development programmes.

## VISION & GOALS

### VISION

A viable population of Masai giraffe that thrives within their current range in a healthy and secure ecosystem acting as a flagship species for the Republic of Rwanda, coexisting with human populations and conservation development.



### GOALS

- 1. To increase the Masai giraffe population in Rwanda by 2029;
- 2. To monitor the Masai giraffe population dynamics within Akagera NP annually;
- 3. To develop a deeper understanding of Masai giraffe ecology in Akagera NP;
- 4. To effectively protect the Masai giraffe population in Akagera NP; and
- 5. To promote the Masai giraffe as a flagship species at both a local level surrounding Akagera NP as well as on a national level.

## STRATEGIC OBJECTIVES

### **OBJECTIVE 1**: ENHANCE CONSERVATION MONITORING AND RESEARCH EFFORTS ON GIRAFFE POPULATION DYNAMICS AND THEIR THREATS

Decisions on giraffe conservation and management in Akagera NP should be based on reliable data, rooted in the best available science. Better data are needed on population size, abundance trends, demographic parameters, ranging patterns, habitat use, genetic diversity, and potential threats to inform and monitor effective conservation initiatives.

	Action	Indicators	Responsible	Timeframe
1.1	Conduct annual individual-based photographic surveys	Survey reports identifying abundance/ distribution generated and disseminated to key stakeholders	ANP C&R GCF	Annually
1.2	Develop a country- wide individual identification giraffe database (integrating camera trap database and annual photographic surveys)	A national database (GiraffeSpotter) established Annual photographic survey and relevant camera trap survey undertaken and data added to the national database	ANP C&R GCF	Ongoing
1.3	Conduct biennial aerial surveys	Survey reports identifying abundance/distribution generated and disseminated to key stakeholders	ANP C&R	Biennially
1.4	Maintain individual identification giraffe database (integrating camera trap database and annual photographic surveys)	Databases (GiraffeSpotter/ Camera Trap) updated with annual photographic survey and relevant camera trap surveys	ANP C&R GCF	Ongoing
1.5	Report monthly on giraffe deaths and poaching threats	Routine patrol reports (giraffe carcasses, snares, poaching incidents) from EarthRanger generated monthly	ANP C&R ANP LE	Monthly
1.6	Understand giraffe space use and resource selection using GPS telemetry studies	10-15 giraffe fitted with GPS tracking devices. Relevant habitat maps generated. Resource selection functions generated. Report published and resource use contextualized with climate change threats	ANP C&R GCF	7 GPS devices deployed in 2023 Additional deployments planned in 2024 Publication drafted 2025

	Action	Indicators	Responsible	Timeframe
1.7	Evaluate the genetic diversity of the existing giraffe population	Tissue samples collected during immobilization (opportunistic biopsy darting) - total of 20-30	ANP C&R GCF	Tissue samples collected by end of 2024
		Collaborate with GCF laboratory collaborators for analyses identified		Permits and samples shipped to for analyses by end of 2024
		Report of population health including inbreeding coefficients disseminated		Analyses of samples and report by end of 2025
1.8	Assess the status of giraffe outside of the designated boundaries of Akagera NP	Report of giraffe survey in Gabiro Military Zone and surrounding communities generated	ANP C&R	Ongoing





# **OBJECTIVE 2**: INCREASE AND IMPROVE IMPLEMENTATION OF LAW ENFORCEMENT AND SECURITY IN KEY GIRAFFE HABITATS

The enforcement of wildlife conservation laws is critical for effective protected area management. Law enforcement in Akagera NP is currently undertaken by a dedicated and organised law enforcement ranger team. Effective conservation of Akagera NP's Masai giraffe and mitigation of potential threats relies strongly on the long-term support and enhancement of this capacity.

	Action	Indicators	Responsible	Timeframe
2.1	Maintain law enforcement efforts with current and/or increasing numbers of rangers	Law enforcement efforts maintained and/or increased	ANP LE	Ongoing
2.2	Maintain reporting of giraffe mortality and poaching/snaring risks	Data collected and reported through existing programmes (currently EarthRanger)	ANP LE	Ongoing

# **OBJECTIVE 3**: INCREASE CAPACITY BUILDING FOR STAFF OF THE RESEARCH AND MONITORING DEPARTMENT IN AKAGERA NP

Research and long-term monitoring are invaluable for the conservation of giraffe in Akagera NP and therefore the continuity of scientific capacity must be ensured. With the involvement of AP as a private partner in the management of Akagera NP, its future is not guaranteed in the long-term and its capacity needs to be managed by a national team of experts.

	Action	Indicators	Responsible	Timeframe
3.1	Train all C&R staff in field data collection	Data collection needs and procedures are understood by all park staff	ANP C&R GCF	Ongoing
3.2	Improve the technical capacity of the C&R team for giraffe monitoring and research	A centralised database for giraffe encounters established Staff trained in relevant methods, and software Protocols/SOP for data curation established	ANP C&R GCF	Ongoing
3.3	Training of staff in independent analyses of photographic survey data for estimating abundance of giraffe	Data analyses can be performed by park staff independently	ANP C&R GCF	Ongoing
3.4	Ensure the involvement of park staff in the scientific process through collaborative research with outside technical partners	Number of park staff participating in planned monitoring, research activities, and reporting	ANP C&R	Ongoing

### Objective 4: Increase awareness and education about giraffe with local communities and at a national level in Rwanda

Communities living around Akagera NP rely in part on natural resources around the park and economic benefits associated with tourism. Through close engagement with the neighbouring communities, management is working to gain the active support of communities and minimize potential conflicts in and around the park. Additionally, enhancing awareness and education of the importance of giraffe conservation, and the importance of conserving the sole population of Masai giraffe in Rwanda will help national efforts whilst also aiding local community-based tourism and development support.

	Action	Indicators	Responsible	Timeframe
4.1	Include giraffe conservation and their importance in the community development programmes and outreach/ Akagera NP environmental education programme	Giraffe conservation is included in community development programmes	ANP Community liaisons, and C&R	Ongoing
4.2	Bring schoolchildren to visit the Park around key environmental awareness days, eg World Environment Day, World Giraffe Day	Schoolchildren of nearby communities have seen giraffe and were given the GCF Nature Workbook	ANP Community liaisons, and C&R	Ongoing
4.3	Continue promoting local tourism using giraffe as a flagship species.	Visitors are aware of the importance of Akagera NP's giraffe for their conservation	ANP Community liaisons, and C&R	Ongoing
4.4	Promote World Giraffe Day (21 June) annually on Akagera NP's social media and local and national media	Social media posts and/or local media engagement achieved	ANP Tourism & Marketing	Ongoing
4.5	Assess and address any current local cultural perceptions of giraffe	Local cultural perception of giraffe is understood.	ANP Community liaisons, and C&R	2024

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## SUPPLEMENTAL MATERIAL

Supplemental Table 1: Abundance estimates of the giraffe population in Akagera NP, Rwanda.

Year	Field Method	Analytical Method	Raw Count	Abundance Estimate	LCL	UCL	Citation
1986	Ground-Based Count	Complete Enumeration	6				Vande weghe, 1990
1988	Ground-Based Count	Complete Enumeration	7				Vande weghe, 1990
1994	Ground-Based Count	Complete Enumeration	20				East, 1999
2002	Aerial Survey	Complete Enumeration	20				Lamprey, 2002
2002	Aerial Survey	Density Extrapolation	101	101	-38.16	240.16	Lamprey, 2002
2010	Aerial Survey	Complete Enumeration	15				Viljoen, 2010
2013	Aerial Survey	Complete Enumeration	54				MacPhearson , 2013
2015	Aerial Survey	Complete Enumeration	79				MacPhearson , 2015
2017	Aerial Survey	Complete Enumeration	88				MacPhearson , 2017
2019	Aerial Survey	Complete Enumeration	78				MacPhearson , 2019
2021	Aerial Survey	Complete Enumeration	85				MacPhearson & Bantlin, 2021
2022	Individual Based Photographic Survey	Spatially Explicit Capture Recapture	78	105.80	81.84	136.84	Brown & Bantlin 2022
2023	Individual Based Photographic Survey	Spatially Explicit Capture Recapture	87	159.92	119.8 7	213.36	Brown & Bantlin 2023

Supplemental Table 2: Threats assessment for the giraffe population in Akagera NP

Threat	Scope	Severity	Irreversibility	Magnitude	Overall	Rank
Habitat Loss	Very High	High	High	High	High	1
Climate Change	Very High	Medium	High	Medium	Medium	2
Demographic Stochasticity	High	Low	High	Low	Low	3
Inbreeding	High	Medium	Medium	Medium	Medium	4
Disease	Medium	Medium	Medium	Medium	Medium	5
Predation	Medium	Medium	Medium	Medium	Medium	6
Poachng	Medium	Medium	Medium	Medium	Medium	7
Community Changes in Attitude	Low	Low	Low	Low	Low	8





