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DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT

NO. 4517 **18 March 2024**

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

PUBLICATION OF THE MULTI-SPECIES BIODIVERSITY MANAGEMENT PLAN FOR VULTURES IN SOUTH AFRICA FOR IMPLEMENTATION IN TERMS OF SECTION 43 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004); ASSIGNMENT OF RESPONSIBILITIES TO THE NATIONAL VULTURE TASK FORCE AND THE REPEAL OF THE BIODIVERSITY MANAGEMENT PLAN FOR THE BEARDED VULTURE

I, Barbara Dallas Creecy, Minister of Forestry, Fisheries and the Environment, hereby, in terms of section 43(1)(b) and (c) and 43(3)(a) and (b) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), publish the Multi-species Biodiversity Management Plan for Vultures in South Africa for implementation, as set out in the Schedule hereto.

The Multi-species Biodiversity Management Plan for Vultures in South Africa aims to implement comprehensive strategic conservation actions that covers the geographic ranges of all nine-vulture species found in South Africa, with a particular focus on the seven resident breeding species. The plan also aims to foster concerted, collaborative and coordinated international efforts to recover these populations to acceptable levels by 2033.

The BMP is published at an opportune time after the publication of the White paper on Conservation and Sustainable Use of South Africa's Biodiversity. The BMP is aligned with the goals and enablers of the White paper. As explicitly recognised that the responsibility rests with a range of stakeholders, including, but not limited to, the State, traditional leaders, traditional health practitioners, communities, private landowners, industry, academia, non-government organisations and civil society, this BMP provides the platform to showcase and uphold what is contained in the White Paper. It is a clear demonstration that many stakeholders concerned with vulture conservation are working together towards the conservation of our vulture species to ensure that all South Africans will continue to benefit from the ecosystem services provided by vultures.

In terms of section 43(2) and 43(3)(c) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), I hereby assign the responsibility for implementation of the Multi-species Biodiversity Management Plan for Vultures in South Africa to the National Vulture Task Force.

This Notice repeals the Bearded Vulture Biodiversity Management Plan that was gazetted in Government Notice No. 350, Government *Gazette* No. 37620 of 8 May 2014.

BARBARA DALLAS CREECY
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

SCHEDULE

BIODIVERSITY MANAGEMENT PLAN (BMP) FOR THE CONSERVATION OF SEVEN VULTURE SPECIES IN SOUTH AFRICA

Authors: Jointly developed and reviewed by the drafting team of the National Vulture Task Force

Lead Agency (cies): National Vulture Task Force (As established by the Department of Forestry, Fisheries and the Environment).

Implementing Organisations:
Department of Forestry, Fisheries and the Environment (DFFE) ; South African Police Services (SAPS); South African National Biodiversity Institute (SANBI); South African National Parks (SANParks); Eskom Holdings SOC Ltd; Ezemvelo KwaZulu-Natal Wildlife (Ezemvelo), Eastern Cape Parks and Tourism Agency (ECPTA); Limpopo Economic Development Environment and Tourism (LEDET); Mpumalanga Tourism and Park Agency (MTPA); North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT), Gauteng Department of Agriculture, Rural Development and Environment (GDARDE), Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (EC DEDEAT), CapeNature, BirdLife South Africa (BLSA); Endangered Wildlife Trust (EWT); VulPro; Wildlife ACT; Wildlife Poisoning Prevention & Conflict Resolution; University of KwaZulu-Natal (UKZN); Raptor Rescue; University of Witwatersrand (WITS); South African Hunters & Game Conservation Association (SAHGCA); People and Parks: Youth Programmes; Traditional Health Practitioners and Healers.

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LIST OF ABBREVIATIONS

FULL NAME	ACRONYMS
African Vultures	AV
African Vulture Crisis	AVC
Associated Private Nature Reserves	APNR
Bearded Vulture Recovery Programme	BVRP
Biodiversity Economy and Sustainable Use Unit	BESU
Biodiversity Management Plan	BMP
Birds and Renewable Energy Specialist Group	BARESG
Convention on Biological Diversity	CBD
Convention on International Trade in Endangered Species of Wild Fauna and Flora	CITES
Convention on Migratory Species	CMS
Conservation Standards	CS
Critically Endangered	CR
Department of Cooperative Governance and Traditional Affairs	COGTA
Department of Forestry, Fisheries and the Environmental Affairs	DFFE
Department of Health	DOH
Dichlorodiphenyltrichloroethane	DDT
Environmental Assessment Practitioner	EAP
Eastern Cape	EC
Eastern Cape Department of Economic Development, Environmental Affairs and Tourism	EC DEDEAT
Environmental Impact Assessment	EIA
Environmental Screening Tool	EST
Endangered Wildlife Trust	EWT
Ezemvelo KwaZulu-Natal Wildlife	EZEMVELO
Greater species diversity	GSD
Human-Wildlife Conflict	HWC
International Ornithological Congress	IOC
International Union for Conservation of Nature	IUCN
Kruger National Park	KNP
KwaZulu-Natal	KZN
Lead Task Team	LTT
Least Concern	LC
Memorandum of Understanding on Birds of Prey	MOU
Multi-Species Action Plan to Conserve African-Eurasian Vultures	MsAP
National Biodiversity Assessment	NBA
National Environmental Management Act	NEMA
National Environmental Management: Biodiversity Act	NEM: BA
National Environmental Management: Protected Areas Act	NEM: PAA
National Environmental Management: Waste Act	NEMWA
National Heritage Resources Act	NHRA
National Vulture Task Force	NVTF
National Wildlife Poisoning Prevention Strategy	NWPPS
National Wildlife Poisoning Prevention Working Group	NWPPWG
National Zoological Gardens	NZG
Near Threatened	NT
Non-Steroidal Anti-Inflammatory Drugs	NSAIDs
Norms and Standards	N&S

FULL NAME	ACRONYMS
Persistent Organic Pollutants	**POPs**
Renewable Energy Development Zones	**REDZ**
South Africa	**SA**
Southern African Development Community	**SADC**
South African Hunters and Game Conservation Association	**SA Hunters**
South African National Biodiversity Institute	**SANBI**
South African National Parks	**SANParks**
Sustainable Development Goals	**SDGs**
Transfrontier Conservation Areas	**TFCAs**
Transfrontier Parks	**TFPs**
Threatened or Protected Species Regulations	**TOPs**
University of KwaZulu-Natal	**UKZN**
Vulture Programme	**VULPRO**
Wind Energy Facilities	**WEFs**
University of the Witwatersrand	**WITS**

DEFINITIONS AND USEFUL TERMS

In this BMP-S, unless the context indicates otherwise, a word or expression defined in the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) or the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) or the White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity, 2023 has the same meaning.

Additionally, the following definitions and terms are in alignment with the terms developed by the Conservation Standards. The Conservation Standards (also known as the Open Standards for the practice of Conservation) are a set of best practices developed by the Conservation Measures Partnership, which support teams to streamline conservation project design, management, monitoring, and learning to help improve the practice of conservation.

Term	Definition and useful terms
Action	A general term used to refer to the work of conservation teams. This includes strategies, activities, and tasks.
Activity	A specific action or set of tasks undertaken by project staff and/or partners to reach one or more objectives. This is the child factor of a strategy. A monitoring activity is a type of activity specifically linked to an indicator and the collection of data.
Critical Threat	Direct threats prioritized as the most important to address
Contributing Factor	Generic term for an element of a situation model, including direct and indirect threats, and opportunities. It is often advantageous to use this generic term since many factors – for example, tourism – could be both a threat and an opportunity
Direct Threats	Primarily human actions that immediately degrade one or more conservation targets (e.g., illegal logging or unsustainable fishing). They can also be natural phenomena altered by human activities (e.g., increase in extreme storm events due to climate change). Typically tied to one or more stakeholders. (Sometimes referred to as a pressure or source of stress. Compare with indirect threat.)
Driver	A synonym for indirect threat.
Ecosystem Service	Services that intact, functioning ecosystems, species, and habitats provide and that can benefit people.
Enabling Condition	A broad or high-level opportunity within a situation analysis. For example, the legal or policy framework within a country.
Goal	A formal statement detailing a project's desired impact, such as the desired future status of a target. A good goal meets the criteria of being specific, measurable, achievable, results-oriented, and time-limited (SMART).

Impact	The desired future state of a conservation target. A goal is a formal statement of the desired impact.
Indicator	A measurable entity related to a specific information need, such as the status of a target, change in a threat, progress toward an objective, or association between one or more variables. A good indicator meets the criteria of being measurable, precise, consistent, and sensitive.
Indirect Threat	A factor identified in an analysis of the project situation that is a driver of direct threats. Often an entry point for conservation actions. For example, logging policies or demand for fish. (Sometimes called a root cause or underlying cause. Compare with direct threat.)
Intervention	A synonym for a specific or targeted strategy.
Key Attribute	Aspects of a target's biology or ecology that, if present, define a healthy target and, if missing or altered, would lead to the outright loss or extreme degradation of that target over time. (Also known as key ecological attribute).
Monitoring	The periodic collection and evaluation of data relative to stated project goals and objectives. (Also referred to as monitoring and evaluation (M&E) or monitoring, evaluation and learning (MEL).
Monitoring Plan	The plan for monitoring your project. It includes information needs, indicators, and methods, timeframe, and roles and responsibilities for collecting data.
Method	A specific technique used to collect data to measure an indicator. A good method should meet the criteria of being accurate, reliable, cost-effective, feasible, and appropriate
Objective	A formal statement detailing a desired outcome of a project, such as reducing a critical threat. A good objective meets the criteria of being specific, measurable, achievable, results-oriented, and time-limited (SMART). If the project is well-conceptualized and -designed, the realisation of a project's objectives should lead to the fulfilment of the project's goals and ultimately its vision. Compare to vision and goal.
Outcome	The desired future state of a threat or opportunity factor. An objective is a formal statement of the desired outcome. (Synonym for result.)
Output	A tangible or intangible product produced by a person, group, machine, or industry immediately after implementing an activity or task (e.g., completed workshop, technical report).
Result	The desired future state of a target or factor. Results include impacts, which are linked to targets and outcomes, which are linked to threats and opportunities.

Results Chain	A visual diagram of a project's theory of change. A results chain includes core assumptions and the logical sequence linking project strategies to one or more targets. In scientific terms, it lays out hypothesized relationships or theories of change.
Sentinel poisoning	A form of intentional poisoning where vultures are the primary target. Here poison baits, largely the carcasses of large mammals such as elephant and buffalo, are laced with poison after being poached, to reduce vulture numbers in areas where poachers are active.
Stakeholder	Any individual, group, or institution that has a vested interest in or can influence the natural resources of the project area and/or that potentially will be affected by project activities and has something to gain or lose if conditions change or stay the same. Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success
Situation Analysis	A process that will help you and your project team create a common understanding of your project's context – including describing the relationships among the biological environment and the social, economic, political, and institutional systems and associated stakeholders that affect the conservation targets you want to conserve. Depending upon the scale of the project and the resources available to it, a situation analysis can be an in-depth formal review of existing evidence and study of the area/problem or a less formal description based on input of those familiar with the area/problem
Situation Model	A visual diagram of a situation analysis. A situation model (diagram) represents relationships between key factors identified in a situation analysis believed to impact or lead to one or more conservation targets. A good model should link the conservation targets to threats, opportunities, stakeholders, and key intervention points. Also called a Conceptual Model
Strategy	A set of activities with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, optimizing opportunities, and limiting constraints. A good strategy meets the criteria of being linked, focused, feasible, and appropriate. This is the child factor of a project.
Target	An element of biodiversity (species, habitat, or ecological system) at a project site on which a project has chosen to focus. All targets should collectively represent the biodiversity of concern at the site.
Task	A specific action in a work plan required to implement activities, a monitoring plan, or other components of a strategic plan. This is the child factor of an activity.
Theory of Change	A series of causally linked assumptions about how a team thinks its actions will help it achieve both intermediate results and longer-term conservation and human well-being goals. A theory of change can be expressed in text, diagrammatic (e.g. results chains), or other forms

Threat	A human activity that directly or indirectly degrades one or more targets. Typically tied to one or more stakeholders.
Vulture Safe Zone	A Vulture Safe Zone (VSZ) is a vulture relevant area where targeted conservation measures are undertaken to address the key threats relevant to the vulture species present and to sustain viable wild populations. VSZs are developed in South Africa to complement national and international efforts to reduce the impact of existing and emerging threats to stabilise and promote recovery of existing vulture populations. The VSZ concept arises from the joint CITES/CMS Multispecies Action Plan for Vultures. In VSZs, conservationists work with landowners, government agencies, and communities to secure large tracts of suitable habitat where land is managed in a vulture friendly manner and the threats to vultures are markedly reduced, so vulture populations can thrive. This includes important vulture foraging and breeding areas, as well as historical ranges.

ACKNOWLEDGEMENTS

The Department would like to acknowledge with appreciation the crucial role played by those that assisted in the development of this Biodiversity Management Plan (BMP) for Vulture species that occur in South Africa. This has not been an easy task but through collaboration of the drafting team and the reviewers, the development of this BMP was possible. With special thanks to the following members of the drafting team as appointed by the Department and their organisations for allowing them to contribute their expertise in undertaking this task:

1. Ms Humbulani Mafumo (Department of Forestry, Fisheries and the Environment - DFFE)
2. Ms Tebogo Mashua (Department of Forestry, Fisheries and the Environment - DFFE)
3. Ms Morongoa Pheeba (Department of Forestry, Fisheries and the Environment - DFFE)
4. Dr Lindy Thompson (Endangered Wildlife Trust - EWT)
5. Dr Gareth Tate (Endangered Wildlife Trust - EWT)
6. Mr Brent Coverdale (Ezemvelo KZN Wildlife)
7. Mr Chris Kelly (Wildlife ACT)
8. Dr Theresa Sethusa (South African National Biodiversity Institute - SANBI)
9. Ms Lulama Matyolo (People and Parks Programme)
10. Ms Nomthandazo Sam Manqele (University of KwaZulu-Natal)
11. Mr Kishaylin Chetty (Eskom Holdings SOC Ltd)
12. Dr Sonja Krüger (Ezemvelo KZN Wildlife)
13. Ms Linda van den Heever (BirdLife South Africa)
14. Dr Danny Govender (SANParks)
15. Ms Kerri Wolter (VulPro)

Reviewers of the BMP:

1. Ms Willeen Olivier (Department of Forestry, Fisheries and the Environment - DFFE)
2. Mr Andre Botha (Endangered Wildlife Trust - EWT)
3. Mr Nicholas Funda (SANParks)
4. Ms Lizanne Nel (SA Hunters and Game Conservation Association)

Special thanks to Ms Skumsa Ntshanga and Ms Mukondi Matshusa for their strategic guidance in the development of this vulture BMP and who allowed members of the drafting team the necessary time, despite their other numerous work commitments to concentrate solely on the development of the BMP in March 2020.

FOREWORD

South Africa is a special country with exceptional biodiversity. This includes a variety of species much of which are unique and endemic and contribute to our status as one of the world's 17 megadiverse nations. This biodiversity wealth gives people tangible benefits such as pollination, food, clean water, medicine, and materials; it supports agricultural and fisheries production and helps protect us from natural disasters like floods and droughts. It also provides the basis of a vibrant tourism industry while offering natural spaces for recreational and cultural activities. Greater species diversity contributes to ecosystem integrity for all life forms. The cost of replacing the ecosystem components and services derived from this diversity would be extremely high, not impossible. With this rich endowment comes the responsibility and challenge of ensuring our species and ecosystems are conserved for the benefit of all South Africans now and into the future, whilst also considering the national development goals and need to improve the well-being of South Africans.

The recently published National Biodiversity Assessment, (NBA) 2018, highlighted the plight of species including vultures and the ecosystems that support them. Vultures are distinctive and important components of our biodiversity. They do not only have an intrinsic value – we want to continue to see these majestic birds in the African sky – but they also provide critical ecosystem services by cleaning up carcasses and other organic waste in the environment. This sanitation service may reduce the impact of diseases in both wild and domestic animals and pathogenic risks to humans.

The International Union for Conservation of Nature Red List status of African-Eurasian vultures highlights the level of threat facing these species in recent years. South Africa has seven resident vulture species. Three of these species are listed as globally Critically Endangered, the highest category of threat, indicating a high risk of extinction in the wild. Unless effective conservation action is implemented nationally, and in the case of vultures in particular, also at a range state level, there is a likelihood that several of these species will become extinct in the near future. The main drivers of decline are poisoning, electrocution, traditional medicinal use, and collisions with energy infrastructure as well as habitat changes. In Africa, the threat of poisoning has accelerated in recent years, with a range of drivers, including but not limited to poisoning for harvesting of vulture parts for the traditional medicine trade, and to reduce the visibility of poaching incidents. This is often done by lacing carcasses of other species with toxic substances. Sometimes vultures are the intended targets, but often they are, through their scavenging habits, unintended victims. The immense scale and extent of the population declines of vultures in Africa have only recently been exposed and has led to the term 'African Vulture Crisis'.

Some outstanding work has been and continues to be done to conserve vultures. In addition to the development of this Biodiversity Management Plan, the establishment of a National Vulture Task Force brings together representatives from relevant government departments and other stakeholders to facilitate an integrated approach to vulture conservation. The National Wildlife Poisoning Prevention Working Group developed amongst others, a National Wildlife Poisoning Prevention Implementation Plan that is aligned to international strategies, whilst the National Lead Task Team is overseeing the process to develop quantitative, measurable targets consistent with achieving the vision of 'ensuring that wildlife in South Africa is not harmed by exposure to lead'.

This BMP for Vulture species in South Africa is published at an opportune time after the publication of the White paper on Conservation and Sustainable Use of South Africa's Biodiversity. The BMP aligns with the

goals and enablers of the White paper. Just as the White Paper explicitly recognizes that the responsibility rests with a range of stakeholders, including, but not limited to, the state, traditional leaders, traditional health practitioners, communities, private landowners, industry, academia, non-government organisations and civil society. This is a clear demonstration that many stakeholders concerned with vulture conservation are working together towards the conservation of our vulture species to ensure that all South Africans will continue to benefit from the ecosystem services provided by vultures.

MS BARBARA DALLAS CREECY
MINISTER OF FORESTRY FISHERIES AND THE ENVIRONMENT

EXECUTIVE SUMMARY

Vultures play a crucial role in maintaining a healthy environment. They serve as nature's clean-up crew by efficiently disposing of carcasses and other organic waste in the landscape. Not only are vultures part of our unique wildlife heritage but these scavenging birds also provide essential ecosystem services that directly benefit humans as well. However, the global vulture population is facing severe threats, making them one of the most endangered functional groups worldwide. The International Union for Conservation of Nature (IUCN) has classified eight out of the fifteen Old World vulture species spanning Africa, Europe, and Asia, as Critically Endangered.

The decline of vultures became evident in the 1990s when populations of three *Gyps* vulture species in Asia plummeted by 96% due to accidental poisoning from the veterinary drug diclofenac. This alarming trend, known as the "Asian vulture crisis," was mirrored by substantial declines in Africa's vulture numbers over the past three decades. The reasons for these declines in Africa, are however more diverse and complex. By 2015, four of Africa's 11 vulture species (six of which are endemic to the continent) were up-listed to Critically Endangered on the IUCN Red List, with an additional three species considered Endangered. The White-backed Vulture (*Gyps africanus*), once abundant in the African savanna and listed as Least Concern as recently as 2004, is now perilously close to extinction in the wild.

The IUCN Red List Index for vultures reveals a steady and continuous deterioration in their global status from 1988 to 2012. Unfortunately, these declines have persisted and are projected to continue into the future. African vulture populations have witnessed declines ranging from 80 to 97% over the past 30 years. South Africa has experienced a rapid decrease in vulture numbers. If current trends persist, vultures are likely to vanish from the region, leading to significant ecological, social, and economic consequences.

The lack of collective and decisive action has contributed to the ongoing decline of vultures on a continental scale, a challenge not unique to South Africa. South Africa is home to nine vulture species, seven of which have established breeding populations. However, these populations continue to face varying degrees of extinction risks. Consequently, there is an urgent need for a Biodiversity Management Plan (BMP) to maximise efforts to safeguard South Africa's vultures.

The development of this BMP involved a consultative process with stakeholders, including a dedicated drafting and reviewing team. The national BMP aims to implement comprehensive strategic conservation actions that covers the geographic ranges of all nine vulture species found in South Africa, with a particular focus on the seven resident breeding species. The plan also aims to foster concerted, collaborative, and coordinated international efforts to recover these populations to acceptable levels by 2033.

The species that are the focus of this BMP are:

Breeding residents:

- Bearded Vulture *Gypaetus barbatus*
- White-headed Vulture *Trigonoceps occipitalis*
- Hooded Vulture *Necrosyrtes monachus*
- White-backed Vulture *Gyps africanus*
- Cape Vulture *Gyps coprotheres*
- Lappet-faced Vulture *Torgos tracheliotos*
- Palm-nut Vulture *Gypohierax angolensis*

Vagrants:

- Rüppell's Vulture *Gyps rueppelli*
- Egyptian Vulture *Neophron percnopterus*

The range and extent of threats facing these species are more varied compared to that of southern Asia with various forms of acute poisoning currently known to be the main reason for the decline. These are driven by several factors, some being particularly significant: conflict between humans and carnivores due to risks perceived by humans, including to their domestic livestock, which unintentionally kills vultures; poachers actively targeting vultures to prevent them exposing their activities to wardens by soaring above illegally killed elephants and other game; and deliberate collection of vultures for illegal trade and belief-based use to fuel superstitions.

Poisoning, intended and unintended, in various forms is a concern throughout vultures' ranges. Other threats, also operating to varying extents over large areas include habitat loss and degradation, decreasing food availability, fragmentation of remaining populations, human disturbance, collisions with wind turbines and powerlines, and electrocution on electricity infrastructure. This plan is the result of extensive consultation with stakeholders, conservation and species experts and has the following vision and desired state:

Vision: Healthy, growing populations of vultures in South Africa fulfilling essential ecosystem services.

Desired state: A safe and secure environment that allows vultures to fulfil all components of their life cycle.

In fulfilling the overall objective, namely, that critical ecosystem services and health benefits that vultures provide to society as a whole persist and to allow for a better understanding of the cultural value of vultures and the value of seeing these majestic birds up in the African sky, the below objectives should be achieved:

1. To reduce and eventually halt the practice of intentional poisoning of vultures and its impact.
2. To work alongside traditional medicine practitioners to ensure the implementation of responsible and sustainable practices that will contribute to the conservation of the species.
3. To ensure that veterinary and human pharmaceuticals with a proven or suspected likelihood of impacting wildlife are kept out of the food chain.
4. Provide environmentally friendly alternative measures to control damage causing animals to avoid causing harm to non-target species.
5. To reduce lead exposure to vultures, preventing lead poisoning as well as related harmful side effects caused by the exposure to lead toxicity.
6. To substantially reduce vulture mortalities caused by existing energy infrastructure and mitigate any losses to vultures from new energy infrastructure.
7. To use a range of conservation mechanisms for increasing the land under biodiversity protection.
8. To support vulture conservation through cross-cutting policies, legislation, and actions to enable mitigation of critical threats.
9. To monitor the status of all species of vultures that occur in South Africa at an appropriate interval to inform policy and conservation actions.
10. Develop a standardised marking and tagging system for all vulture species.
11. Identify research gaps and conduct research to generate knowledge, create a centralised data hub and provide information relevant to conservation management requirements, both *in situ* and *ex situ*.
12. Ensure appropriate *ex situ* management practices that benefit vulture conservation.
13. Promote vulture conservation through effective education, promotion, and awareness.

The document also outlines the proposed structure, processes, and resources necessary for the successful implementation of the BMP. It includes details about the coordination team, steering committee, global and regional working groups, and other support structures deemed essential for effective implementation. Guidance is provided on monitoring, evaluation, and review processes to be followed during the implementation phase. Additionally, it suggests components that should be included in communication strategies, fundraising initiatives, and resource mobilization plans to promote and garner support for the plan from Range States and other target audiences.

1. INTRODUCTION

Africa is home to 11 of the 15 species of Old-World vultures (Botha et al. 2017). Vultures are a characteristic and spectacular component of Africa's biodiversity. They provide critical ecosystem services by disposing of carcasses quickly and efficiently (Şekercioğlu 2006; Şekercioğlu et al. 2004; Markandya et al. 2008; Berlinguer et al. 2021). Once common and widespread across the continent, African vultures have been undergoing widespread, multi-species declines over the last 30 years (Ogada et al. 2016a, b), not unlike the Asian Vulture Crisis in late 1990s which saw populations of three species of *Gyps* vulture collapse throughout South Asia, by >96% in just 10 years (Ogada et al. 2016b).

South Africa is home to nine vulture species, seven of which have established breeding populations in the range state and are currently facing threats of extinction (Taylor et al. 2015). Cliff-nesting species include the Bearded Vulture *Gypaetus barbatus meridionalis* and the Cape Vulture *Gyps coprotheres.* Tree-nesting species include the Hooded Vulture *Necrosyrtes monachus*, White-backed Vulture *Gyps africanus*, Lappet-faced Vulture *Torgos tracheliotus*, White-headed Vulture *Trigonoceps occipitalis*, and Palm-nut Vulture *Gypohierax angolensis.* The Egyptian Vulture *Neophron percnopterus,* although once considered a resident breeding species, has not bred within South Africa since the 1920's (Hockey et.al. 2005) and is considered a non-breeding species for the purpose of this BMP. According to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (2021), three of the seven vulture species that breed in South Africa have moved from globally Vulnerable or Endangered to Critically Endangered between the 2014 and 2015 assessment periods. These include the White-headed, Hooded and White-backed Vulture. The Lappet-faced Vulture moved from Vulnerable to Endangered. Regionally, the Bearded Vulture has been assessed as Critically Endangered due to the declines in the local population as well as range contraction (Krüger 2015). In December 2021, the Cape Vulture was down-listed from Endangered to Vulnerable (BirdLife International 2021a). The Palm-nut (BirdLife International 2021a) is considered to be Least Concern internationally (BirdLife International 2016), having not been assessed within the region. The Rüppell's Vulture (***Gyps rueppelli***) listed as Critically Endangered internationally (BirdLife International 2021b) is considered a rare vagrant in Southern Africa, although records of hybridisation with Cape Vultures have been recorded within South Africa (Verdoorn 2004).

African vulture population declines have largely been due to widespread poisoning, both intentional and unintentional (Ogada et al. 2012; Murn and Botha 2017), collisions and electrocutions with energy infrastructure as well as habitat change (Botha et al. 2017). The declines are further exacerbated by the lack of collective and decisive action by African governments. Therefore, an integrated approach to safeguard the vulture populations regionally, as set out in the framework of the Vulture Multi-Species Action Plan to Conserve African-Eurasian Vultures (MsAP) (Botha et al. 2017) is needed but requires strengthening at a national level in each country. Hence there is a need for a Biodiversity Management Plan (BMP) for local breeding vulture populations in order to address the problem in South Africa.

1.1 Vision and desired state

Vision: *Healthy, growing populations of vultures in South Africa fulfilling essential ecosystem services that benefit society.*

Desired state: A *safe and secure environment that allows vultures to fulfil all components of their life cycle.*

To achieve this vision and desired state, the BMP proposes the following objectives:

1.2 Objectives

In fulfilling the overall objective, namely, the critical ecosystem services and health benefits that vultures provide to society as a whole persist and to allow for a better understanding of the cultural value of vultures the below objectives should be achieved.

1. To reduce and eventually halt the practice of intentional poisoning of vultures and its impact.
2. To work alongside traditional medicine practitioners to ensure the implementation of responsible and sustainable practices that will contribute to the conservation of the species.
3. To ensure that veterinary and human pharmaceuticals with a proven or suspected likelihood of impacting wildlife are kept out of the food chain.
4. Provide environmentally friendly alternative measures to control damage causing animals to avoid causing harm to non-target species.
5. To reduce lead exposure to vultures, preventing lead poisoning as well as related harmful side effects caused by the exposure to lead toxicity.
6. To substantially reduce vulture mortalities caused by existing energy infrastructure and mitigate any losses to vultures from new energy infrastructure.
7. To use a range of conservation mechanisms for increasing the land under biodiversity protection.
8. To support vulture conservation through cross-cutting policies, legislation, and actions to enable mitigation of critical threats.
9. To monitor the status of all species of vulture that occur in South Africa at an appropriate interval to inform policy and conservation actions.
10. Develop a standardised marking and tagging system for all vulture species.
11. Identify research gaps and conduct research to generate knowledge, create a centralised data hub and provide information relevant to conservation management requirements, both *in situ* and *ex situ.*
12. Ensure appropriate *ex situ* management practices that benefit vulture conservation.
13. Promote vulture conservation through effective education, promotion, and awareness.

1.3 Benefits of the BMP

- Key stakeholders and their respective roles in achieving the objectives of this plan are identified, alongside policy opportunities and barriers to effect wide-scale changes.
- The establishment of a functional framework for the development and implementation of the conservation actions for the species nationally.
- This BMP creates communication and resource mobilisation opportunities.

1.4 Anticipated outcomes

The anticipated outcomes of the implementation of this BMP for the next five years are as follows: -

- Collaborative and concerted efforts for the conservation of the seven vulture species of conservation concern in South Africa
- An understanding of the urgency for implementing the actions amongst the role players and stakeholders.
- An agreed structure responsible for implementation, monitoring and evaluation.
- Clarity and acceptance of roles, responsibilities, and accountability amongst role players.
- Acceptance and support for the plan amongst stakeholders.
- A plan that comprehensively and concisely covers all aspects related to the conservation requirements of the species and provides realistic targets for the five-year life of this iteration.
- Achieving the conservation targets set for the species.

2. BACKGROUND

2.1 Summary of the conservation status of South Africa's vulture species

The seven resident breeding vulture species found in South Africa are listed in Table 1, along with their conservation status, a brief description of the regional decline, and the population estimates for each species within South Africa.

2.2 Summary of everything known about the species and anything pertinent to its management, in sufficient details, including needs to be researched

The MsAP (Botha et al. 2017) contains brief species' summaries, which can be referred to. Section 5 of this document provides detailed information about each species covered in this BMP. This section briefly highlights important details, which are relevant to the general management of vultures and their conservation needs. There are various natural history traits that are important to understand for the effective management and conservation of vultures.

(i) Vultures are obligate scavengers, and they range over large areas to find food, as carcasses are not predictable in space or time. Consequently, vultures often range over provincial and national borders, which necessitates cross-border collaboration in the conservation of vultures.

(ii) Most vulture species are social feeders; and one carcass may be attended by several other vultures, which makes them susceptible to threats such as poisoning. Therefore, any provisioned food cannot contain most non-steroidal anti-inflammatory drugs (NSAIDs), lead fragments, poisons, certain veterinary drugs etc., and it cannot be in an area that attracts vultures to a nearby threat such as power lines, wind developments, etc.

(iii) Vultures are particularly susceptible to lead poisoning due to their scavenging lifestyle and their highly acidic stomachs. Carcasses or offal from animals containing fragments of lead that are left in the veld pose a risk to vultures.

(iv) The frontal field of view typical to vultures during foraging and flight, provides comprehensive visual coverage of the ground beneath. However, the small binocular region and large blind spot above the head (Martin *et. Al. 2012)*, which would be in the direction of travel when flying, makes them particularly susceptible to collisions with overhead energy infrastructure, such as power lines and wind turbine blades.

(v) The occurrence and placement of wind turbines in areas regularly used by thermalling, traversing and soaring vultures, compounded by the rotor blur and speed of wind turbine blades, increases their likelihood of collisions with wind turbines.

(vi) Vultures are large bodied, and regularly perch and roost on unsafe energy infrastructure, often in large numbers, making them increasingly prone to electrocutions.

(vii) A final consideration is that vulture body parts are used in traditional medicine, to varying degrees in different parts of the country, but particularly in the Eastern Cape, KwaZulu-Natal, and Limpopo provinces (Pfeiffer et al. 2015).

A significant amount of work was initiated in the last 10 years to better understand vulture biology and conservation. Current research gaps include the following questions:

(i) What is the role that vultures play in disease ecology?

(ii) What is the effect of the use of vultures in traditional medicine on vulture populations in South Africa?

(iii) Are mitigation techniques used on power infrastructure helping to reduce mortalities?

(iv) Have the numbers of nest-predator species increased due to land-use change? (v) What are the effects of untested NSAIDs on vultures in South Africa?

(v) What is the impact of land-use change on the availability of nesting trees for vultures and vulture breeding productivity?

Table 1. Vulture species that occur in South Africa, their conservation status* and rate of decline. Species are listed in taxonomic order according to the International Ornithological Congress (IOC) World Bird List (Gill and Donsker 2020).

No.	Species	Global status	Regional status[A]	Regional decline	National population estimates	References
1.	Hooded Vulture *Necrosyrtes monachus*	CR	CR	≥ 25% in 1 generation	100-200 mature individuals in SA	a, e
2.	White-backed Vulture *Gyps africanus*	CR	CR	80% over 3 generations	3 435 breeding pairs in SA	a, e
3.	White-headed Vulture *Trigonoceps occipitalis*	CR	CR	≥ 25% in 1 generation	68 breeding pairs (in SA)	a, e, h, i
4.	Lappet-faced Vulture *Torgos tracheliotus*	EN	EN	≥ 50% in 3 generations (45 y)	166 breeding pairs (in SA)	a, e
5.	Cape Vulture *Gyps coprotheres*	VU	EN	≥ 50% in 3 generations (48 y)	4 400 pairs (10 000 individuals) regionally	a, e
6.	Palm-nut Vulture *Gypohierax angolensis*	LC	NA	Not threatened, but data deficient	40 individuals in RSA	a, b
7.	Bearded Vulture *Gypaetus barbatus*	NT	CR	83% of 3 generations (53 years)	352 to 390 individuals (c. 200 mature birds) regionally	a, c, d

*'Status' refers to the global threat category according to the IUCN Red List of Threatened Species (IUCN 2020), where NA= Not Assessed, LC = Least Concern, NT = Near Threatened, vu = Vulnerable, EN = Endangered and CR = Critically Endangered. [A]'Regional' refers to the Republic of South Africa, Lesotho and Swaziland. a = IUCN (2020), b = Rushworth and Piper (2004), c = Krüger (2014), d = Krüger et al. (2014a), e = Taylor et al. (2015), f = Snyman (1999), g = Venter (2017), h = B. Hoffman (pers. comm.), i = B. Coverdale (pers. comm.).

3. CONSERVATION STATUS AND LEGISLATIVE CONTEXT

South Africa is a party to a number of international Conventions and other intergovernmental policy frameworks that provide a platform for tackling the main threats to vulture populations. This section outlines legislation that is binding to South Africa.

3.1 INTERNATIONAL LEGISLATION, REGIONAL AND SUB-REGIONAL LEGAL INSTRUMENTS GOVERNING SPECIES CONSERVATION

3.1.1 United Nations Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) were adopted in September 2015 by 193 Member States of the United Nations General Assembly as part of the wider global development framework, Transforming our World: the 2030 Agenda for Sustainable Development. The 2030 Agenda adopts sustainable development as the organising principle for global cooperation through the 17 Goals. These Goals reflect the Agenda's five key themes of people, planet, prosperity, peace and partnerships. The 17 goals are further refined into 169 targets.

3.1.2 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. It was inspired by the world community's growing commitment to sustainable development. It has three main objectives: conservation of biological diversity; sustainable use of the components of biological diversity; and fair and equitable sharing of the benefits arising out of the utilization of genetic resources. South Africa became a Party to the CBD on 31 January 1996 by ratification.

The fifteenth meeting of the Conference of the Parties to the CBD held in Montreal, Canada, from 7 to 19 December 2022, in its decision 15/4, adopted the Kunming-Montreal Global Biodiversity Framework, and urged Parties and other Governments to implement it, and, in particular, to enable participation at all levels of government, with a view to fostering the full and effective contributions of women, youth, indigenous peoples and local communities, civil society organizations, the private and financial sectors, and stakeholders from all other sectors. Parties and other Governments were also invited to cooperate at the transboundary, regional and international levels in implementing the Kunming-Montreal Global Biodiversity Framework.

The Framework, building on the Strategic Plan for Biodiversity 2011-2020, its achievements, gaps, and lessons learned, and the experience and achievements of other relevant multilateral environmental agreements, sets out an ambitious plan to implement broad-based action to bring about a transformation in our societies' relationship with biodiversity by 2030, in line with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, and ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled.

3.1.3 The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

South Africa is a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which aims to ensure that international trade in wild animals and plants is legal, sustainable and traceable, and does not threaten the survival of the species in the wild. All the vulture species endemic to South Africa are listed on Appendix II of CITES, through the Order listing "Falconiformes". This implies that trade in specimens (live and dead animals, including their parts and derivatives) of the species is regulated by means of a permit system subject to relevant conditions. (Appendix II listing consists of species not necessarily threatened with extinction but may become so unless trade is regulated, and species whose specimens in trade look like those of species listed for conservation reasons).

3.1.4 The International Union for Conservation of Nature (IUCN)

The IUCN was established in France in 1948 as the "International Union for the Protection of Nature". The IUCN brings together states, government agencies and a diverse range of non-governmental organisations (NGOs) working at field and policy levels, together with scientists and experts to protect nature. The IUCN Red List is a tool to determine the risk of extinction to species and plays an important role in guiding conservation activities of governments, NGOs and scientific institutions.

South Africa became a State Member of the IUCN on 23 July 1993. The IUCN is increasingly playing a prominent role in guiding conservation activities of governments, NGOs and scientific institutions with a goal of providing information and analyses on the status, trends and threats to species in order to inform and catalyse action for biodiversity conservation. As such, an entire series of guidelines on mitigating the impacts of renewable energy, including onshore wind energy, have been generated through the IUCN structures. The IUCN uses a scientifically rigorous approach to determine risks of extinction that is applicable to all species in order to produce the IUCN Red List of Threatened Species. The IUCN Species Programme, working with the IUCN Species Survival Commission (SSC) and with members of the IUCN, draws on and mobilises a network of scientists and partner organisations working in almost every country in the world, which collectively hold what is likely the most complete scientific knowledge base on the biology and conservation status of species. The major role of the SSC is to provide information to IUCN on the conservation of species and on the inherent value of species and their role in:

- ecosystem health and functioning,
- the provision of ecosystem services, and
- the provision of support to human livelihoods.

3.1.5 The Convention on the Conservation of Migratory Species (CMS)

South Africa became a party to the Convention on the Conservation of Migratory Species (CMS) of Wild Animals (also known as the CMA or Bonn Convention) on the 1st of December 1991. This convention aims to conserve terrestrial, aquatic, and avian migratory species throughout their range. The mandate for the Vulture MsAP was established at the 11th CMS Conference of Parties (COP11) in November 2014. CMS Resolution 11.14 on the Programme of Work on Migratory Birds and Flyways was adopted, and

Action 9 of the Resolution, under the Species Conservation Actions section, seeks to promote the development, adoption and implementation of species action plans for priority species in line with CMS priorities for concerted and cooperative action.

During the CMS 12th Conference of Parties (COP12) held in Manila in 2017, a MsAP for the conservation of African-Eurasian Vultures was adopted. The Vulture MsAP aims to provide a comprehensive, strategic conservation Action Plan covering the geographic ranges of all 15 species of migratory African-Eurasian vultures and to promote concerted, collaborative and coordinated international actions towards the recovery of these populations to acceptable levels by 2029. The Vulture MsAP has been designed to ensure that it is relevant to each and every one of the 128 Range States covered by the plan.

South Africa is one of the 128 range states included in the MsAP. Each range state is encouraged to utilise the Vulture MsAP to develop a tailored National Vulture Conservation Strategy focusing on the species that occur within their jurisdiction and address the specific threats each species is facing. All the vultures that occur in South Africa (except for the Bearded Vulture and the Palm-nut Vulture) are listed on CMS Appendix I, which comprises endangered migratory species. CMS parties are encouraged by the IUCN's Hawaii Recommendation (IUCN 2016) to 'find a path forward to address concerns over the use of lead ammunition in hunting', to engage with hunters, industry and other stakeholders (section 2.a) and to phase-out 'lead ammunition used for hunting in areas where scavengers are at particular risk from the use of lead ammunition'.

In addition to the species listings, the CMS have adopted a number of resolutions and guidelines related to the energy sector. The CMS Energy Task Force was established in 2015, in accordance with Resolution 11.27 (Rev. COP13) Renewable Energy and Migratory Species to support the implementation of these resolutions and the use of relevant guidelines.

3.1. 5. 1 CMS Memorandum of Understanding on Birds of Prey (Raptors MoU)

On the 4th December 2008, South Africa signed the CMS Memorandum of Understanding on Birds of Prey (i.e. the CMS Raptors MoU), which is a non-binding Multilateral Environmental Agreement aiming to improve domestic legal protection for migratory birds of prey. The Raptors MoU is responsible for the overarching coordination and implementation of the Vulture MsAP across the range. South Africa is home to various Raptors species, including eagles, hawks, buzzards, harriers, kites, falcons, vultures and the Secretary bird. Although the MoU is not a legally binding arrangement, it is recognized as an international agreement. The MOU aims to promote internationally coordinated actions to achieve and maintain the favourable conservation status of migratory birds of prey throughout their range in the African-Eurasian region, and to reverse their decline. The Raptors MOU is one of several instruments operating under the Convention on the Conservation of Migratory Species of Wild Animals (CMS). The Signatories to the MOU strive to adopt, implement and enforce legal, regulatory and administrative measures to conserve birds of prey and their habitat.

3.1.6 Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted on 22 May 2001 and entered into force on 17 May 2004 (UNEP 2009). It aims to protect human health and the environment by putting measures in place to control persistent organic pollutants with the aim of ridding the environment of the chemicals listed as POPs. The Convention's list of POPs [the list for all POPs is in Annex A of the convention, and includes dichlorodiphenyltrichloroethane (DDT) and dieldrin] can be accessed at:
(http://chm.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx).

Organochlorine pesticides have been linked to population-level reproductive problems in raptors worldwide (Ames 1966; Grier 1982; Opdam et al. 1987; Newton and Haas 1988; Olsen et al. 1992). Although South Africa became a signatory to the Convention in 2001 and ratified it in 2002 and particularly following the malaria epidemic in 2000, it registered for exemption to continue the use of DDT only for disease vector control in accordance with the World Health Organization recommendations and guidelines. The occurrence of residues of DDT and its metabolites (DDT and DDD) in White-backed, Lappet-faced and Cape Vultures in South Africa (Van Wyk et al. 1993; Van Wyk et al. 2001) is likely to persist in the vulture populations foraging in the malarial areas of southern Africa as a result of the previous and continued use of DDT.

3.1.7 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)

The Rotterdam Convention was signed in 1998 and entered into effect in 2004 (UNEP-FAO 2017). It focuses on prior informed consent as a key tool for developing countries to make informed decisions on the import and use of highly toxic chemicals. It enables member governments (including South Africa) to exchange information on banned or severely restricted chemicals and to prevent unwanted trade in certain chemicals (Annex III). This list comprises pesticides that have been banned or severely restricted for health or environmental reasons and it includes carbofuran, an agricultural pesticide that can kill non-target species, such as humans and vultures, where poisoning could occur via the food chain, by secondary exposure and by direct poisoning with laced bait (Otieno et al. 2010). It should also be noted that the Convention does not ban or restrict any chemicals, nor does it mean that any individual country must automatically prohibit their import, it is for information exchange about the chemical characteristics, in order to provide for a national decision-making process on their import and export. The Rotterdam Convention should result in a reduction on the use of these chemicals, but some of these still seem to be widely available in South Africa and have been implicated in numerous vulture mass-poisoning events (Ogada et al. 2016a). Indeed, the easy availability of carbamate, organophosphate and other pesticides, could be the key cause of intentional and unintentional poisoning of vultures in South Africa (Ogada 2014). South Africa became a Party to the Rotterdam Convention on 04 September 2002.

3.1.8 Agreements to create Transfrontier Conservation Areas (TFCA)

Although there is no specific legislation that provides for transfrontier initiatives, there are multilateral agreements between South Africa and various neighbouring countries, which have resulted in six transfrontier conservation areas being established. These include the /Ai/Ais-Richtersveld Transfrontier Park, Kgalagadi Transfrontier Park, Great Limpopo TFCA, Greater Mapungubwe TFCA, Lubombo TFCA and Maloti-Drakensberg TFCA (Department of Environmental Affairs 2019). The latter is particularly important for vultures, as it comprises much of the breeding range of southern Africa's geographically and genetically isolated population of Bearded Vultures (Krüger et al. 2014a; Krüger et al. 2015a). Similarly, the 35 000 km² Great Limpopo TFCA contains breeding populations of four vulture species (Murn et al. 2013; Thompson et al. 2017a), and the South African section of the Lubombo TFCA might be important for White-backed (Taylor et al. 2015) and Palm-nut Vultures (BirdLife International 2016). The South African Development Community's (SADC) Protocol on Wildlife Conservation and Law Enforcement requires each of the states that have signed memorandums of understanding to establish TFCAs to cooperate in the conservation and sustainable use of their shared wildlife resources (SADC 1999).

3.1.9 Southern African Development Community Protocol on Wildlife Conservation and Law Enforcement

The SADC is a regional organisation that was established in 1992, to continue strengthening ties within the southern African region. SADC protocols are legally binding documents, to which member states are committed. SADC passed its Protocol on Wildlife Conservation and Law Enforcement in 1999. The Protocol aims to establish a common framework for the conservation and sustainable use of wildlife resources among member states and to assist with the enforcement of laws governing those resources (SADC 1999). It encourages SADC states to cooperate over shared resources and discourages them from damaging biodiversity (Wolmer 2003; Holmes-Watts and Watts 2008; Blackmore and Trouwborst 2018).

Old World vultures can be considered a shared resource, because their large home ranges transcend international borders: South African legislation can affect vultures that travel between Lesotho, Swaziland, Mozambique, Zimbabwe, Botswana, Zambia, Malawi, Namibia and Angola (Phipps et al. 2013; Krüger et al. 2014b; Botha et al. 2017), all of which are among the 14 SADC members. SADC states are required to develop public education programmes concerning wildlife conservation, to support research that contributes to the sustainable use and conservation of wildlife and to adopt and enforce policy and legal instruments necessary to ensure the conservation and sustainable use of wildlife resources (Articles 5, 6 and 7). Parties must also have restrictions on trade in wildlife resources and products and protect wildlife resources and wildlife habitats to ensure the maintenance of viable wildlife populations (Article 7). Parties must also cooperate in wildlife law enforcement and allocate appropriate financial and human resources required for the effective application of the legislation governing the conservation and sustainable use of wildlife (Article 9).

The Protocol provides an effective vehicle for neighbouring SADC countries to set up TFCAs and transfrontier parks (TFP) (Article 4). A TFCA differs from a TFP (which is a legally declared conservation

area) in that it contains multiple land uses that promote the conservation of, *inter alia*, biodiversity (Wolmer 2003). In both instances (TFCAs and TFPs), the threat to vultures (e.g. poisoning, persecution) could be specifically regulated, if not precluded. As mentioned earlier, the Protocol is a powerful tool that could be used specifically for the protection of vultures at a regional scale.

3.1.10 Convention Concerning the Protection of the World Cultural and Natural Heritage 1972

The Convention Concerning the Protection of the World Cultural and Natural Heritage 1972 (also known as the World Heritage Convention) (UNESCO 1972), links nature conservation to the preservation of cultural properties. Its definition of 'natural heritage' includes 'areas that constitute the habitat of threatened species of animals' (Article 2). South Africa ratified the convention in 1997 and as of 31 January 2017, 193 states were part of the convention. The states recognise that their heritage constitutes a world heritage and they accept that it is their duty to protect it (Article 6).

Where a world heritage site includes habitat critical for the survival of one or more species of vultures and should this habitat be included in the outstanding universal value that led to the site's inscription, the state party responsible for the site would be obliged to safeguard that habitat as part of a global heritage. Should, however, the vulture habitat not be included in the outstanding universal value that led to the site's inscription, the Convention would provide little if any impetus to have the habitat safeguarded. Furthermore, whereas the Convention covers both natural and cultural physical characteristics in intangible heritage (Articles 2 and 3), a species irrespective of its threatened status or its global charisma, by definition, cannot qualify as an 'outstanding universal value'. In many respects, such limitations add to the sentiment that the scope of the Convention requires reconsideration (Strasser 2002). Once a World Heritage Site is declared under the World Heritage Convention Act (Act no 49 of 1999), it is recognised as a protected area under NEM: PAA. The area is then also covered under the Regulations for the Proper Administration of Special Nature Reserves, National Parks and World Heritage Sites as amended (2014) These regulations provide for the same protection for vultures and vulture habitat occurring inside inscribed World Heritage Sites as in National Parks.

3.1.11 African Convention on the Conservation of Nature and Natural Resources (Maputo Convention)

The African Convention on the Conservation of Nature and Natural Resources (also known as the Maputo Convention) was adopted in Maputo in 2003 and entered into force in 2016 and was amended by its parties in 2017 (African Union 2003). This Convention aims to 'enhance environmental protection' and 'foster the conservation and sustainable use of natural resources' (Article II) and it supports the creation of a network of conservation areas and environmental management that is based on scientific research (Article XVIII). Despite the Convention only being ratified by South Africa in 2013, the aims and principles had already influenced the drafting of South Africa's biodiversity conservation legislation (Blackmore 2018). Parties are obliged, under Article IX, to 'maintain and enhance species and genetic diversity of plants and animals', paying particular attention to 'socially, economically and ecologically valuable species that are threatened'. With regards to hunting and capturing, the Convention prohibits the use of indiscriminate means of taking and the use of means that are capable of causing serious disturbance to populations of a species (Article IX, 3 (b) (iii)), which must include drugs and poisons. It is the most

comprehensive regional treaty on the conservation of natural resources and the environment, however, as with most Multilateral Environmental Agreements (MEAs), there are few penalties for non-compliance, making full implementation very unlikely (Ogada 2014). Nonetheless, this Convention, together with the SADC Protocol, provides individual and collective foundation for, at least, southern African states to conserve and protect vultures.

3.2 NATIONAL LEGISLATION GOVERNING SPECIES CONSERVATION

South Africa's legislation and policies for environmental management, including biodiversity conservation, has undergone profound changes in the recent years. South Africa has only recently introduced an obligation for management plans as part of the regulations promulgated in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM: BA). This policy and legal development process is on-going. Systems to implement and enforce legislation are in place but the challenge is complex. Collaboration amongst stakeholders is required if the decline of vulture species is to be curbed.

3.2.1 The Constitution of the Republic of South Africa

The Constitution of South Africa, 1996 provides for the equal enjoyment of all rights and freedoms under section 9. Conservation in South Africa is premised in section 24 of the Constitution which provides that:

Everyone has the right:-

(a) To an environment that is not harmful to their health or wellbeing, and
(b) To have the environment protected for the benefit of present and future generations, through reasonable legislation and other measures that
  i) Prevent pollution and ecological degradation
  ii) Promote conservation, and
  iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

If section 24 were to be paraphrased to highlight the importance of conserving vultures, the rights of citizens of South Africa would be impinged upon in the following manner according to each section:
(a) An environment without vultures and their role in cleaning the environment of animal carcasses poses a risk to the health and wellbeing of all South Africans.
(b) Vultures are an integral part of the environmental system that needs to be conserved for present and future generations. If the current declines continue unabated, local extinctions will occur.

Furthermore, various sections of the Constitution afford protection to persons who utilise vultures either within a cultural or traditional context. No one right supersedes another, and any conservation action needs to be cognisant of these sections. Such sections include:

- **Section 31. Cultural, religious and linguistic communities:**

(1) Persons belonging to a cultural, religious or linguistic community may not be denied the right, with other members of that community- (a) to enjoy their culture, practise their religion and use their language; and (h) to form, join and maintain cultural, religious and linguistic associations and other organs of civil society. (2) The rights in subsection (1) may not be exercised in a manner inconsistent with any provision of the Bill of Rights. It is however important to also note,

(i) that in some instances the poisoning of vultures is driven by the demand for vulture parts amongst a certain sector of the community;

(ii) harvesting vultures for sale to Traditional Health Practitioners and Healers is a source of income for some people while;
(iii) use of vultures is a practice by both the Traditional Health Practitioners and Healers and the sector of the community that believes in the healing powers of the vulture made traditional medicine.

Pertinent to this, is section 24 that highlights the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation and promote conservation (Constitution).

- **Section 15 of the Constitution entitles people to believe in what they choose**: Everyone has the right to freedom of conscience, religion belief, thought and opinion.

The indiscriminate killing of vultures for use in traditional medicine, however, is unsustainable (McKean et al. 2013). If the practice is not drastically curtailed the long-standing cultural beliefs that relate to vultures will no longer be feasible.

- **Section 9 of the Constitution guarantees equality before the law and further adds**: equality included the full and equal enjoyment of all rights and freedoms.

The protection of vultures and the ecosystem services that they provide is afforded protection by the Constitution and the rights contained therein which should be balanced to ensure the survival of vultures and the future sustainable use of the resource. The unregulated use of vultures, i.e. harvesting of vultures will ultimately result in the extinction of the species and thus appropriate legal mechanisms must be implemented to align with section 24(b) of the Constitution.

3.2.2 National Environmental Management Act

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) creates the fundamental legal framework that gives effect to the environmental right guaranteed in section 24 of the Constitution. NEMA provides for cooperative governance in relation to environmental matters by establishing the necessary government institutions that will ensure proper implementation of environmental protection and management. NEMA provides a framework in which development or resource use projects are established in a sustainable manner, taking into account their possible negative impact on the environment. Within this framework, development or resource use in South Africa are now considered economically, socially and environmentally integrated processes.

NEMA provides general principles of environmental management that are to be applied in all decision making undertaken by the state where the environment may be affected (Section 2). The primary purpose of these principles is to ensure the progressive achievement of the 'environmental right' held in the Bill of Rights in the country's Constitution.

NEMA includes a requirement for an Environmental Impact Assessment (EIA) to be undertaken prior to any activity taking place that may significantly harm the environment (section 22 and 28). These activities are listed in three Government Gazette notices. It is common cause that the effectiveness of the EIA process is directly dependent on the environmental assessment practitioner, avian specialists and, importantly the assessing government official, to understand the susceptibility of vultures to both direct and indirect consequences of a potentially harmful activity being undertaken. Such understanding would

need to include the applicability of mitigation and remediation measures that would render the impact on vultures negligible should the activity be permitted. DFFE has developed a screening tool that includes requirements for specific studies and activities if certain conditions occur. As part of the screening tool, specific Protocols are published in the Government Gazette. The Birdlife Africa guidelines for Wind and Solar Development that has been used in the past, has been strengthened and published as a Protocol on Birds, specifically pertaining to infrastructure. The Protocol contains requirements a year-long avifaunal study of the windfarm facility site before the EIA is initiated, for activities close to for instance roosts and feeding sites and requires a study on cumulative impacts in a 10km radius and modelling of expected mortality and monitoring during operations. A specific Protocol for the mitigation of impacts of Wind Energy on Vultures are also in the process of being developed, based on the risk model and map by UCT. The decision-making process also takes into consideration the guidelines for transmission and distribution infrastructure developed by ESKOM.

NEMA also provides for the promulgation of specific environmental legislation, and a number of sections within both NEM: PAA and NEM: BA could be utilised to further strengthen vulture conservation.

3.2.2.1 National Environmental Management: Protected Areas Act

The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. In addition, it provides for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental cooperation and public consultation in matters concerning protected areas and for the continued existence, governance and functions of South African National Parks (SANParks). NEM: PAA distinguishes between several categories of protected areas, namely: special nature reserves, national parks, world heritage sites, nature reserves, and protected environments. It also recognises world heritage sites, marine protected areas, specially protected forest areas, and mountain catchment areas. Protected areas are vital for ecological sustainability and adaptation to climate change, serving as nodes in the ecological infrastructure network. Chapter 3 provides reasons for the declaration of protected areas, including the protection of species and their habitats. This has special relevance to South Africa's vulture species, most of which are endangered or critically endangered and provide important, if not critical, environmental services to people and livestock (Whelan et al. 2008; Moleón et al. 2014; Morales-Reyes et al. 2018).

3.2.2.2. National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM: BA) provides for, among others, the management and conservation of biological diversity within the Republic; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources; and to give effect to ratified international agreements relating to biodiversity which are binding on the Republic.

The Minister may, in terms of section 56 of NEM: BA and by Notice in the Gazette, publish a list of species that are threatened or in need of national protection. Currently, with the exception of the Palm-nut Vulture, all breeding vulture species are listed as critically endangered, endangered, vulnerable or protected. Subsequent to the substantial review of the threatened or protected species list, all vulture species are included in one of these categories. More specifically, NEM: BA regulates restricted activities involving listed threatened or protected species through a permit system. Section 57(1) of NEM: BA specifies that a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the NEM: BA. Unfortunately, this is presently only addressing trade issues, and no other activities.

Section 43 (1) (b) of NEM: BA provides that any person, organisation or organ of state desiring to contribute to biodiversity management may submit to the Minister for his or her approval a draft management plan for an indigenous species listed in terms of section 56; or which is not listed in terms of section 56 which does warrant special conservation attention; or a migratory species to give effect to the Republic's obligations in terms of an international agreement binding on the Republic.

(a) Threatened or Protected Species Regulations

To achieve the objectives of NEM: BA, the Department promulgated the Threatened or Protected Species (TOPS) Regulations, 2007. The purpose of these regulations, amongst others, is to:

- further regulate the permit system set out in Chapter 7 of the NEM: BA in so far as that system applies to restricted activities, as defined in NEM: BA involving specimens of listed threatened or protected species;
- provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;
- provide for the regulation of the carrying out of a specific restricted activity, namely hunting;
- provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;
- provide for the protection of wild populations of listed threatened species

In terms of the TOPS Regulations a risk assessment is compulsory if the restricted activity involves a wild population of a listed critically endangered species. These measures provide a framework for coordinated action to conserve *inter alia* vulture species.

(b) CITES Regulations

It is a requirement of CITES that Parties must regulate international trade through national legislation, hence the promulgation of the CITES Regulations in 2010 under NEM: BA, in order to give effect to the provisions of CITES. All vultures are listed in Appendix II of CITES and international trade is regulated.

(c) Norms and Standards for Biodiversity Management Plans for Species

NEM: BA makes provision for the development of Biodiversity Management Plans for Species (BMP-S). To effect this, the Department developed Norms and Standards (N & S) for BMP-S which were gazetted in March 2009 for implementation. The purpose of these N & S is to provide a national approach and minimum standards for the development of a BMP-S. A BMP-S can be developed by any person, or organ of state desiring to contribute to the management of biodiversity in South Africa and achievement of the objectives of the NEM: BA. Additionally, a BMP-S can be developed for any indigenous or migratory species. The BMP aims to provide for the long-term survival of a species in the wild and provides the platform for an implementing organisation or responsible entity as appointed by the Minister to monitor and report on the progress regarding the implementation of the BMP.

3.2.2.3 National Environmental Management: Waste Act

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) regulates waste management to protect public health and the environment. It provides for measures to prevent pollution and ecological degradation and for the remediation of contaminated land. Habitat used by vultures for bathing, breeding and foraging may be protected under Part 6, section 26 (1) (a) of the Act, which prohibits the illegal disposal of waste on land or in water bodies. Similarly, littering is prohibited under section 27 (2) (a) of the Act and this should benefit Cape Vultures in particular, as this species is known to ingest small pieces of plastic and glass (Benson et al. 2004; Pfeiffer et al. 2017b).

3.2.2.4 National Heritage Resources Act

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) empowers civil society to conserve, at a national level, the Republic's national heritage resources 'so that they may be bequeathed to future generations. The NHRA also provides for provincial heritage resources authorities to designate heritage areas to 'protect any place of environmental or cultural interest' (section 31). Many South Africans have strong cultural beliefs surrounding vultures and therefore the NHRA could perhaps be used to designate areas that protect vultures, such as breeding, bathing and foraging habitat.

3.2.2.5 Animal Protection Act

Sections 2 (d) and 2 (j) of the Animals Protection Act, 1962 (Act No. 71 of 1962) respectively state that an offence has been committed by: Any person who – 'lays or exposes any poison or any poisoned fluid or edible matter of infectious agents, except for the destruction of vermin or marauding domestic animals or without taking reasonable precautions to prevent injury or disease being caused to animals' or 'lays any trap or other device for the purpose of capturing or destroying any animal, wild animal or wild bird the destruction of which is not proven to be necessary for the protection of property or for the prevention of the spread of disease'.

3.2.2.6 National Forest Act

Although the National Forest Act, 1998 (Act No. 84 of 1998) (NFA), and in particular the sections that fall under chapter 3, will be specifically applied to protect forest and woodland ecosystems and identified protected tree species, this can contribute to the protection of certain vulture species that utilise these habitats for nesting or feeding. Although the NFA has never been used to protect other species, it has the power to protect some of the habitats of these species. As of 2023 the National Forests Amendment Act, 2022 (Act No. 1 of 2022) is not yet being implemented. It is expected to be implemented as soon as the National Forests Act Regulations of 2009 is amended.

Section 7 deals with the prohibition on the destruction of trees in all natural forests, not only in areas that are legally protected. Legal precedence has applied the definition of natural forest to recovering forests (where deforestation occurred) as well. Sections 8 – 11 deals with the declaration of certain forest areas as protected forest areas and sets out the procedure for and effect of this declaration, and these areas are also recognised under NEM: PAA. If specific forest and woodland areas are important for vulture conservation, it can be strengthened by having the conservation of vultures / vulture breeding sites included in the management objectives, as activities inconsistent with these objectives are not allowed.

Sections 12-15 deals with the protection of specific trees, any group of trees, a woodland or a species of trees declared as protected. It established emergency procedures for protecting trees, and includes woodlands, which is not normally seen as forest areas. Under Section 15 (1) of the NFA 'no person may cut, disturb, damage, destroy or remove any protected tree: or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister' (Republic of South Africa 1998). Contravention of this Act is an offence and may result in a fine and/or imprisonment for up to three years. The protection of specific groups of trees that are important as vulture breeding sites could be requested, if these areas also require better protection of the trees in those areas. The latest list of protected trees was published in Government Gazette Number. 2984 on 27 January 2023. A number of large trees that can be used as nesting sites are listed, among them *Breonadia salicina*, in which Hooded Vultures nest in Limpopo Province and the current sale of furniture made from this tree species at various locations in the Lowveld without a permit, is an offence and requires investigation and enforcement (Thompson and Blackmore 2020) and *Vachellia erioloba*, which is widely used by nesting critically endangered White-backed Vultures in the Northern Cape and Free State provinces (Mundy et al. 1992). However, despite its protection, *V. erioloba* is vulnerable to clearing for renewable energy facilities, mining, 'herbicide application for improved grazing', irrigation pivots used in agriculture and it is used for firewood and building materials (Seymour and Milton 2003; Colahan 2004) through licences issued on application. This is especially prevalent in the southern-most breeding clusters for White-backed vultures in the Northern Cape along the Vaal-Gariep system.

For all the above provisions to ensure sustainable forest management there are also enforcement measures set out in the legislation.

Section 16 deals with the registration against the title deeds, where the Minister has declared a forest to be a natural forest or a particular tree or group of trees or woodland to be protected, while section 17 deals with the Minister's power to declare controlled forest areas by preventing deforestation or further

deforestation, or rehabilitate a natural forest or woodland protected under section 12 (1) of the NFA which is threatened with deforestation. This includes emergency measures such as declaring a controlled forest area, which, if urgent enough, could be declared immediately with public consultation following afterwards. Section 18 allows any natural or juristic person or any organ of State to apply to the Minister for the application of any of these conservation measures to protect a tree, group of trees or forest.

Furthermore, under sections 23 and 24, activities in a State Forest are regulated by the issuing of licences, and the Minister may attach conditions to the license. In a situation where the issuance of a licence may negatively impact on vultures, conservationists may motivate for the licence to not be issued, or that specific conditions be attached to it. Section 26 regulates the granting of servitudes, during which process motivation may also be submitted to disallow the granting of said servitudes. Section 26 (1) (e) specifically states that it should not "materially affect the ecology and the useful extent of the State Forest".

Any objection to a decision by the Department is covered by the Appeals processes which is a new chapter in the Amendment Act that will be implemented as mentioned above. Another addition in the Amendment Act is that no prospecting or mining is allowed in these areas except in terms of an existing lease agreement to mine gravel or sand for road maintenance.

3.2.2.7 Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act

Section 7 (2) (a) of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) requires that: 'No person shall for reward or in the course of any industry, trade of business –

(i) use, or recommend the use of, any agricultural remedy or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or described on such container
(ii) use any agricultural remedy unless he is a pest control operator registered in terms of this Act or otherwise than in the presence and under the supervision of a pest control operator so registered.'

Under Section 7 (2) (b) of the Act, there is an exemption for veterinarians to use stock remedies for purposes other than those instructed on the label.

3.2.2.8 The Hazardous Substances Act

The Hazardous Substances Act, 1973 (Act No. 15 of 1973) controls the importation, manufacture, sale, use, operation and application of hazardous substances, including those that are toxic, corrosive and irritant. Substances listed as Group I or Group II hazardous substances have specific requirements for their sale and distribution. Group IA hazardous substances includes leaded paint (Department of Health 2009), which has been shown to reduce fertility of captive Cape Vultures (Naidoo et al. 2012). Group I hazardous substances also includes some pesticides, such as strychnine, which was widely used in South Africa to poison mammalian predators and indirectly poisoned vultures (Berliner 1984; Allan 1989).

3.2.2.9 White Paper on Conservation and Sustainable Use of South Africa's Biodiversity

The White Paper reviews, updates and builds on the 1997 Draft White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity, here in referred to the White Paper. The White Paper was published for implementation in the Government Gazette No 3537 on the 14 June 2023. The White Paper was developed to promote the conservation of the rich biodiversity and ecological infrastructure that supports ecosystem functioning for livelihoods and the well-being of people and nature, and identified the following challenges that require policy intervention:

a. Fragmented conservation responsibilities, duplication of efforts and underfunded conservation mandates that hamper the effective conservation and sustainable use of South Africa's biodiversity;
b. Inadequate transformation in the sector, where a majority of the population are disadvantaged disenfranchised from contributing to conservation and sustainable use;
c. Inadequate efforts in addressing the global challenges of biodiversity loss, land degradation and climate change in the context of sustainable development;
d. Proliferation of biodiversity and conservation legislation, uneven governance, limited capacity and declining allocation of resources in the management of biodiversity and inadequate revenue generation efforts; and
e. Practices within the sector that have brought the country into disrepute.

In addressing these challenges, the White Paper emphasises the importance of the biodiversity sector to South Africa's economy, underpinned by strengthened conservation, sustainable use and access, and fair and equitable sharing of benefits arising from the utilisation within a duty of care of biodiversity and its components. Using the vision: *An inclusive, transformed society living in harmony with nature, where biodiversity conservation and sustainable use ensure healthy ecosystems, with improved benefits that are fairly and equitably shared for present and future generations*.

The four goals and two enabling conditions identified in the White Paper are as follows:

Goal 1: **Enhanced Biodiversity**: All biological diversity and its components conserved;
Goal 2: **Sustainable Use**: The sustainable use of biodiversity enhances thriving living land and seascapes and ecosystems, livelihoods, and human well-being, while a duty of care avoids, minimises, or remedies adverse impacts on biodiversity;
Goal 3: **Equitable Access and Benefit Sharing**: Benefits are derived and shared from the use and development of South Africa's genetic and biological resources, without compromising the national interests; and
Goal 4: **Transformed Conservation and Sustainable Use**: Effect is given to the environmental right as contained in Section 24 of the Constitution which facilitates redress and promotes transformation.

Enabler 1: Integrated, Mainstreamed and Effective Biodiversity Conservation and Sustainable Use: Integrated policy and practice across government and effective implementation of Multilateral Environmental Agreements; and
Enabler 2: **Enhanced Means of Implementation**: Expanded and developed ability to effectively conserve biodiversity, to manage its use and benefits, while addressing factors threatening biodiversity.

In seeking to give effect to the White Paper it explicitly recognizes that the responsibility rests with a range of stakeholders, including, but not limited to, the state, traditional leaders, traditional health practitioners, communities, private landowners, industry, academia, non-government organisations and civil society. Building partnerships, particularly community – private partnerships, between these constituencies will be important.

3.3 Provincial legislation (Ordinances), Policies and Frameworks

The protection of vultures in each of South Africa's nine provinces is governed by the provisions set out in their respective legislation as conservation is a concurrent competency in terms of the Constitution. However, not all the vulture species are afforded the same level of protection under such provincial legislation, as certain existing provincial legislation is outdated. Contravening the various provisions within these varying suites of legislation, may result in fines of varying amounts and/or imprisonment of varying periods, depending on the level of protection afforded to vultures under these Acts/Ordinances. These varying degrees of protection provide further support for a National BMP for vultures.

4. SPECIES DETAILS

Taxonomy

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Accipitriformes
Family:	Accipitridae
Subfamily:	Aegypiinae and Gypaetinae
Genus:	Gyps, Necrosyrtes, Coprotheres, Torgos, Trigonoceps, Gypohierax, and Gypaetus

4.1 Bearded Vulture (*Gypaetus barbatus meridionalis*)

Global status: Near Threatened (BirdLife International 2022)
Regional status: Critically Endangered (Krüger 2015)

Distribution: Regional population restricted to highlands of Lesotho and South Africa along the Drakensberg escarpment of eastern KwaZulu-Natal, north-eastern Eastern Cape and north-eastern Free State (Krüger, 2015) (Figure 1).

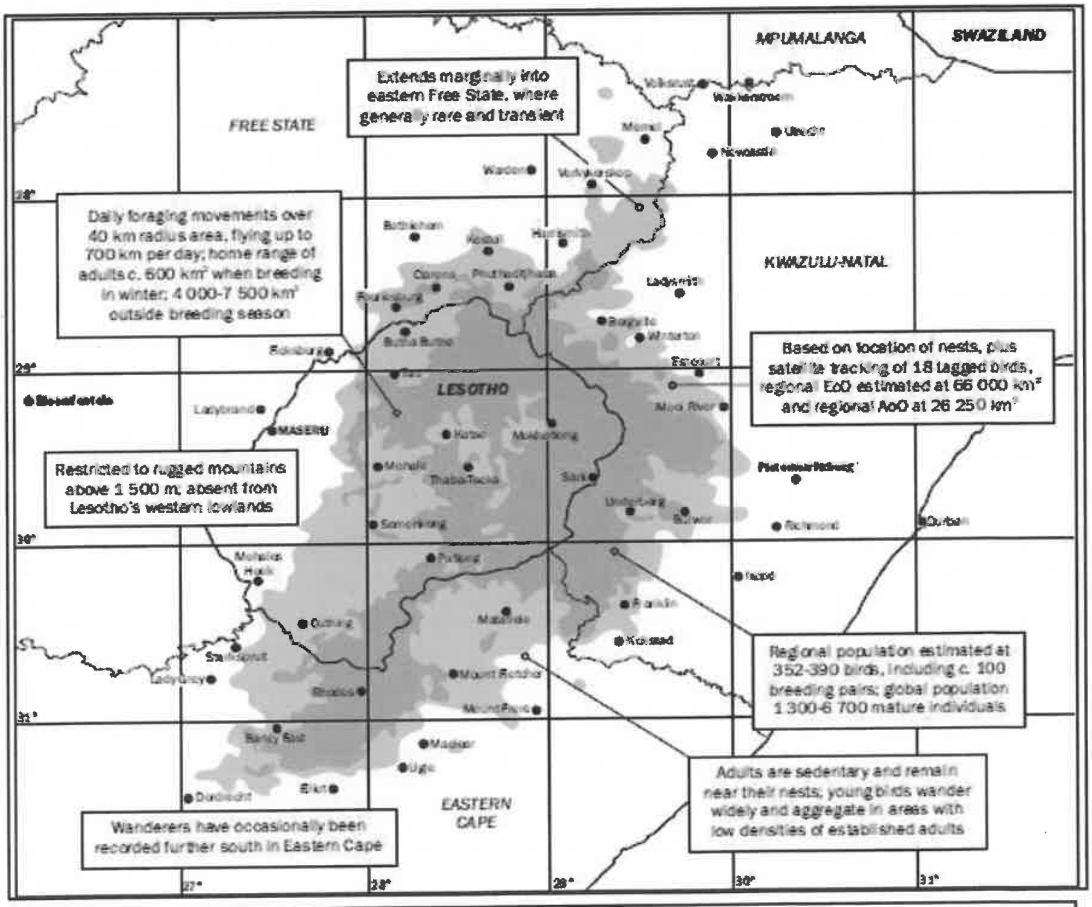

Figure 1: Distribution of Bearded Vulture within southern Africa (Krüger 2015)

41

Population size and trend: The regional population is estimated at 352-390 birds of which c. 200 are mature individuals (Krüger et al. 2014a). The decline over the last three generations (i.e. 53 years) is estimated at 82.8% (Krüger 2014). The achievement of a positive growth rate would require a reduction in mortality rates of >50% and an increase in productivity of >25% (Krüger 2015).

Movements: In southern Africa, a tracking study indicated that breeding birds are largely sedentary and forage within close proximity of their nests; juvenile and immature birds can cover most of the species' range while foraging, regularly crossing the border between Lesotho and South Africa (Krüger et al. 2014b).

Habitat: The species occupies remote mountainous areas, with precipitous terrain, usually above 1,000 m. In southern Africa, the species is restricted to higher altitudes such as the Maloti-Drakensberg Mountains. In southern Africa it is almost entirely dependent on livestock carcasses for food due to the low density of wild ungulates over much of its range.

Ecology: As a scavenger, Bearded Vultures consume prey remains left by predators or other scavengers; 70% of the biomass of their diet is bones. Of the remainder, 25% consists of soft tissue and 5% skin (Hiraldo et al. 1979). Only during the period when they are raising young do they need soft tissue. Bearded Vultures preferentially consume large bones up to 25 cm in length and 3.5 cm in diameter (Llopis 1996). Bones too big to be swallowed whole are dropped onto a rocky surface from a 20-70 m height while in flight, with the birds collecting the fragments and the marrow (Boudoint 1976). They construct large nests (averaging 1 m in diameter), composed of branches and wool, situated in remote potholes or caves or, less frequently, on remote overhanging cliff ledges that are re-used over the years. Breeding occurs from May-December in southern Africa (Ferguson-Lees and Christie 2001). Eggs are incubated for 54 days on average and nestlings fledge after almost four months in the nest (Margalida 2002). In the case where two eggs are laid, obligatory 'cainism' occurs in which the older sibling kills the younger (Thaler and Pechlaner 1980), a common trait in larger raptors.

Major threats:

Unintentional poisoning (poison baits). Feeding on carcasses poisoned by poison baits targeting mammalian predators is thought to be the most significant cause for declines in this species in southern Africa (Krüger 2014).

Collision with energy infrastructure (powerlines). Mortalities of birds colliding with power lines and other cables are known from southern Africa (Krüger 2014). Collisions are likely to increase due to increased electrification of the Lesotho highlands (Rushworth and Krüger 2014). There is indirect evidence to support that the abandonment of territories is based on the density of power lines within a pair's territory (Krüger et al. 2015b)

Unintentional poisoning (lead). A study by Krüger and Amar (2018) revealed lead accumulation in the bones of Bearded Vultures in southern Africa suggesting a long-term exposure to this heavy metal in southern Africa. Ingestion of lead particles when feeding on carcasses containing lead shot or fragments of lead bullets is a source of exposure.

Direct persecution. The species is targeted for the traditional medicine trade or use of body parts such as feathers for ceremonial purposes (Mundy et al. 1992; Maphisa 1997; Mander et al. 2007). The birds are either poisoned, trapped or shot. Gin traps and Coyote Getters have been used to capture and kill Bearded Vultures in the Free State Province (Ambrose 1983; Colahan 1991; Colahan and Esterhuizen 1997), in Lesotho (Ambrose 1983; Blair and Blair 1983) and in KwaZulu-Natal (pers. Obs., S. Krüger). Direct persecution through shooting may increase as the number of firearms increases in Lesotho (Maphisa 1997). One of the marked birds in South Africa was shot and killed in the Free State province in 2017 and a fledgling was killed in Thaba-Tseka District in Lesotho in 2019 (pers. Obs. S. Krüger, C. Kelly).

Secondary threats:

Decline of food availability. A loss of wild ungulates, improved animal husbandry practices and improved animal hygiene is resulting in reduced food supply (Boshoff et al. 1983).

Disturbance at nest sites. A range of human activities in close proximity to nesting sites may have an impact on breeding success and may cause abandonment of previously successful nests (Guy 1974; Brown 1991; Vernon and Boshoff 1997; Kopij 2001; Krüger et al. 2015b). These include theft of eggs or nestlings from the nest, veld fires, livestock farming activities and recreational activities such as mountaineering, climbing and aviation. A range of developments and construction could have a similar effect.

Habitat loss and degradation. The change in land use from livestock farming to monocultures has and will further reduce the foraging range of the species.

Potential threats:

Collision with energy infrastructure (wind farms). Proliferation of wind farms in various parts of the species' range (e.g. Eastern Cape and Lesotho) should be closely monitored to assess and record any impact on the species. Rushworth and Krüger (2014) and Reid et al. (2014) predict devastating consequences for the southern African Bearded Vulture population should the several thousand wind turbines currently planned for development in the Lesotho Highlands, materialise.

Genetic bottlenecks. The small, isolated southern African population could in the long term suffer a reduction in genetic diversity which could influence breeding success and its ability to adapt to global change, and ultimately reduce the probability of the persistence of this population. This could also apply to planned re-introductions, if these reintroduced populations are geographically isolated and genetic exchange with existing wild populations is unlikely and/or continued genetic supplementation does not take place.

Climate change. It is predicted that species breeding at higher altitudes, such as Bearded Vulture in southern Africa, may experience range contractions due to increased temperatures (Simmons and Jenkins 2007).

4.2 White-headed Vulture (*Trigonoceps occipitalis*)

Global Status: Critically Endangered (BirdLife International 2022)
Regional Status: Critically Endangered (Allan 2015a)

Distribution: This species has an extremely large range in sub-Saharan Africa from Senegal, Gambia and Guinea-Bissau, east to Eritrea, Ethiopia and Somalia, and south to easternmost South Africa and Swaziland (Figure 2). Occurs in northern regions of South Africa and in eastern Swaziland (Mundy 1997). Regionally confined to conservation areas in Lowveld regions of Limpopo and Mpumalanga provinces, the Zululand region of KwaZulu-Natal and the Swaziland Lowveld. The species is also vagrant in North

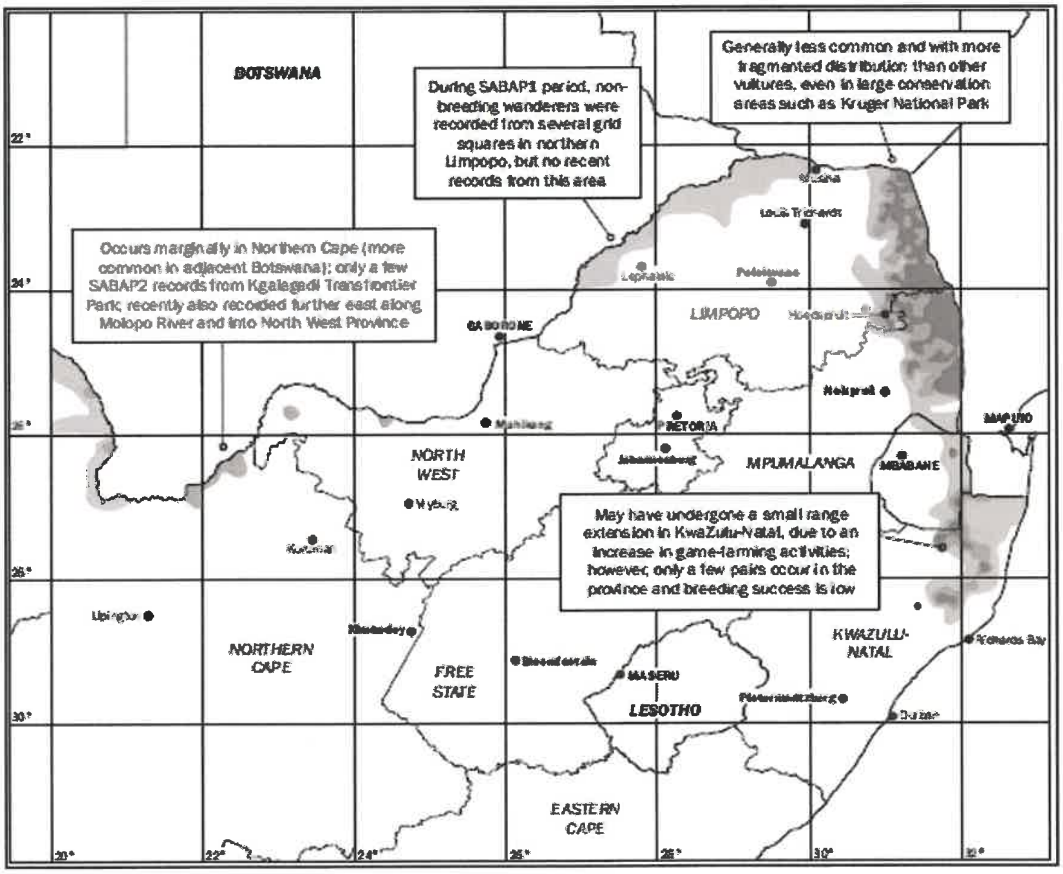

Figure 2: Distribution of White-headed Vulture in South Africa & Eswatini (Allan 2015a)

West, Limpopo and Northern Cape Provinces.

Population size and trend: The species has undergone a rapid population decline across its range.

Movements: Adults are largely sedentary, perhaps more so than any other African vulture; however, immatures are more nomadic (del Hoyo et al. 1994; Ferguson- Lees and Christie 2001). Compared to many vulture species, there is little knowledge of the movements (Murn and Holloway 2014) but recent results from satellite-tracked individuals in South Africa (Coordinating Unit of the Raptors MOU 2015)

show individuals moving between South Africa and Mozambique, albeit with apparently smaller home ranges than some of the other African vultures.

Habitat: White-headed Vultures prefer mixed woodland at low altitudes, avoiding semi-arid thornbelt areas (Mundy et al. 1992). It generally avoids human habitation (Mundy et al. 1992).

Ecology: It is a predator and scavenger (Murn 2014) but also feeds on carrion and bone fragments from large and small carcasses. It feeds alone or in pairs, rarely more than two pairs congregating at larger carcasses. It often snatches food from other vulture species, consuming it nearby and it is often the first vulture species to arrive at a carcass (Mundy et al. 1992). It is known to take small or weak live prey but may also scavenge from other raptors (del Hoyo et al. 1994). The species is thought to be a long-lived resident that maintains a territory (Murn and Holloway 2014; del Hoyo et al. 1994). It nests and roosts in trees, most nests being in *Vachellia* or *Senegalia* spp. or baobabs (Mundy et al. 1992). The species is highly sensitive to land use and is largely restricted to large, protected areas (Murn et al. 2015).

Major threats:

Unintentional poisoning (poison baits). Poisoned baits targeting mammalian carnivores causing livestock losses kill these birds when they feed directly on the baits themselves or secondarily when they feed on animals killed by poison baits (Ogada et al. 2016).

Habitat loss and degradation. Land use changes through agricultural intensification and development threaten this species throughout its range (Mundy et al. 1992; BirdLife International 2017).

Intentional poisoning (for use in African traditional medicine). This is a major threat in West, Central and southern Africa (Roxburgh and McDougall 2012; Buij et al. 2016).

Secondary threats:
Intentional poisoning (sentinel poisoning). Especially in southern Africa (Roxburgh and McDougall 2012 Ogada et al. 2015), carcasses of large mammals such as elephant, buffalo and other large herbivores are deliberately laced with poison after being poached, to reduce vulture numbers in areas where poachers are active and to reduce the chances of being detected by rangers.

4.3 Hooded Vulture (*Necrosyrtes monachus*)

Global Status: Critically Endangered (BirdLife International 2022)
Regional Status: Critically Endangered (Allan 2015b)

Distribution: A widespread resident throughout, and endemic to, sub-Saharan Africa, including densely forested areas in Central Africa (Figure 3).

Population size and trend: Range-wide decline of 83% over the last three generations (Botha et al. 2017). Regional population estimated at 100-200 mature individuals (Allan 2015b).

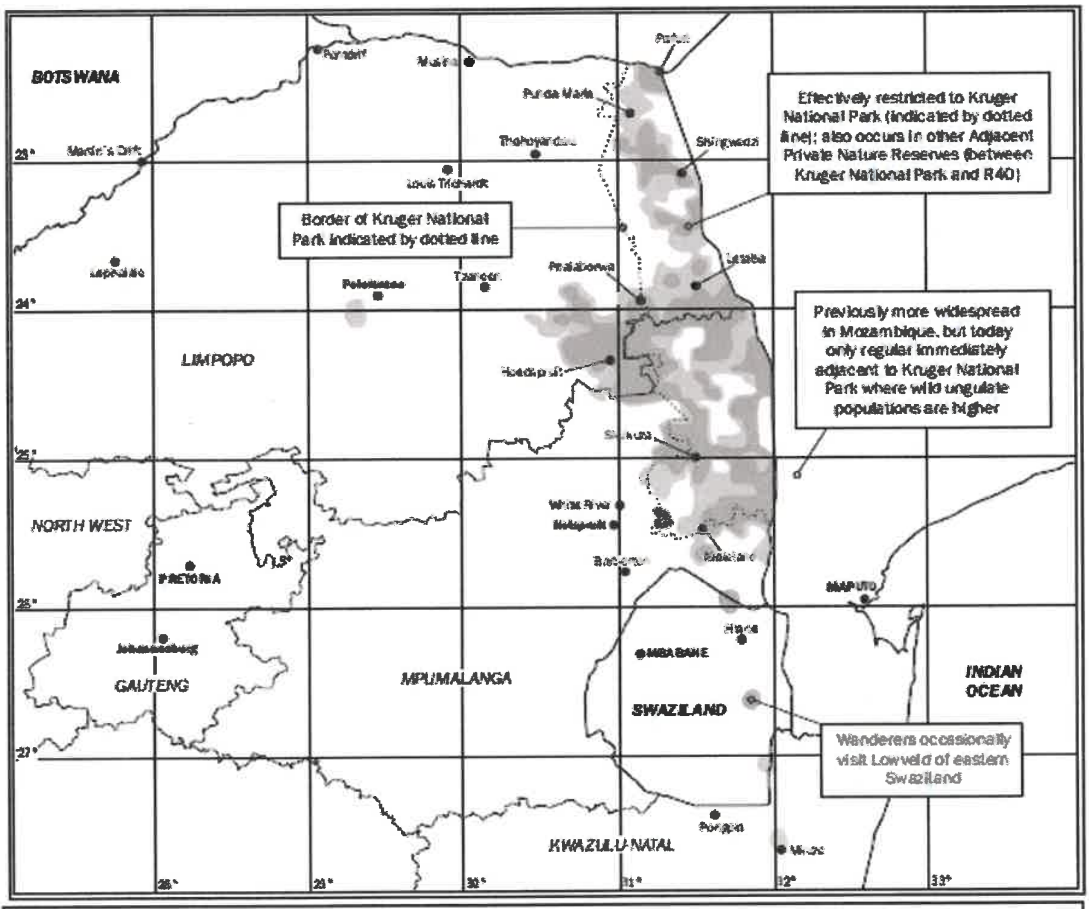

Figure 3: Distribution of Hooded Vulture in South Africa and Eswatini (Allan 2015b)

Movements: The species is generally considered sedentary, with some dispersal of non-breeders and immature birds, especially in response to rainfall (Ferguson-Lees and Christie 2001). Recent satellite tracking has shown that individuals move several hundred kilometres from their capture sites between South Africa, Mozambique and Zimbabwe (Coordinating Unit of the Raptors MOU 2015).

Habitat: In southern Africa, it tends to avoid human settlements and often breeds in large trees along river courses (Roche 2006).

Ecology: The species feeds on carrion, it is gregarious at larger carcasses but because of its smaller size is often dominated by larger species. In southern Africa it is generally more solitary and is largely found in conservation areas where it relies on natural food for most of its diet (Anderson 1999). Breeding in southern Africa occurs in May-December. It is an arboreal nester and lays a clutch of one egg. Its incubation period lasts 46–54 days, followed by a fledging period of 80–130 days. Young are dependent on their parents for a further 3-4 months after fledging (Ferguson-Lees and Christie 2001).

Major threats:

Poisoning. The African Wildlife Poisoning Database (The Endangered Wildlife Trust and the Peregrine Fund 2023) contains 10 mortality records for Hooded Vultures between January 2015 and April 2023. This is almost certainly an underestimate of the true number of Hooded Vultures poisoned, and from these records, it is difficult to know the intentions behind the poisoning. Poisons currently used for poisoning vultures in South Africa's Lowveld area are predominantly organophosphates and carbamates (Endangered Wildlife Trust, unpublished data).

Intentional poisoning (for use in African Traditional Medicine). Poisoning to obtain carcasses for this purpose is a threat particularly in West Africa (because of the species' relatively higher density in that region), and to a much lesser extent in southern Africa. There is little evidence for this in East Africa. Hooded Vultures are killed for this purpose using poisons, shotguns, and traps (Saidu and Buij 2013, Odino et al. 2014, Henriques et al. 2020; Mashele et al. 2021b, Mashele et al. 2021a, Daboné et al. 2023, Jallow et al. 2022).

Unintentional poisoning (human-wildlife conflict). Hooded Vultures may be unintentionally poisoned when stock-killing predators or crop raiding animals are targeted. For example, in January 2023, in the Hoedspruit area, Hooded Vultures were poisoned when feeding on the carcasses of poisoned Bushpigs (*Potamochoerus larvatus*) (Endangered Wildlife Trust, unpublished data).

Intentional poisoning (sentinel poisoning). Carcasses of large mammals such as elephants, buffalo and other large herbivores are laced with poison after being poached, to reduce vulture numbers in areas where poachers are active. (Ogada et al. 2014).

Habitat loss. There has been a decline in the breeding habitat available for this species in South Africa, for example, large areas of riparian forest have been lost along the banks of the Olifants River in Limpopo Province due to floods in the last three decades (J.P. Davies, EWT, unpublished data). This leads to the loss of suitable nesting trees along major river courses.

Electrocution on powerlines, and collisions with powerlines. Hooded Vultures may be killed or injured when they collide with powerlines, and they may be electrocuted on structures that are not 'bird-friendly'.

Secondary threats:
Poorly managed captive predator facilities. Lions (*Panthera leo*) and leopards (*P. pardus*) were recorded to be killing vultures (surplus killing) at a predator breeding tourist facility in Limpopo, where big cats are housed in large camps without roofs, and smaller feeding enclosures are not used (Thompson et al. 2020). Wild vultures are attracted to the site by a nearby vulture restaurant, and they land in the cats' enclosures to feed on food scraps.

Poorly managed feeding sites. At a small-scale piggery in Limpopo, increased amounts of food attract wild vultures and Chacma Baboons (*Papio ursinus*), which repeatedly attack and kill Hooded Vultures (L.J. Thompson, EWT, pers. obs.).

4.4 White-backed Vulture (*Gyps africanus*)

Global status: Critically Endangered (BirdLife International 2022)
Regional status: Critically Endangered (Allan 2015c)

Distribution: The White-backed Vulture is the most common and widespread vulture species in Africa, occurring extensively throughout West, East and southern Africa (Figure 4). Regionally it occurs in the northern parts of South Africa and in eastern Eswatini (Mundy 1997), only absent in two of South Africa's nine provinces (i.e. the Western Cape and the Eastern Cape).

Population size and trend: Currently estimated at 270,000 individuals globally and rapidly declining; this decline has been projected at 90% (range 75-95%) over the last three generations (Ogada et al. 2016). The best estimate puts the regional population at 3,675 breeding pairs (7,350 mature individuals), (Allan 2015c).

Movements: The adults of the species are generally considered more sedentary, but individuals will cover huge areas in search of food (BirdLife International 2017; Ferguson-Lees and Christie 2001) whereas juveniles and immatures in particular disperse over vast areas. For example, six immature birds tracked from South Africa were found to range across six countries (South Africa, Namibia, Angola, Zambia, Botswana and Zimbabwe) and three were noted to travel more than 900 km from their place of capture (Oschadleus 2002; Phipps et al. 2013a) with mean foraging range of 269,103 km^2. Some populations are thought to shift their ranges in response to food availability and seasonal rains (Bildstein 2006; Ferguson-Lees and Christie 2001).

Habitat: Primarily a lowland species of open wooded savannah, particularly areas of *Vachellia*. They require tall trees for nesting, usually in loose clusters of 2-13 nests (del Hoyo et al. 1994). The species has also been recorded nesting on electricity pylons in South Africa (Anderson and Hohne 2007; de Swardt 2013) to an extent that they end up recolonizing past distribution range.

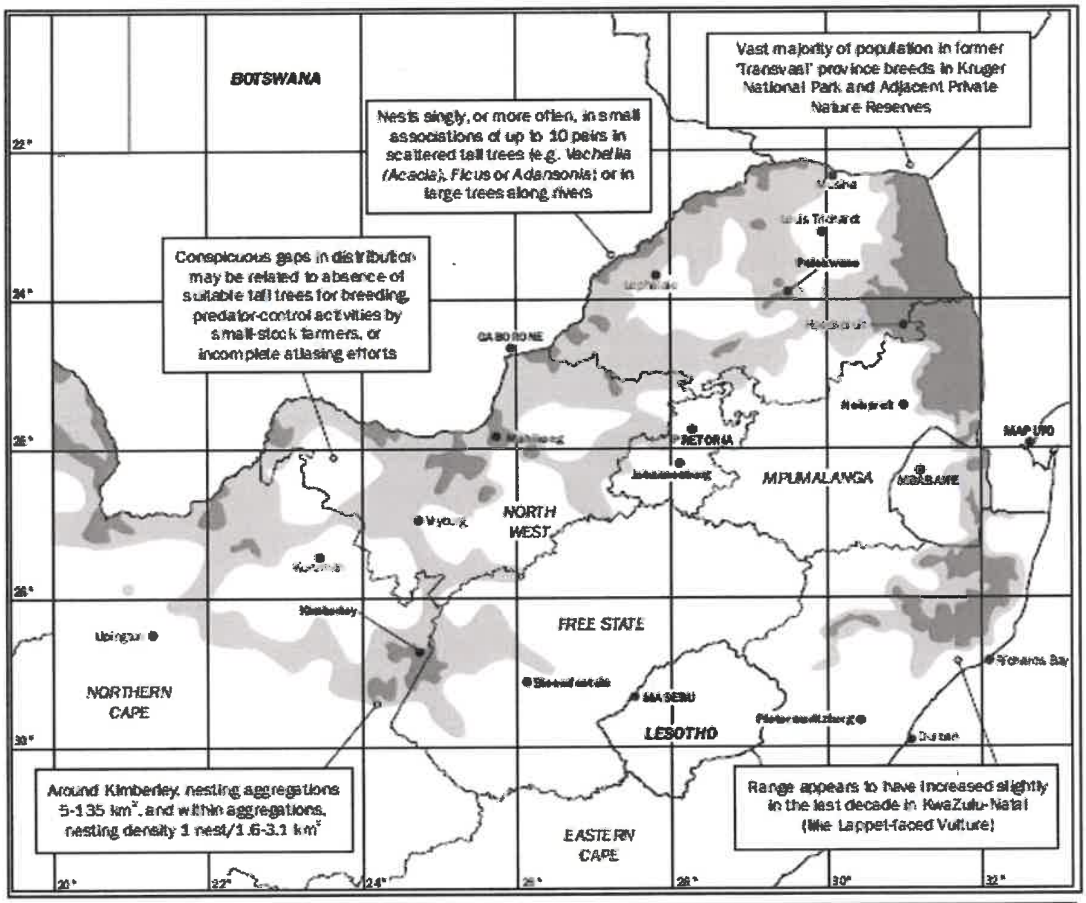

Figure 4: Distribution of White-backed Vulture in South Africa & Eswatini (Allan 2015)

Ecology: The White-backed Vulture is a highly gregarious species congregating at carcasses, in thermals and at roost sites. The species feeds on carrion and bone fragments of larger carcasses, mainly soft muscle and organ tissue. They soar together with other vultures, which can facilitate efficient foraging. After feeding, they often bathe together with other species at favoured sites (del Hoyo et al. 1994). In South Africa, Monadjem et al. (2013) showed that adult survival was high with many regularly visiting supplementary feeding sites.

Major threats:

Intentional poisoning (sentinel poisoning). Prevalent in southern Africa (Roxburgh and McDougall 2012; Ogada et al. 2015; Murn and Botha 2017), this is the deliberate poisoning of the carcasses of large mammals such as elephant, buffalo and other large herbivores after being poached to reduce vulture numbers in an area where poachers are active; large numbers of birds have been killed in this manner. All vultures occurring in areas where this is practiced are susceptible to this threat, but the threat to White-backed Vultures is particularly severe because of the large number of birds of this species that congregate at carcasses.

Intentional poisoning (for use in African traditional medicine) is a significant threat in southern Africa (McKean et al. 2013; BirdLife International 2017).

Unintentional poisoning (poison baits). This is a major threat in southern Africa (Ogada and Keesing 2010; Otieno et al. 2010; Kendall and Virani 2012; Roxburgh and McDougall 2012; Botha et al. 2015; Botha et al 2017).

Habitat loss and degradation. This results mainly from rangeland conversion to crop farming (Virani et al. 2011) and from bush encroachment (Schultz 2007) as well as loss of suitable nesting trees due to high elephant stocking rates (Rushworth et al. 2018).

Secondary threats:

Electrocution on energy infrastructure. The species is vulnerable to electrocutions by smaller electricity pylons, as well as collisions while in flight with overhead transmission lines.

Human disturbance. The species is sensitive to human disturbance, especially when breeding, typically restricting nesting to protected or sparsely populated areas.

NSAIDs. NSAIDs such as diclofenac are not known to be widely used for veterinary purposes (nor are they licensed for use in the region), but are known to be toxic to the species (Naidoo et al. 2011). Ketoprofen is also widely available and is equally toxic to White-backed Vultures (Naidoo et al. 2009a).

Drowning in farm reservoirs. White-backed Vultures occasionally drown in circular farm dams. Poisoned birds may be especially vulnerable, as the poison may generate extreme thirst.

Unintentional poisoning (lead). Unintentional poisoning may occur via the ingestion of lead bullets or lead fragments, another threat, the impact of which has previously been underestimated (Kenny et al. 2015; Naidoo et al. 2017; van den Heever et al. 2019).

4.5 Cape Vulture (*Gyps coprotheres*)

Global Status: Vulnerable (BirdLife International 2022)
Regional Status: Endangered (Allan 2015d)

Distribution: The Cape Vulture occurs mainly in South Africa with small populations in Lesotho, Botswana and Mozambique. It formerly bred in Eswatini, Zimbabwe and Namibia, and a small number of roost sites are still used in these countries (Figure 5).

Population size and trend: The global population estimate in 2013 was 4,700 pairs or 9,400 mature individuals (Taylor et al. 2015). Although Piper et al. (1999) reported continued declines in the population in the late 1990s, there have been recent population increases (Benson 2015) and the South Africa population is currently considered to be stable to increasing.

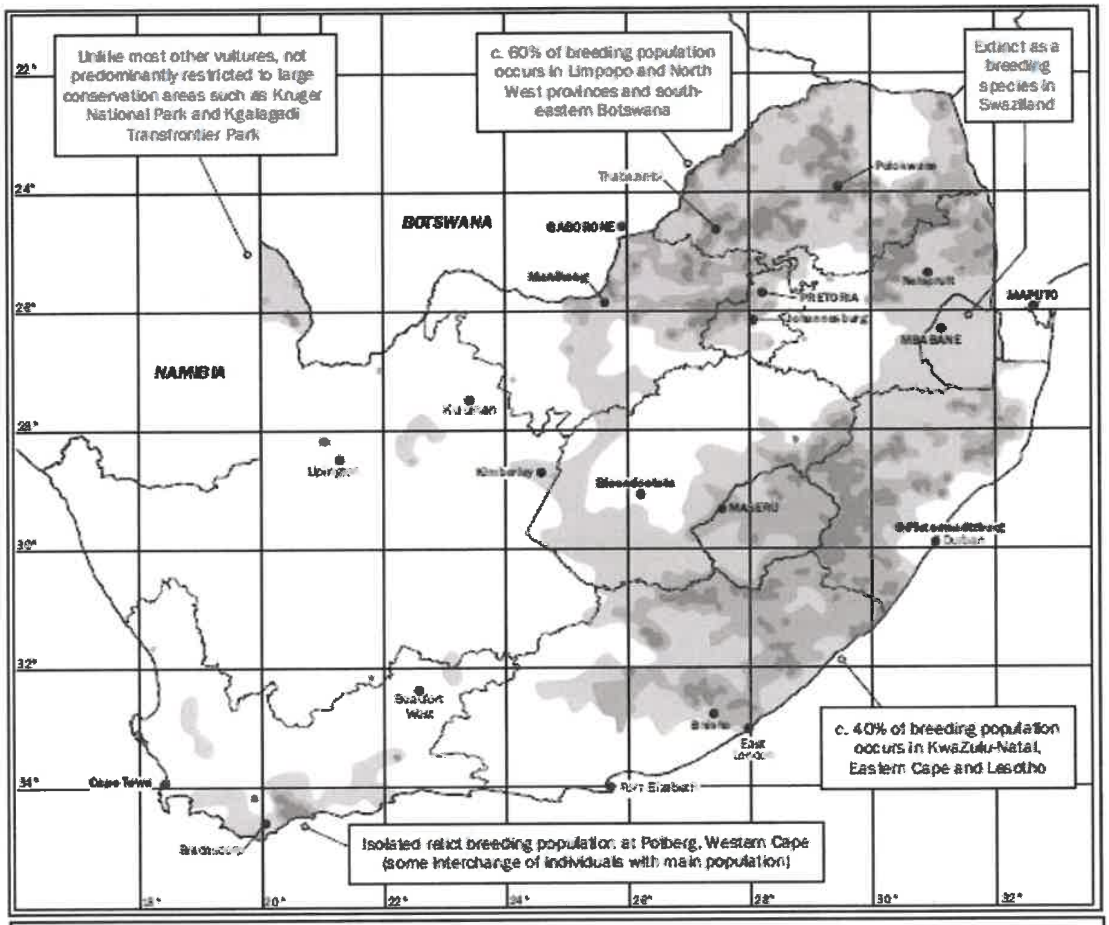

Figure 5: Distribution map of the Cape Vulture in South Africa, Lesotho and Eswatini (Allan 2015d)

Movements: Recent satellite tracking projects have shown that individuals can cover large distances. Phipps et al. (2013b) reported average home ranges of 121,655 km^2 for five adults and 492,300 km^2 for four immature birds satellite tagged in South Africa. Bamford et al. (2007) showed similar results for juveniles in Namibia, but significantly smaller ranges for adults (21,320 km^2). The tagged vultures

travelled more than 1,000 km from the capture site. Long-distance, cross-border movements were not unusual with five countries (Namibia, Botswana, Zimbabwe, Lesotho and South Africa) entered by different vultures. A Cape Vulture satellite tracked in 2014 moved more than 1,000 km between South Africa, Botswana, Zimbabwe and Mozambique (C. Hoogstad, pers. comm.).

Habitat: Savanna and open grassland, usually near mountains; the most significant breeding sites are located in the savanna biome while smaller colonies are found along the Drakensberg escarpment and along the south-east coastal regions of South Africa. This species uses cliffs for nesting and roosting (Mundy et al. 1992; Del Hoyo et al. 1994).
Ecology: It is a carrion feeder specialising on larger carcasses, mainly soft muscle and organ tissue. Cape Vultures are highly gregarious, often soaring in groups using conspecifics to help locate food. They are colonial cliff nesters.

Major threats:

Unintentional poisoning (poison baits). The practice of the placement of poisoned baits targeting mammalian carnivores that kill these birds when they feed on the baits themselves or the animals that were killed by them is known to be the most significant threat that affects this species across its range (Boshoff and Anderson 2006).

Electrocution on or collision with energy infrastructure. More than 1000 Cape Vultures have been killed by powerline collisions and electrocutions in South Africa since 1996 (Endangered Wildlife Trust (EWT) Mortalities Database). The proposed development of extensive wind energy installations within the breeding range of the Cape Vulture in South Africa and Lesotho may increase the impact of energy infrastructure on this species in future (Pfeiffer and Ralston-Paton 2016).

Intentional poisoning (for African traditional medicine). Cape Vultures are among those caught and consumed for purported medicinal and psychological benefits (McKean and Botha 2007). It is estimated that 160 vultures are sold annually and that there are 59,000 vulture parts consumed in eastern South Africa each year, involving an estimated 1,250 hunters, traders and healers. At recent harvest levels, the populations of Cape Vultures in the Eastern Cape, KwaZulu-Natal and Lesotho could become locally extinct within 44-53 years (McKean et. al. 2013).

Secondary threats:

Human disturbance. A range of human activities in proximity to known breeding colonies may have an impact on breeding success and may cause collapse of previously successful colonies (Borello and Borello 2002). These include recreational and tourism related activities such as mountaineering, climbing and recreational aviation such as paragliding.

Intentional poisoning (sentinel poisoning). Almost all sentinel poisoning incidents in southern Africa have occurred outside of the breeding range of this species, so there have been few recorded mortalities from this practice among Cape Vultures to date. However, as the trend in elephant poaching, and the

sentinel poisoning associated with it, seems to be expanding and increasing in southern Africa, and South Africa in particular, this is likely to change (Botha et al. 2017).

Habitat loss and degradation. Schultz (2007) indicated the foraging ability in certain parts of the species' range may be severely impeded by bush encroachment and thickening which affects the birds' ability to detect food on the ground.

Unintentional poisoning (lead). This occurs via the ingestion of lead bullets or lead fragments and may be another threat the impact of which has previously been underestimated (Naidoo et al. 2017; van den Heever et al. 2019).

Drowning in farm reservoirs. Vultures occasionally drown in circular farm dams. Poisoned birds may be especially vulnerable, as the poison may generate extreme thirst.

NSAIDs. NSAIDs such as diclofenac are not known to be widely used for veterinary purposes (nor are they licensed for use in the region) but are known to be toxic to the species (Naidoo et al. 2011). Ketoprofen is also widely available and is equally toxic to Cape Vultures (Naidoo et al. 2009b).

Climate change. Cape Vulture breeding areas within the north or western extent of their distribution and those at lower altitudes are likely to be lost, gradually decline, or exhibit decreased breeding activity due to increasing temperatures (Simmons and Jenkins 2007; Phipps et. al. 2017) at higher elevations may be lost due to increases in temperatures (Simmons and Jenkins 2007).

Food Supply. Throughout large swathes of their range, Cape Vultures depend heavily on livestock carcasses as a food source, largely due to the loss of historical local wildlife populations. Improvements in animal husbandry and livestock care has resulted in decreased availability of livestock as a food source for the species.

4.6 Lappet-faced Vulture (*Torgos tracheliotos*)

Global Status: Endangered (BirdLife International 2022)
Regional Status: Endangered (Allan 2015e)

Distribution: The species occurs in the northern regions of South Africa and in eastern Eswatini (Mundy 1997) (Figure 6). It has disappeared as a breeding species from the Western Cape, Eastern Cape and Northern Cape south of the Orange River.

Population size and trend: The global population is estimated to be at least 9,200 individuals (BirdLife International 2021c). The African population has been estimated to be at least 8,000 individuals (Mundy 1992).

Movements: Lappet-faced Vultures are regarded as a partial migrant that makes significant movements in response to rainfall (Bildstein 2006). Tagged birds had an average home range size of 22,000 km^2 and moved between Kenya and Tanzania (Coordinating Unit of the Raptors MOU 2015). Murn and Botha (ibid.) satellite-tagged an individual which moved more than 200 km from the capture site in South Africa and travelled into Mozambique. Two immature individuals satellite tagged in Saudi Arabia (Shobrak 2014) had a mean home range size of 283,380 km^2 and moved about 400 km before returning in the autumn.

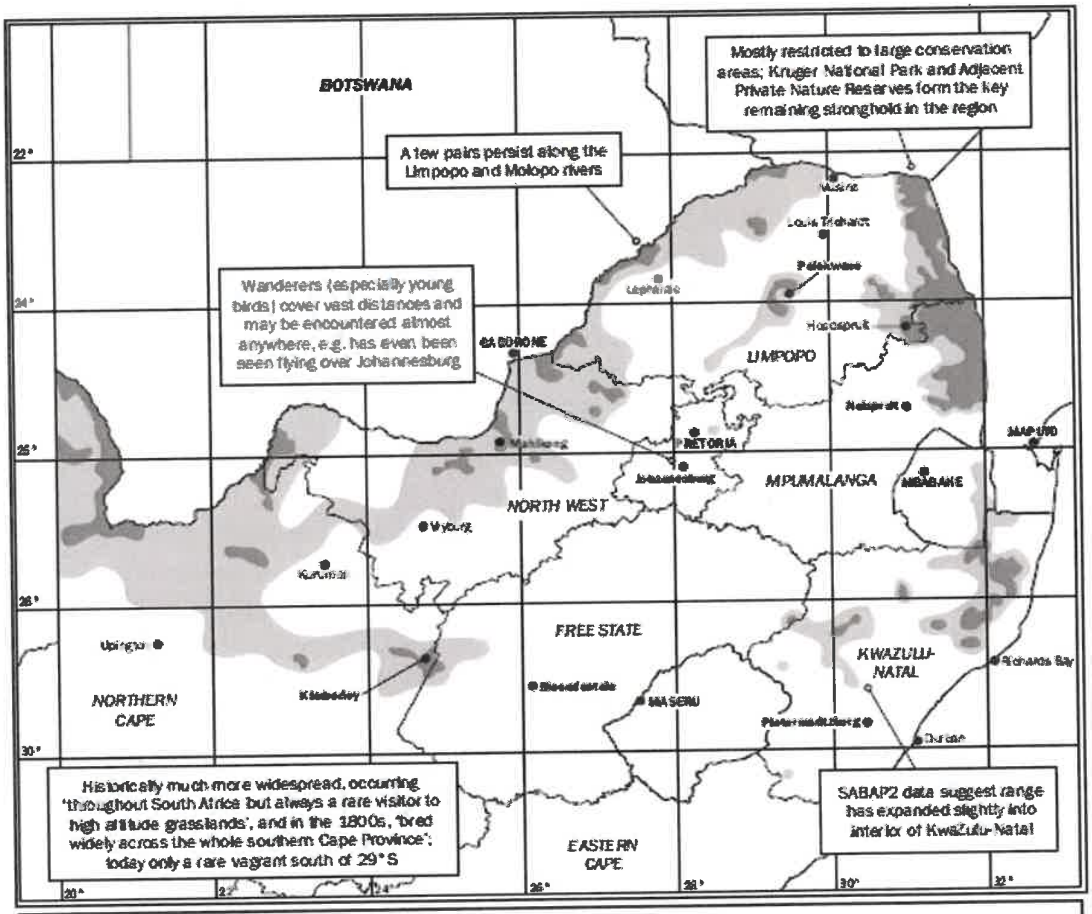

Figure 6: Distribution of Lappet-faced Vulture in South Africa and Eswatini (Allan 2015e)

Habitat: The species inhabits dry savanna, arid plains, deserts and open mountain slopes (Shimelis et al. 2005), up to 3,500 m in altitude (BirdLife International 2017).

Ecology: Lappet-faced Vultures range widely when foraging and whilst they take a broad range of carrion, they are also known to hunt, probably taking a variety of small reptiles, fish, birds and mammals (Mundy et al. 1992). Although usually a more solitary species, up to 50 birds may gather with other vultures at larger carcasses. Lappet-faced Vultures usually build solitary nests often in *Senegalia* but also in *Balanites*, *Terminalia* and *Maerua* spp. (Shimelis et al. 2005, Shobrak 2011). They do not usually breed until at least six years of age and fledge on average 0.4 young/pair/year (Mundy et al. 1992). Timing of breeding can vary significantly across the species' range, for example in Mozambique, egg-laying occurs from late April until mid-August, with a peak in May and June (Parker 2005).

Major threats:

Habitat loss and degradation: Land use changes through agricultural intensification and development threaten this species throughout its range (BirdLife International 2019).

Intentional poisoning (African traditional medicine). During a poisoning incident in the Gonarezhou National Park in Zimbabwe, most of the 15 Lappet-faced Vultures killed had their bills removed, presumably for use in African traditional medicine (Groom et al. 2013).

Intentional poisoning (sentinel poisoning). According to Ogada et al. (2015), this is the deliberate poisoning of the carcasses of large mammals such as elephant, buffalo and other large herbivores after being poached to reduce vulture numbers in areas where poachers are active. Lappet-faced Vultures, like most other species occurring in areas where this practise is prevalent, are susceptible to this threat.

Secondary threats:

Farm reservoirs. Vultures occasionally drown in circular farm dams. Poisoned birds may be especially vulnerable, as the poison may generate extreme thirst.

Unintentional poisoning (poison baits) at carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores, especially in eastern and southern Africa (Komen 2009, Otieno et al. 2010, Groom et al. 2013, Kendall and Virani 2012).

Human disturbance. This is particularly significant at nests on the Arabian Peninsula where low tree densities result in people establishing dwellings under or near trees used by this species for breeding, causing them to abandon nesting sites (Shimelis et al. 2005; Shobrak 2011). The same probably applies in areas of sparse tree cover elsewhere within the species' range. In large protected areas containing elephants, nesting trees have also been pushed over and destroyed by these animals (Murn and Botha 2017).

Electrocution on or collision with energy infrastructure. Shimelis et al. (2005) highlight the threat to Lappet-faced Vultures from electrocutions and collisions from power lines, particularly power poles, reporting 49 individuals known to have been killed between 1996 and 2003.

4.7 Palm-Nut Vulture (*Gypohierax angolensis*)

Global Status: Least Concern (BirdLife International 2016).
Regional Status: Not assessed (considered peripheral) (Taylor et al. 2015).

Distribution: Palm-nut vultures are found throughout most of the coastal areas of the African continent from The Gambia to Kenya and as far South as South Africa (Van Zyl 2006). The only Southern African subregions to have the breeding resident pairs of Palm-nut vulture are South Africa, Mozambique and Malawi. The breeding distribution of the Palm-nut Vulture during the 1970s census period was centred on the Raffia Palm *Raphia australis* groves of the Kosi Bay system and Mtunzini. Its distribution is linked to the presence of the Raffia Palm at all permanently occupied sites, and the existence of this species at Mtunzini is entirely due to the artificial cultivation of Raffia Palms (Hockey et al. 2005). There seems to be an expansion in range of the species southward with birds being recorded as far south as Scottburgh on the south coast of KwaZulu-Natal and breeding being confirmed in urban eThekwini.

Population size and trend: The total African population is estimated to be 80,000 pairs (Mundy et. al. 1992), with no evidence of decline being reported. The population is thought to be stable (Birdlife International 2022) with in excess of 12 breeding pairs in South Africa in 2003 (Hockey et. al. 2005).

Movements: Partial migrant, with juveniles dispersing from breeding areas (Bildstein 2006). Dean and Le Maitre (2008) counted a lower percentage of juveniles in October than in May along the Congo River, probably indicating dispersal. Most movements are probably a response to changes in the availability of watered areas. Vagrants occasionally turn up far outside the usual range.

Habitat: Found mostly in savannas, at the edges of moist tropical and riparian forests, in coastal habitats, lagoons, and in areas of oil palm plantations. Brown and Amadon (1968) also listed mangrove swamps as a preferred habitat. Its distribution in West and central Africa coincides closely with the presence of the oil palm *Elaeis guineensis* and in southern Africa, with the palm *Raphia vinifera*. Typically a lowland species, but in Kenya may be found as high as 1,825 m (Clancey 1985) and up to 2,300 in Malawi (Dowsett-Lemaire and Dowsett op cit.). Spends much of its time perched near food trees, or walking about on beaches, sandbars, and riverbanks. Does not soar as much as other vulture species and can be seen commuting between feeding and nesting areas. Gregarious, roosting in small groups in trees, but forages singly.

Ecology: It breeds in forest and savannah across sub-Saharan Africa, usually near water, its range coinciding with that of the oil and Raffia Palms. It is quite approachable, like many African vultures, and can be seen near habitation, even on large hotel lawns in the tourist areas of countries such as The Gambia.

Major threats: This species is currently not persecuted, but it is affected by habitat loss in certain parts of its range. The expansion of palm plantations has increased nest site availability (BirdLife International 2022; Hockey et. al. 2005). The threats to this species in South Africa are not well understood. The low population size makes the species vulnerable to stochastic events and habitat loss through open cast sand dune mining and urban expansion could reduce suitable habitats. The cultivation of Raphia Palms

for their ornamental value is currently increasing providing additional food and nesting sites. There is also a large portion of its habitat protected by the iSimangaliso Wetland Park. There are no current species-specific conservation initiatives as this species is the only vulture species in South Africa where the population size is increasing.

5. THE STATEMENT OF THREATS ADVERSELY AFFECTING THE SPECIES

Due to their life history, traits and ranging behaviour, vultures are highly susceptible to human induced threats (Virani et al. 2011). They are wide ranging birds that cannot be confined within the boundaries of protected areas, they often cover vast distances searching for food and scavenge even in non-protected lands. This increases their exposure to anthropogenic threats, including both intentional and unintentional poisoning, persecution, electrocution and collision with energy infrastructure, shortage of safe food supplies, loss of suitable habitat, disturbance, and climate change. These threats are constantly changing and evolving, some are on the increase and some come and go, and in most cases are difficult to manage. The current situation is critical and vultures are declining across the African continent with a 90% decline recorded for some species in just over three decades, while declines of 50-60% have been measured in the savannas of southern and East Africa (Ogada et al 2015).

5.1 Poisoning

Poisoning, in its various forms, is one of the most significant threats that impacts on South African vultures. In the context of vultures there are two broad types of poisoning: unintentional (secondary) poisoning, where vultures are not the intended target; and intentional (primary) poisoning, where vultures are intentionally targeted.

The use of poisons to kill wildlife intentionally has a long history not only in South Africa but worldwide. Natural plant and animal-based toxins and synthetic pesticides have been used to kill wildlife, a method that is silent, cheap, easy and effective (Ogada 2014). Many classes of pesticides have been used to poison wildlife, including organochlorines, organophosphates, carbamates and pyrethroids.

Populations of scavengers have been decimated by feeding on poisoned carcasses (Virani et al. 2011; Botha et al. 2012; Ogada et al. 2012). Vultures, for which the primary food source is meat, soft tissue and organs from carcasses, are obviously at risk. The majority of South African vulture populations are affected to varying degrees by unintentional and intentional poisoning.

Poisoning incidents are spread across the African continent (Figure 7).

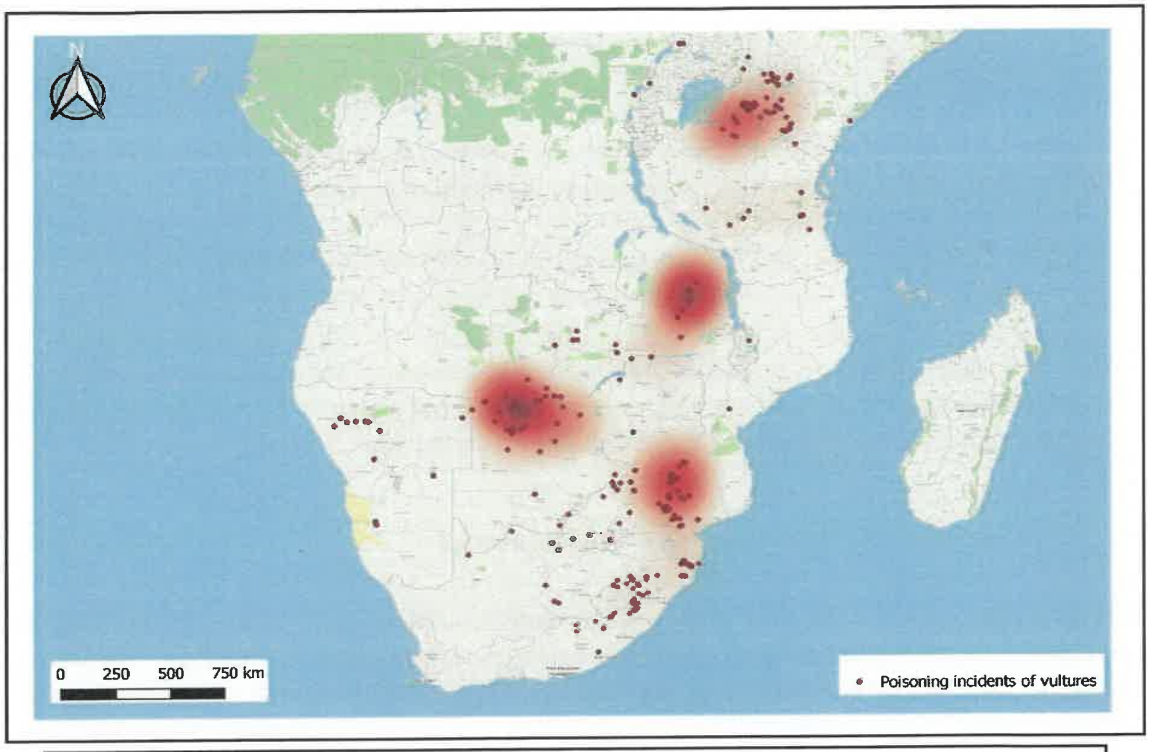

Figure 7: Locations of known vulture poisoning incidents reported to the African Wildlife Poisoning Database (2000 to 2020). African Wildlife Poisoning Database (Endangered Wildlife Trust and The Peregrine Fund. 2021; https://awpd.cloud.).

5.1.1 Unintentional (secondary) poisoning

Unintentional poisoning occurs when vultures: 1. Consume poisoned carcasses set out to target other species to alleviate human-wildlife conflict. 2. Feed on the carcasses of animals that have died as a result of consuming a poisonous substance. 3. When they consume livestock that has been treated with NSAIDS or other veterinary medicines harmful to vultures. 4. Consume food that contains lead fragments or traces of lead (such exposure can either be lethal within a short space of time or lead to long term side effects). Pollution of the environment by a range of chemicals due to spills and the dumping of chemical waste and other substances that can affect vultures' food or water sources also pose a threat although the impact is not yet well documented.

5.1.1.1 NSAIDS and other veterinary medicines

Unintentional poisoning of *Gyps* vultures in Asia due to the ingestion of NSAIDs has caused rapid and severe declines in three formerly common and widespread species with serious consequences for the ecosystem and knock-on economic, sanitary, human health and cultural effects. The main factor causing the declines has been shown to be the veterinary use of the common NSAID, diclofenac. Although veterinary diclofenac is not available in South Africa, Voltaren®, a human diclofenac medication is widely used and easily available. Additionally, Ketoprofen was identified as being lethal to *Gyps* vulture species in 2009 (Naidoo et al. 2010) and several other NSAIDs commonly used to treat livestock and equines are

thought to be toxic to vultures and include nimesulide (Cuthbert et al. 2016), carprofen (Cuthbert et al. 2007), flunixin (Zorrilla et al. 2014) and phynylbutozone (Fourie et al. 2015).

Only two safe alternatives, meloxicam (Swarup et al. 2007) and tolfenamic (Chandramana, 2022), have been identified so far (see https://www.biorxiv.org/content/10.1101/2021.08.23.456758v1). The availability of new NSAIDs is increasing (Khan 2013) although most are untested with regard to their toxicity to vultures. At the volumes required to effectively treat livestock and equines, the exorbitant price of Meloxicam will prevent its routine use in these animals. Cost-effective alternatives need to urgently be found and recommended to the veterinary officials, farmers and equine owners.

5.1.1.2 Human-wildlife conflict and problem animal control

Farmers who experience frequent crop-raiding by elephants, hippopotamus, buffalo and other herbivores, or whose livestock or game populations fall prey to predators, may resort to poisoning to alleviate such problems. Synthetic pesticides are widely used as the poison of choice for killing 'problem' predators such as lion, leopard, hyena and jackal. Such use of pesticides is illegal in South Africa but implementation and enforcement of the regulations is often weak; consequently, poisoning has become the most widely used means of killing these animals.

Poisoned baits are often large carcasses, such as livestock, killed by predators. This poisoning is indiscriminate and often does not affect the targeted individual or species, but instead kills a multitude of unintended species, including vultures. Vultures are especially vulnerable to this type of poisoning and can die in large numbers during a single incident due to their social feeding behaviour (Ogada et al. 2015). There are also ample data that show that the target animals killed are themselves also a significant source of secondary poisoning when vultures feed on such poisoned animals.

In other cases, small parcels of meat laced with pesticide are placed in strategic locations, targeting problem animals. In addition to targeting 'problem animals' such parcels of meats are placed strategically to target domestic dogs that are used for illegal hunting purposes. White-headed Vultures, in particular, are vulnerable to this type of poisoning (Botha et al. 2017; Ezemvelo KZN Wildlife and Wildlife ACT, 2016).

Conflict between livestock owners and vultures due to the predation on weakened ewes and lambs has been recorded during drought periods resulting in the illegal killing of vultures and complaints about vultures 'annexing' waterholes and troughs which other animals tend to then avoid using.

5.1.1.3 Lead

Lead has been demonstrated across the world, including in South Africa, to be a significant environmental contaminant and risk to people, and potentially to the persistence of certain species of wildlife. While there are strict health and safety regulations to minimise human exposure to lead, there is a general lack of appreciation of the risks to the environment, and few management guidelines, policies or legal instruments are in place or being implemented to minimise environmental exposure. Plaza and Lambertucci (2019) highlight the threat that lead poses to vulture species, however this is often not

recognised. Not all potential sources of lead for vultures are well understood. Lead poses a serious threat to African vulture populations (Naidoo et al. 2017; Garbett et al. 2018; van den Heever et al. 2019), and have, for a population in the Northern Cape, been conclusively linked to lead-based ammunition (van den Heever et al. 2023). Lead-based ammunition are used in, amongst others, hunting, wildlife-management, agricultural practices and problem animal control. Vultures in particular are very susceptible to lead as they are highly mobile obligate scavengers that are exposed to lead fragments present in the carcasses of animals shot with leaded ammunition. Their highly acidic stomachs, which dissolve more lead than the stomachs of other animals, increase the absorption of the heavy metal (Pain et al. 2009).

In wild African vultures, elevated blood lead levels have been linked to areas and seasons that experience increases in hunting activity (Garbett et al. 2018). In South Africa, a sample of non-scavenging birds that were tested, did not show elevated blood lead levels, while scavenging birds did (van den Heever et al. 2019). Interestingly, in South Africa, it was found that White-backed Vulture nestlings too had elevated lead levels, leading van den Heever et al. (2019) to conclude that nestlings are likely receiving food containing lead fragments from their parents. Krüger and Amar (2018) found that although blood lead levels in Bearded Vulture were low, bone lead levels in individuals found dead were elevated and may have contributed to their deaths. There is a general lack of awareness amongst the relevant role-players regarding the potential risks to vultures associated with the use of lead-based ammunition. In addition, availability of suitable, affordable alternatives is a challenge not only in South Africa, but also the rest of Africa.

Whilst more immediate and direct mortality from poisoning and other threats is highly visible, African vultures are long lived and at a high trophic level (high up the food chain), which increases their vulnerability to bioaccumulation. Although most of the attention has been given to the lethal impacts of toxins on vultures, bioaccumulation may have sub-lethal but significant negative effects on reproductive success, immune response and behaviour. Gongoso et al. (2009) discovered evidence of bioaccumulation in Egyptian vultures causing reduced mineralisation in the bone as lead contamination increased. Furthermore, bioaccumulation was more evident in males than females, suggesting that this effect may be important for declining species. Additional research relating to bioaccumulation in vultures in South Africa is necessary. Recent research on Cape and White-backed Vulture chicks suggests that lead interferes with chicks' ability to manufacture haemoglobin, resulting in anaemia with extreme lead levels resulting in compromised liver function (van den Heever et al. unpublished), Tracking studies conducted on newly fledged White-backed Vulture juveniles further suggest that birds exposed to blood lead levels above certain critical thresholds are displaying significant lack of movement, resulting in failure to significantly expand their home ranges during their first year of life (van den Heever et al. unpublished).

5.1.2 Intentional (targeted) vulture poisoning

5.1.2.1 African Traditional Medicine

Pesticides are increasingly used to acquire wild animals or their body parts for consumption and commercial trade. Where vultures are concerned, a major driver of this trade is referred to here as African traditional medicine, in which wildlife parts and derivatives are used to treat a range of physical and mental diseases, or to bring good fortune. The trade associated with African traditional medicine has

existed for many years in some areas (especially parts of West, Central and southern Africa) and is accepted as cultural practice. With the rapid growth of human populations, and more effective harvesting methods (through highly toxic substances), with an already declining vulture population, the impact of harvesting for traditional use is becoming more apparent. Figure 8 highlights the known localities of poisoning events specifically for traditional medicine use. It should also be stated that the remains of other wildlife species killed by means of poisoning for trade that are left out in the veld pose a secondary poisoning risk to vultures and other avian scavengers. For example, in most instances where lions were targeted for trade by being poisoned in the northern Kruger National Park (KNP), vultures were poisoned when feeding on the remains of the poisoned predators (A. Botha pers comm).

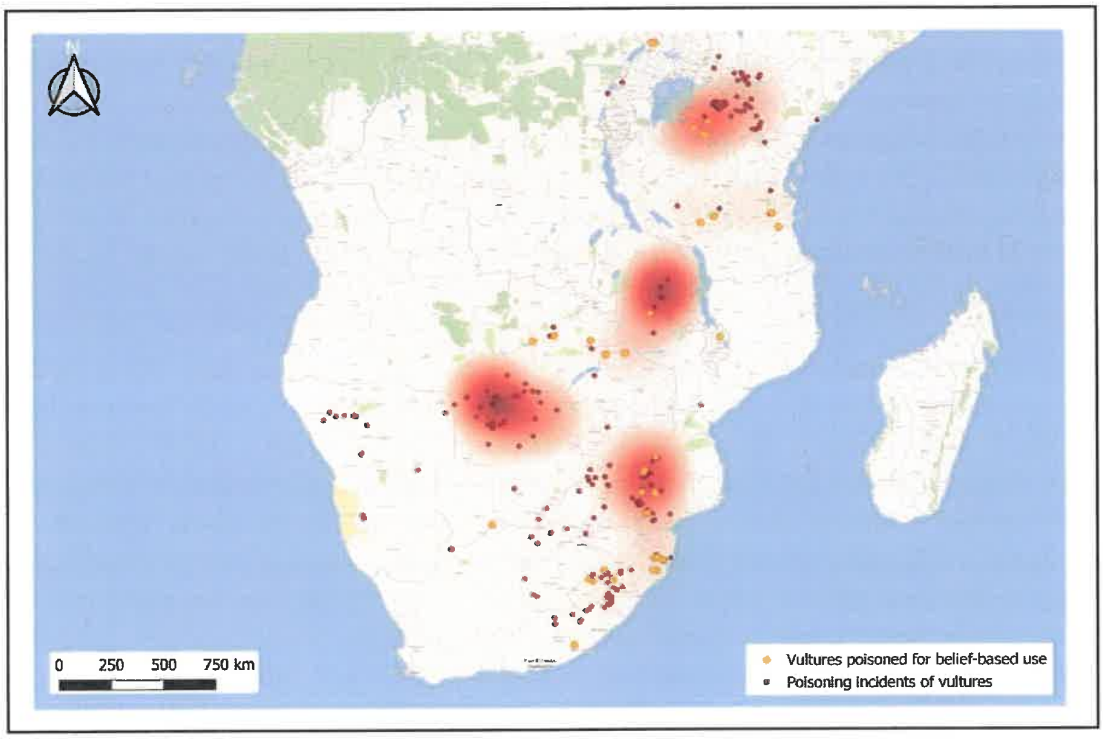

Figure 8: Locations of known vulture poisoning incidents for Traditional medicine use reported to the African Wildlife Poisoning Database (2000 to 2020). (Endangered Wildlife Trust and The Peregrine Fund. 2021, https://awpd.cloud).

In the eastern parts of South Africa, White-backed Vultures are one of the preferred vulture species in trade, according to a survey of traditional healers and traders (McKean et al. 2013). During 2019 and early 2020, over 90 vulture carcasses were recovered following a spate of targeted poisonings in northern KwaZulu-Natal. These incidents included 83 White-backed, six Lappet-faced and one White-headed Vulture. It is believed that the last adult White-headed Vulture resident in the northern cluster of KwaZulu-Natal's vulture breeding population (the area including Mkuze, Pongola and Magudu) was killed during these events (Wildlife ACT and Ezemvelo KZN Wildlife pers. comm. 2020). These incidents combined with other environmental pressures continue to place pressure on the existing population, thereby

supporting the McKean et. al. (2013) prediction that such populations could become locally extinct by 2034.

McKean et al. (2013) further predicted that the Cape Vulture populations in the Eastern Cape and KwaZulu-Natal could become locally extinct within 54 years should harvesting levels of White-backed Vultures remain unabated. With a decreasing White-backed Vulture population in KwaZulu-Natal, a larger proportion of the harvesting pressure could be brought to bear on Cape Vultures.

A study on the use of vultures by an association of traditional health practitioners in Bushbuckridge, estimated that this single association of over 400 healers may use as many as 400-800 vultures a year (Mashele et al. 2021a, b).

5.1.2.2 Sentinel poisoning

The increase in poaching of elephants in Africa has resulted in an increase in mass poisoning of vultures. Vultures are deliberately poisoned by poachers who may use large quantities of toxic pesticides on elephant carcasses because circling vultures signal potential illicit activities to those who are combating poaching (Ogada 2014; Ogada et al. 2015; Richards et al. 2017); vultures are killed because they act as sentinels of poaching. Vulture mortality associated with ivory poaching has increased more rapidly than that associated with any other types of poisoning, accounting for one third of all vulture poisonings recorded in Africa since 1970 (Ogada et al. 2016a, b).

This phenomenon has now been recorded in South Africa (Fig. 9), where the first two incidents resulted in the deaths of 154 White-backed Vultures after feeding from poisoned elephant carcasses in the Kruger National Park (Murn and Botha 2017). Since January 2019, at least 450 vultures of four threatened species, eight Lions, two Leopards, Spotted Hyenas and several other species have been killed in at least 13 incidents in the Kruger National Park onwards due to the lacing of poached animal carcasses with poisons. To date, most of the incidents have occurred in the northern regions of the park. Poisoning is evidently increasing and expanding with, for example, at least three new incidents recorded in the southern half of the Kruger National Park since February 2020. Several incidents of poisoning of vultures associated with subsistence poaching of herbivores for meat have also been recorded in the Kruger National Park in recent years, and the rationale may also be sentinel poisoning, since no parts were harvested from the dead vultures (G. Tate pers. comm).

The frequency of the incidents, and the number of vultures that have been poisoned in each incident is very concerning and is likely to have significant population impacts.

5.2 Energy infrastructure

5.2.1 Electrocution

Avifaunal mortality by electrocution on power lines is a global problem and it is a significant threat to vultures in South Africa (BirdLife International 2017). South Africa's power line grid is extensive (Figure 10) and is becoming more prevalent as energy demand increases, resulting in infrastructure growth (van Rooyen 2000).

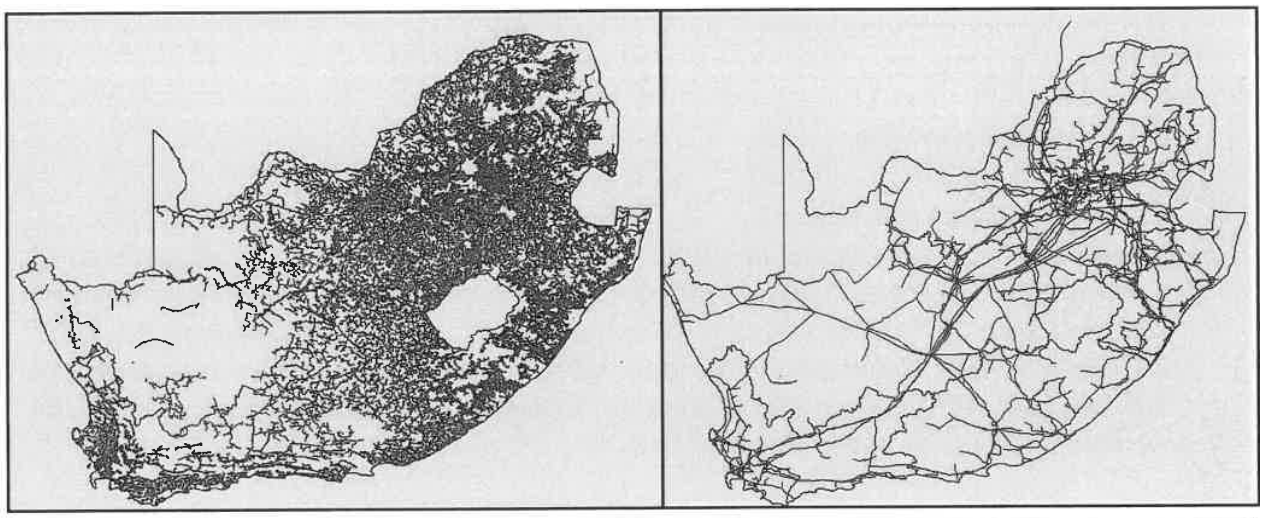

Figure 9: Powerline distribution (left) and transmission (right) networks in South Africa. (Eskom/EWT Strategic Partnership database unpublished 2020).

The electrocution of avifauna occurs when the gap of electrical components is bridged between two live or one live and one earth component of a power line (Kagan 2016). Electrocution can also occur through flashovers as a result of excrement (also known as streamers), which is electrically conductive, creating a conductive path between the bird and the associated infrastructure (van Rooyen et al. 2002). Due to their large wingspan and gregarious roosting, large bird species such as vultures, are particularly vulnerable to electrocution and South Africa has experienced numerous vulture mortalities as a result of electrocutions (Figures 11 and 12) (van Rooyen 2000).

Electrocution risks can be significant in poorly designed or uninsulated energy infrastructure, particularly older distribution medium voltage power lines (Kagan 2016). Effective planning, design and mitigation measures can dramatically reduce the impact of energy infrastructure on avian populations (BirdLife International 2017). Electrocution from power lines is one of the key threats for the long-term protection of vultures in South Africa, with data suggesting that this cause of mortality makes a significant contribution to low juvenile and immature survival rates (van Rooyen 2000; Shimelis 2005; Boshoff and Anderson 2006).

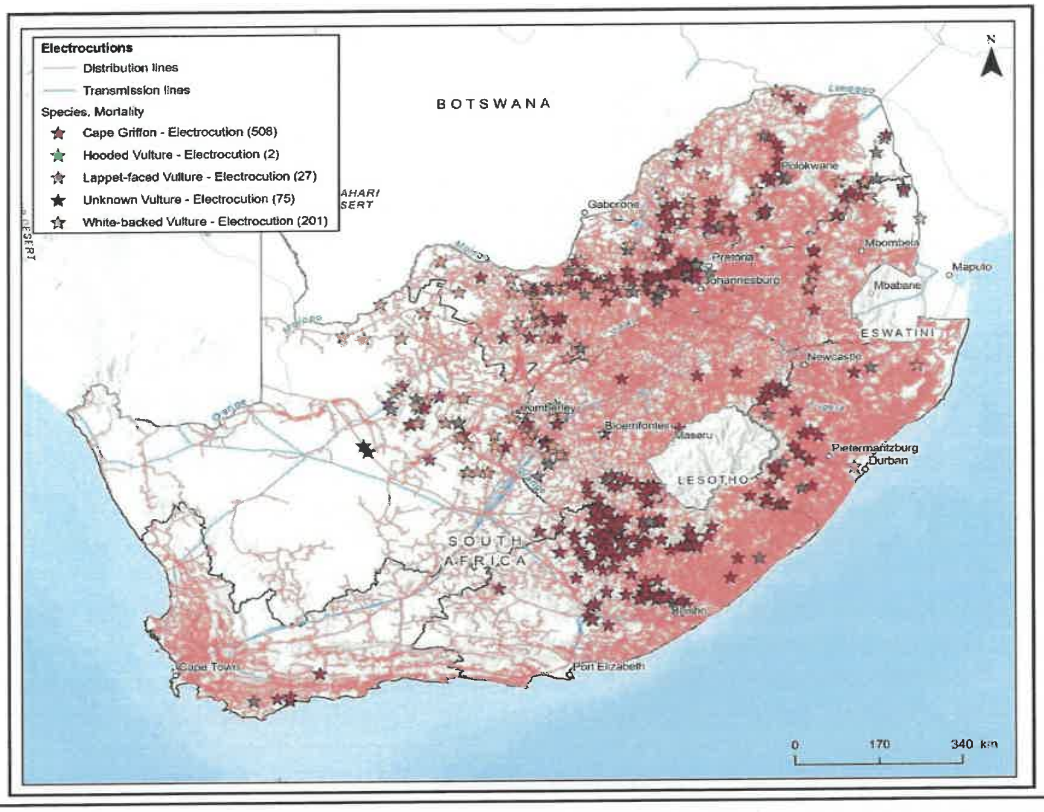

Figure 10: Fatal vulture electrocutions on powerlines across South Africa reported to the EWT/Eskom Central Incident Register from 1996-2022 (Eskom/EWT Strategic Partnership database unpublished, 2022). Numbers in legend indicate the count of fatalities for each species.

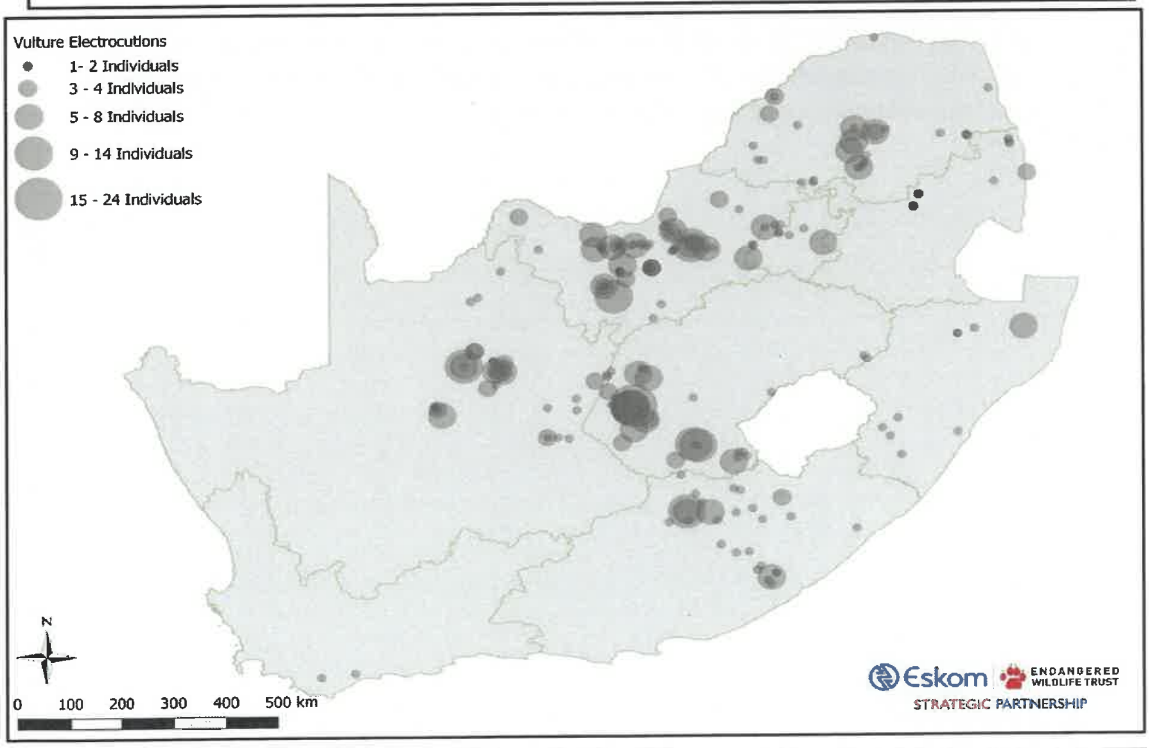

Figure 11: Map reflecting power line vulture electrocution incidents in South Africa (Eskom/EWT Strategic Partnership database unpublished 2020).

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Energy infrastructure has played a role in avifaunal mortalities and injuries as a result of collisions with power lines, often leading to the decline of sensitive species at a global level (Boshoff et al. 2011). Collisions with power lines are a significant threat to vultures, where they are susceptible largely due to their size and relatively poor manoeuvrability (van Rooyen 2000). A number of additional factors increases the likelihood of vultures colliding with power lines which include poor light at certain times of the day and inclement weather conditions (Harris and Mirande 2013). VulPro, a vulture rehabilitation centre, has recorded 384 deaths or injuries resulting in vultures needing captive care in the past 5 years (VulPro Annual Report 2022). Moreover, of the 250 non-releasable vultures in residence at VulPro, minimally 200 of them were rendered disabled due to powerline incidents. Since 1996, many vulture mortality incidents have been recorded on the Eskom/EWT Strategic Partnership Central Incident Register (CIR) database and this partnership is working to mitigate unsafe lines and structures across South Africa. Wildlife mortalities are reported to the EWT toll free number (0860 111 535) and wep@ewt.org.za to trigger the Eskom Wildlife Incident Management Process. However, many more incidents go unreported as vultures often collide and carcasses are scavenged, collide in inaccessible areas, or they are injured and move away and out of sight from the power line servitudes (Shaw et al. 2015). A large number of vulture mortalities are associated with powerline collisions, and this is one of the main factors that have caused major declines of Cape, White-backed and Lappet-faced Vultures in South Africa (Shimelis 2005; Boshoff et al. 2011; BirdLife International 2017) (Figures 13 and 14).

The increase in renewable energy installations (e.g., wind, solar and geothermal generation facilities) will inevitably lead to an expansion of the power line distribution network, which will likely increase the risk of collisions for vultures in certain areas. Despite their acute vision, vultures' field of view and normal head position when foraging can make them unaware of obstructions in their direction of travel, and they may be particularly vulnerable to collisions with infrastructure such as wind turbines and power lines (Martin et al. 2012). The proliferation of renewable energy initiatives can therefore be detrimental to vultures if the locations of turbines and associated infrastructure are in areas favoured by these birds (Jenkins et al. 2010).

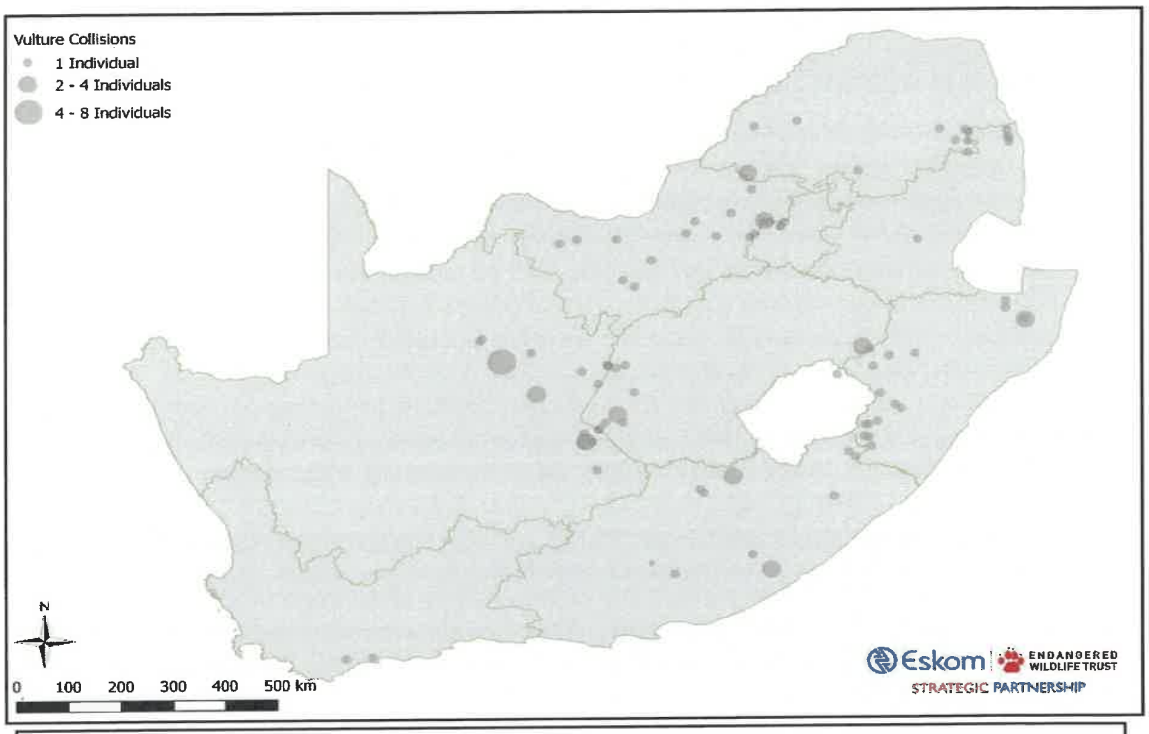

Figure 12: Powerline vulture collision incidents in South Africa (Eskom/EWT Strategic Partnership database unpublished 2020).

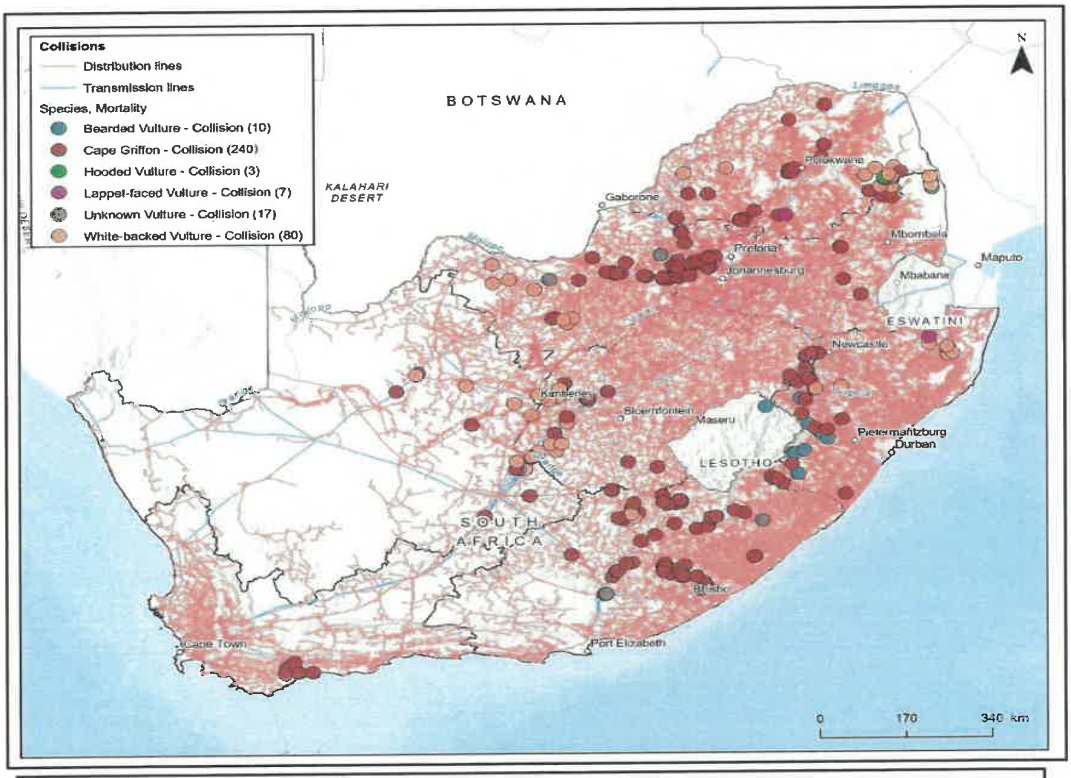

Figure 13: Fatal vulture collisions on powerlines across South Africa reported to the EWT/Eskom Central Incident Register from 1996-2022 (Eskom/EWT Strategic Partnership database unpublished 2022). Numbers in legend indicate the count of fatalities for each species.

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The rapid development of wind energy in southern Africa represents an additional threat to the already fragile populations of African vultures. The distribution of the Vulnerable Cape Vulture in particular, overlaps considerably with wind energy development areas in South Africa, creating conflicts that can hinder both vulture conservation and sustainable energy development. Cape Vultures are known to collide with wind turbines on wind energy facilities (WEFs). Indeed, the last five years have shown concerning numbers of mortalities on wind farms, particularly in the Eastern Cape (G. Tate pers. comm). As of June 2023, there have been 30 Cape and six White-backed Vulture fatalities reported at wind farms within South Africa, the majority of which are collisions (S. Ralston pers comm 2023). The current fatality rate of Cape Vultures at South Africa's WEFs is 0.008 birds per turbine per year (S. Ralston, unpublished data). It is important to note that these figures are not an accurate reflection of the actual number of vulture fatalities. Not all wind farms are monitoring, reporting and/or mitigating fatalities.

When Renewable Energy Development Zones (REDZ) are taken into account, a significant overlap exists between the Cape Vulture range and both operational and proposed WEFs. Subsequently, there is pressing concern around the potential cumulative impact of WEFs on the Cape Vulture population within these areas of overlap. This concern is compounded by the recent gazetting and fast tracking of REDZ across the country, which is sure to increase the level of collision risk for Cape Vultures and other collision prone species (Figure 15).

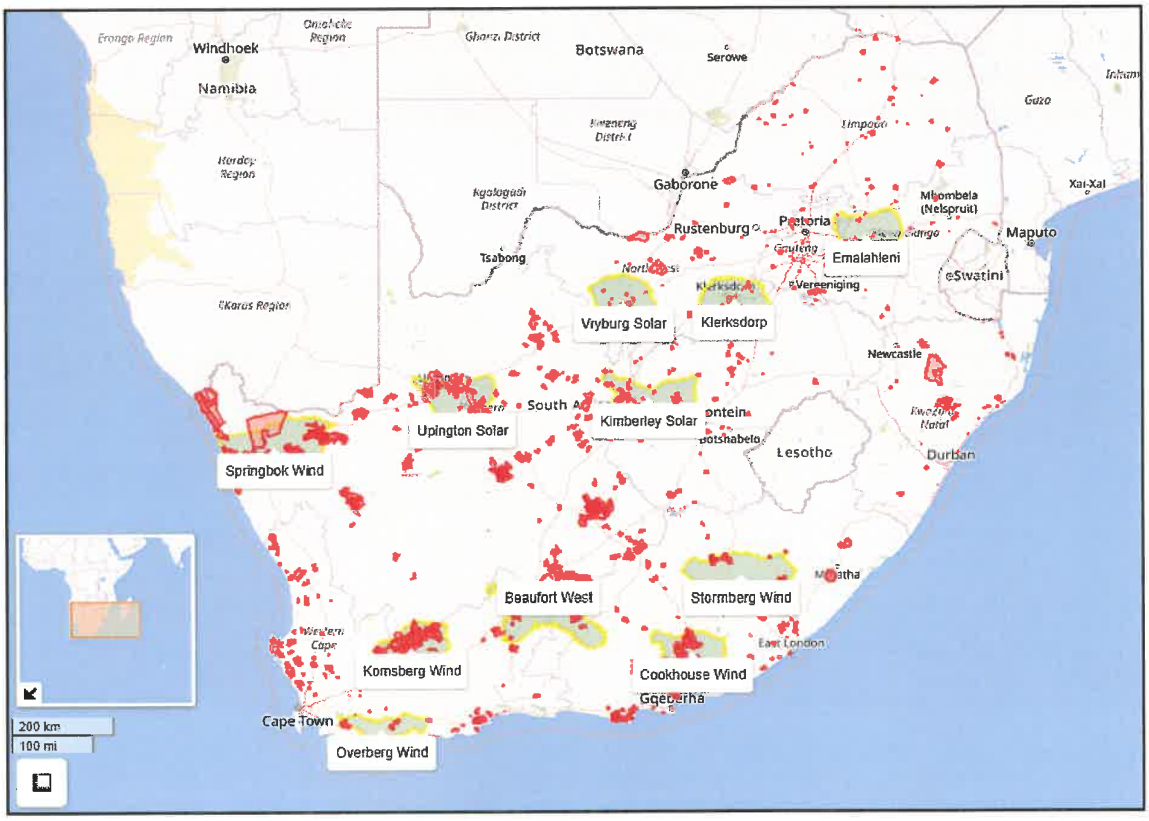

Figure 14: Renewable Energy Development Zones (REDZ) (shaded regions with yellow outline) within South Africa as well as the 2021 fourth quarter South Africa Renewable Energy EIA Applications indicated by red shaded regions. Endangered Wildlife Trust 2022.

A controversial wind farm development in the Maloti mountains of Lesotho, an important site for both Bearded and Cape Vultures, was given approval in 2014 (Anonymous 2014), and is likely to result in

significant vulture mortalities if substantial mitigation measures are not implemented. Even relatively small-scale wind energy developments in the Lesotho Highlands pose a threat to local vulture populations (Reid et al. 2014; Rushworth and Krüger 2014) and could lead to local extinctions.

Sensitivity models are currently being developed for Cape Vulture (Cervantes *et al.* in review) and have been completed for Bearded Vulture (Reid et al. 2014). Habitat suitability models for all breeding vulture species in South Africa is currently being developed between BirdLife South Africa, Ezemvelo KZN Wildlife, Wildlife ACT and the Endangered Wildlife Trust.

5.3 Climate change

Mainstream projections of climate change suggest that average global temperatures will be 3-5°C higher in the year 2100 compared to 2000 (IPCC 2014). However, analyses of weather data for southern Africa reveal that temperatures are increasing faster than projected by IPCC models, with warming by 2015 already exceeding the increases predicted for 2035, and with rates of heating highest in arid zones (van Wilgen et al. 2016). Sustained periods of hot weather negatively impact body condition and breeding success in a number of southern African arid-zone birds (du Plessis et al. 2012; Cunningham et al. 2013; van de Ven et al. 2020), and the fitness costs of increasing heat exposure as a consequence of climate change are expected to drive major declines in avian diversity in the subregion's semi-desert and desert habitats (Conradie et al. 2019).

Importantly, in addition to the increase in average temperature and average maximum temperature, there is expected to be a significant increase in the frequency of extreme temperature events (IPCC 2014; Coldrey 2019). The increase in the frequency of extreme weather events associated with climate change may cause direct avian mortality (McKechnie et al. 2021) and drive local avian population dynamics (Parmesan et al. 2000). While little work has been done on the subject, tree-nesting vultures may be particularly vulnerable to the direct impacts of rising air temperatures in coming decades. Solar heat loads experienced in nests partly or entirely exposed to the sun elevate the operative temperatures experienced by vulture nestlings well above air temperature, creating conditions under which even small increases in air temperature are likely to cause large increases in the thermal challenges posed by hot weather. The most obvious of these challenges concerns the risks of hyperthermia to embryos and later to nestlings. The second closely related risk is that of nestling dehydration arising from increases in evaporative cooling requirements, when operative temperatures exceed body temperature and evaporative water loss becomes the only mechanism whereby body temperature can be maintained below lethal limits. Parent vultures may mitigate some of the effects of solar radiation load on eggs and nestlings through shading behaviour, which could be critical for nestling survival (e.g. Williams et al. 2011). However, high thermal loads incurred by adults during hot weather may mean parents are forced to leave chicks exposed if air temperature exceeds critical thresholds. In addition, the time spent shading the chick could conceivably reduce available foraging time, although the large size of vultures makes this less of an issue than the provisioning-thermoregulation trade-offs in smaller birds.

It is speculated that the vulture species breeding at higher altitudes (Bearded and Cape Vultures) in southern Africa may experience range contractions due to increased temperatures associated with accelerated climate change (Simmons and Jenkins 2007), although recent analyses provided no support for the hypothesis that climate change may be driving Bearded Vulture nest site abandonment (Krüger

et al. 2015b). There are concerns that Cape Vulture breeding colonies in the north of the species' range are at greater risk from the effects of climate change than those in the south and that areas currently containing the bulk of the breeding population may become unsuitable for breeding (Phipps et al. 2017). The overall impact of climate change can be more severe when it occurs with other major threats such as habitat loss and reduction in available food sources.

Bush encroachment is taking place across much of southern Africa, and increases in atmospheric CO_2 concentrations from anthropogenic activities are likely to be at least partially responsible for driving this process (Bond and Midgley 2012; O'Connor et al. 2014). Carcass utilisation by vultures may be constrained by the surrounding vegetation, as high vegetation densities may leave insufficient space for the vultures to take-off once satiated (Bamford et al. 2009). For example, White-backed Vultures were reluctant to land at carcasses from which the angle required to clear the surrounding vegetation on take-off was greater than 6°, and Cape Vultures were not observed on carcasses from which the required angle of take-off was greater than 4°. Increasing vegetation densities due to bush encroachment may therefore decrease available foraging habitat (Bamford et al. 2009). Experimental provisioning indicated that bush encroachment levels above 2,600 trees per hectare are avoided by foraging *Gyps* vultures (Schultz 2007). It is possible, however, that the expansion of trees into currently unsuitable areas (grasslands) will create more suitable areas for tree-nesting vulture breeding.

It is expected that there will be direct and indirect impacts of global climate change on vultures; however, additional research and monitoring of anticipated and actual effects of climate change on vultures in South Africa is necessary.

5.4 Disturbance of nest sites

A wide range of human activities can cause disturbance and displacement, such as construction of infrastructure, agriculture, aviation, commercial and recreational drone use, mining, blasting and quarrying.

Generally, White-backed Vultures are vulnerable to nest harvesting or disturbance by humans, especially outside protected areas (Bamford et al. 2009). Komen (1985) considered human disturbance at breeding colonies of Cape Vulture a significant problem. Benson and Dobbs (1985) indicated that mountaineering impacts nesting Cape Vultures in South Africa.

Aviation may cause disturbance, which may be a significant problem for already rare species. The South African Air Force maintains a policy of keeping a flight-restricted 2 km buffer from Cape Vulture colonies in the Magaliesberg and de Hoop to avoid disturbance, but as far as it is known, such measures are not widespread elsewhere nor are these regulated and monitored. It has been suggested that recreational aviation has caused disturbance and is on the increase in certain areas (Wolter pers comm 2022).

5.5 Habitat loss, degradation and fragmentation

The impact of habitat change on vulture populations is complex although it is often cited as a contributing factor to vulture declines. This may concern large scale modification affecting food supply (considered above) or other ecological factors. More specifically, cliff or tree-nesting vultures have specific breeding site requirements, which are easily affected by human activities such as quarrying, building of tourist or leisure facilities near breeding cliffs, widening of roads and highways, logging, other forms of deforestation and clearance of large trees in agricultural areas.

Schultz (2007) suggests that bush encroachment in northern Namibia, exacerbated by increasing CO_2 levels worldwide, reduces foraging success in both Cape and White-backed Vultures. This coincided with long term declines in the Cape Vulture population in that country. Land use changes in southern Africa are varied and include degradation by intensive agriculture, cultivation, urbanisation, roads, dams, mines, desertification, afforestation and alien vegetation. Further quantitative research is needed to determine how these factors affect various species of vultures in South Africa. For instance there is already evidence that supplementary feeding in the vicinity of Cape Vulture breeding colonies during the nest-building stage can increase the number of breeding pairs and ultimately the number of offspring (Schabo et al. 2016).

The biodiversity component of the DFFE's newly developed Environmental Screening Tool (EST) is the result of a partnership between South African National Biodiversity Institute (SANBI), the EWT and BirdLife South Africa. All registered environmental assessment practitioners (EAPs) are required to generate an EST report for the site at which a potential development occurs. The EST report flags the presence of threatened species according to different sensitivity levels, which are based on a variety of species data (e.g. nest records, occurrence records or predictive models). Based on the sensitivity level that is triggered by the EST, EAPs are then required to adhere to the legislation in NEMA's Terrestrial Plant/Animal Species Protocols. If threatened bird species, such as vultures, are found to be nesting on the potential development site, a specialist bird survey will be required as mandatory during the EIA process.

5.6 Diseases

Although there has been evidence of infectious diseases such as avian influenza (Ducatez et al. 2007), West-Nile virus and avian malaria in various vulture species across the world, no information on the prevalence of disease and its threat to wild and captive vultures in South Africa is known. However, across vulture ranges, exposure to poultry diseases (e.g., avian influenza, Newcastle's disease) are a potential risk. The increase in global temperatures may facilitate microbial activity, which in turn could have a negative impact on both domesticated and wild animals. The absence of competitive regulation by vultures may also result in increased numbers of mammalian scavengers (e.g., jackals and feral dogs) at carcasses, which may facilitate the spread of diseases such as rabies and canine distemper. This may pose a significant risk to humans, livestock and other wildlife (van den Heever et al. 2021). Globally, our knowledge on how infectious diseases may impact vulture health is a field of research that has been neglected (Ives et al. 2022). The same holds true for South Africa, where studies on the diseases of vultures are few, and indeed the role that vultures play in preventing versus facilitating transmission of diseases remains to be determined (Turnbull et al. 2008).

5.7 Poor enforcement of legislation i.e., prosecution

Despite the existing contemporary legislation providing protection for South Africa's vulture species, the enforcement thereof, has been lacking. The contributing factors include *inter alia* staff turnover within the judiciary and South African Police Service, the non-charismatic nature of the species (in comparison to Rhino, Lion and Elephant), and the inability for conservationists to quantify an economic value for the species. The Cape Vulture is the only species to date which has been economically valued and although only one species out of several have been given a conservation value, this in itself reiterates the importance of saving Africa's vultures. If just one species can be valued at R511 166 523, just imagine the total conservation value of all South African vultures. The conservation value can be summed up as the sum of the species existence value and the impact value and represents the total value created by the species population when it is sustainability and actively protected and managed. *Endangered Wildlife OU. Cape Vulture Evaluation. Kadaka Tee 5-312, 10621 TALLINN, ESTONIA.* Wolter K. VulPro Annual report (2022), www.vulpro.com. Compounding the lack of enforcement, is the inability to link poisoning events to suspects and the limited resources available to investigate environmental crimes. Ezemvelo KZN Wildlife and Wildlife ACT have responded to poisoning events and provided intelligence, however, no follow up takes place. When suspects are apprehended, sentences are either wholly suspended or inadequate.

5.8 Other threats

A range of additional threats affect vulture populations throughout South Africa but these are often more species-specific, with more localised effects than the threats discussed above. However, particularly at breeding sites, these can have locally significant impacts on productivity, the importance of which is likely to increase if vultures continue to decline and populations become more fragmented.

5.8.1 Elephants

The impact from the ever-expanding elephant populations in various protected areas in South Africa is of increasing concern for tree-nesting vultures. To date, Elephant damage to most of the White-backed Vulture nest-trees has been recorded in Atherstone Nature Reserve in Limpopo (J. Heymans, LEDET, pers. comm.), and is suspected to be somewhat overlooked in many other areas. There is ongoing research in the Associated Private Nature Reserves (APNR) along the western boundary of the Kruger National Park, looking at impacts and mitigation options for Elephant damage to vulture nest-trees. This is an aspect that requires further assessment and monitoring across reserves and private conservation areas that have elephants, and which also serve as important breeding sites for tree-nesting vultures.

5.8.2 Poor management plans and approaches

In many cases existing reserve management plans do not specifically address vulture conservation and therefore actions to address threats to the species are not considered or implemented.

5.8.3 Quality of protected areas

Protected areas, and the diversity of species contained therein, play a vital role within the biodiversity conservation matrix. Understanding the local context of a protected area and the human impact thereon

is an important aspect for overall biodiversity conservation (Jones et al. 2018). The lack of appropriate management and resources can impact upon the overall quality of a reserve's biodiversity assets. An example is the case of the Cape Vultures breeding colony at Moletjie Nature Reserve, Limpopo Province, which is currently declining due to disturbance and killings for African traditional medicine (Hirschauer et al. 2021). Kane et al. 2022 found that protected areas in South Africa are used less frequently than those in other parts of the African continent by Gyps vultures.

5.8.4 Drowning

Historically, Cape Vultures were susceptible to drowning with records of at least 120 individuals (21 incidents) being killed in small farm reservoirs in southern Africa between the early 1970s and late 1990s (Anderson et al. 1999). Modifications to many reservoirs have now been made (Boshoff et al. 2009) but drownings do still occur. It is unclear whether this is still a significant threat to Cape Vultures. Seven White-backed Vultures drowned in the Kalahari area and Mokala National Park of the Northern Cape during 2020-2021 (R. Visagie, pers. obs.).

5.8.5 Predation

Predation may be contributing to the decreased vulture breeding success in certain areas of South Africa (K. Wolter pers. comm. 2021). These have been attributed to Leopards, Pythons and Baboons in the Olifants River Private Game Reserve in the 2018 and 2019 surveys. Predation can be expected to increase at certain times, e.g., with drought, but these remain natural occurrences. It is however important that such cases should be monitored and captured in a mortalities database. Predation in this reserve is suspected to be associated with drought impacts, but whether this effect will persist beyond the drought is yet to be determined.

The predation of White-back Vulture eggs by Pied Crows *Corvus albus* has been documented (Johnson and Murn 2019) however further research is required to determine the extent and impact thereof on breeding productivity on other vulture species.

5.8.6 Illegal killing, taking and trade

Other forms of illegal killing, taking and trade in various forms not covered above, can also be directly targeted at vultures. The latest case is where vulture eggs were illegally harvested from South Africa and taken to the United Kingdom where they were confiscated at Heathrow Airport (The Guardian 2018). There are also reports from local communities of vulture killings attributed to boredom and disrespect for the species.

5.8.7 Collisions with aircraft

Aircraft and aviation collisions continue to pose a threat to vultures and there have been a handful of incidents in South Africa with the most recent one (2017) being at one of the Magaliesberg Cape Vulture colonies. Two people flying a small two-seater Cessna aircraft collided with a Cape Vulture above the colony. Both individuals died as a result as well as the vulture (K. Wolter pers. comm. 2021).

5.8.8 Collisions with other modes of transport and fencing

Vultures are occasionally killed on roads and railway lines but there is little substantive data about this in South Africa. Two Cape Vulture (in 1983 and 2015) and two White-backed Vulture (in 2001 and 2017) roadkill records were submitted to the EWT Wildlife Roadkill Application (https://endangeredwildlifetrust.wordpress.com/2013/12/21/the-ewt-launches-citizen-science-roadwatch-data-app/). Train mortalities have been recorded in the APNR in the Lowveld and in Pongola Game Reserve in KwaZulu-Natal (Botha and Coverdale pers. comm.).

Collision with and entanglement in electrical, woven and barbed wire fencing (five Cape Vulture (2006-2016) and two White-backed Vulture (2015-2017) (VulPro unpublished data)) has been recorded in South Africa. Given the high security concerns in South Africa this threat may increase and needs to be monitored.

6. THREATS PER SPECIES AND LEVEL OF THREAT

The drafting team worked as a group to rate threats and strategies as well as produce a diagram of threats to vultures and proposed conservation interventions. The drafting team used the Open Standards for the Practice of Conservation, or Conservation Standards (CS), framework, under the guidance and facilitation of the EWT (Figures 16 and 17). The Conservation Standards (CS), developed by the Conservation Measures Partnership in 2002, are a widely adopted set of principles and best practices from evidence-based conservation, adaptive management, and other decision-support approaches. The CS brings together common concepts, approaches and terminology for conservation project design, management and monitoring to help improve the practice of conservation. The CS can be applied at any geographic, temporal, or programmatic scale. The CS is being used by projects, programmes, organisations and agencies around the world: (https://www.google.com/maps/d/viewer?mid=1SjO0wTkLMeavaWZuSiJagd4Tak0&ll=23.634986547680523%2C27.12113459646116&z=2), and are continuously being updated by the CMP in collaboration with the broader community. This open-source, strategic process helps conservation teams achieve lasting impact (https://conservationstandards.org/about/). At its core, the CS is oriented around a five-step management cycle:

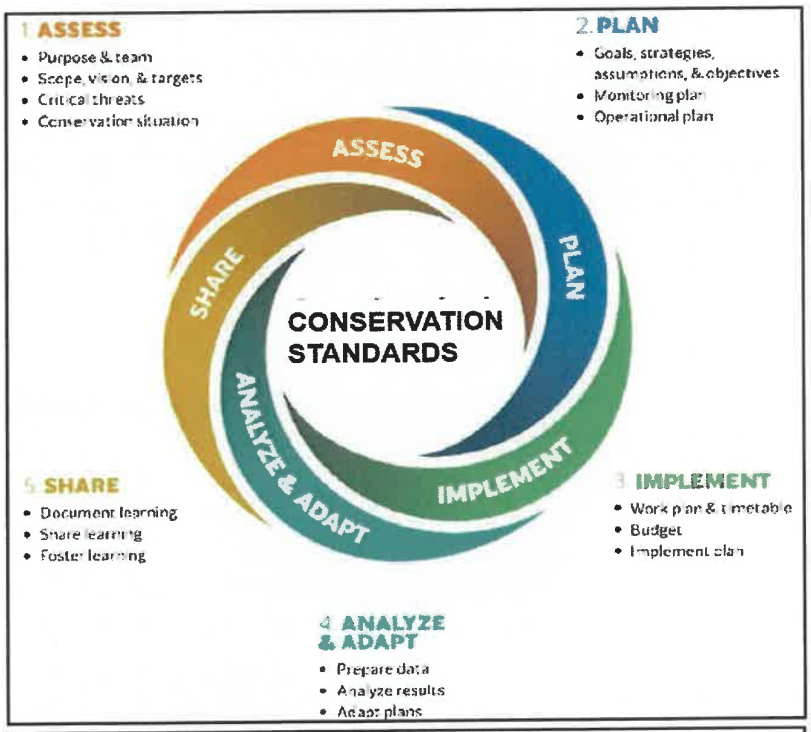

Figure 15: The five-step management cycle of the Conservation Standards

The first step is to create a situation model which is a visual diagram of a situation analysis that represents the relationships between key factors identified in a situation analysis believed to impact or lead to one or more conservation targets. Such an analysis was conducted, and the model shown in Figure 17.

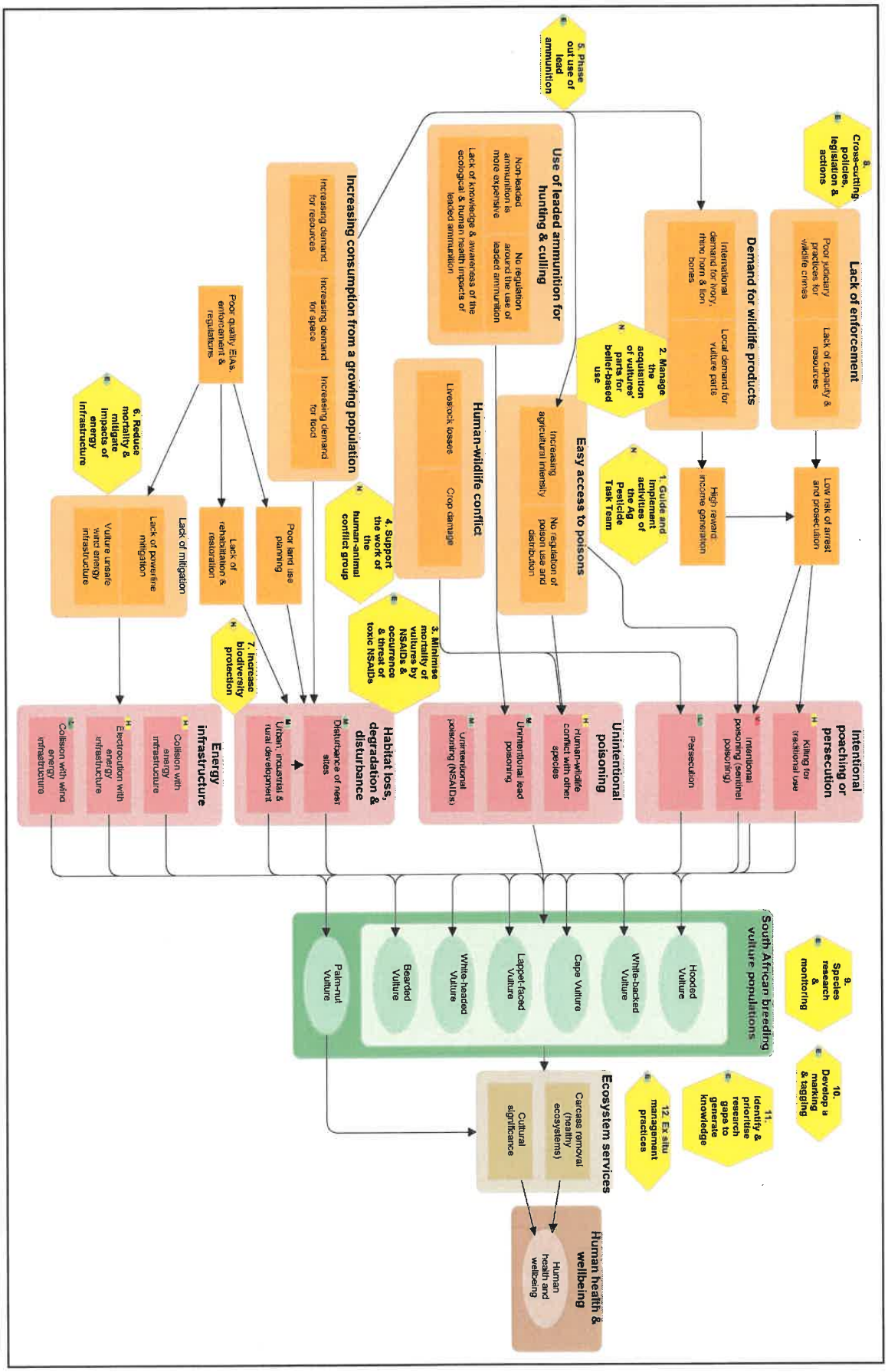

Figure 16: A situation model describing the current situation for vultures in South Africa. The scope of the project (green rectangle) shows the vulture species as the conservation targets (green oval) and the direct threats that affect these species (pink boxes). The orange boxes show the drivers of those direct threats while yellow hexagons display the strategies to be implemented that will reduce the direct threats and/or improve the vulture conservation targets.

Direct threats are defined as primarily human actions that immediately degrade one or more of the conservation targets (in this case, vultures). There are a number of tools and processes to help teams prioritise and rank threats. Most tools assess the extent of the threat and the severity of its impacts on the conservation targets. Together, these two criteria provide an overall threat magnitude. Other frequently used criteria include irreversibility and/or urgency. We used the Threat Analysis function in the online Miradi Share site, which is the software that allows users to implement all five steps of the CS. To rank and prioritise threats, the Threat Analysis function in Miradi Share is based on three criteria: scope (the proportion of the species or habitat expected to be affected by the threat within 10 years); severity (the level of damage to the species or habitat expected if current trends continue); and irreversibility (the degree to which the species or habitat can be restored if the threat is removed) (see Appendix A1 for more details). The Threat Analysis combines the Scope and Severity to give the threat magnitude which is then combined with the Irreversibility to give the threating rating of a single threat on a single conservation target (i.e. specific vulture species). The rating has four potential levels of low, medium, high or very high of that threat on the target. This helps teams to then determine which the most important threats for each target are and which the most important threats are across all targets. This result of this rating for each threat can be seen in Table 2.

Table 2. Summary of each **threat** impact and its accompanying rating

Threats/ Targets	Hooded Vulture	White-backed Vulture	White-headed Vulture	Cape Vulture	Bearded Vulture	Lappet-faced Vulture	Palm-nut Vulture	Summary Threat Rating
Human-wildlife conflict with other species	Medium	Medium	Low	High	High	Medium	Not Specified	High
Unintentional lead poisoning	Medium	Medium	Medium	Medium	Medium	Medium	Not Specified	Medium
Collision with wind energy infrastructure	Not Specified	Low	Not Specified	Medium	High		Not Specified	Low
Persecution	Not Specified	Low	Not Specified	Low	Low	Low	Not Specified	Low
Disturbance of nest sites	Medium	Medium	Not Specified	Medium	Medium	Medium	Not Specified	Medium
Intentional poisoning (sentinel poisoning)	Very High	Very High	Very High	Medium	Not Specified	High	Not Specified	Very High
Unintentional poisoning (NSAIDs)	Low	Medium	Low	Medium	Medium	Medium	Not Specified	Medium
Killing for traditional use	Medium	High	High	High	High	Medium	Low	High
Collision with energy infrastructure	Low	Medium	Low	High	High	Medium	Low	High
Electrocution with energy infrastructure	Low	High	Low	High	Low	Low	Low	High
Urban, industrial and rural development	Low	Medium	Low	Medium	Medium	Medium	Medium	Medium
Summary Target Ratings:	**High**	**High**	**High**	**High**	**High**	**High**	**Low**	**Very High**

In the CS, a strategy is a set of activities with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, optimising opportunities, and limiting constraints. Strategies are placed within a situation model as yellow hexagons (see Fig. 18) and are specifically designed to help the project team change the conservation situation by ultimately reducing the impact of direct threats and/or directly improving the conservation target(s). Teams tend to define many strategies and it is often relevant to rank the strategies against one another. This is called strategy prioritisation or strategy rating. Within the CS, strategies are ranked using two criteria: Potential Impact

and Feasibility (Appendix A2). Combining the potential impact and feasibility gives a strategy summary rating of the effectiveness of a strategy. The rating has five potential levels of very effective, effective, less effective, not effective and needs more information (Appendix A2). This helps teams to then determine which are the most important strategies to be focusing on that will be the most effective. This result of this rating for each strategy can be seen in Table 3[1].

Table 3. Strategy impact prioritisation/rating for the strategies defined in the situation model in Figure 17

Strategy	Potential Impact	Feasibility	Summary Rating
1. Guide and implement activities of the Agricultural Pesticide Task Team	Medium	High	Need More Info
2. Manage the legal acquisition of vulture parts for use in African traditional medicine	Medium	Medium	Need More Info
3. Veterinary (NSAIDs) and human pharmaceuticals with a proven or suspected likelihood of impacting wildlife are kept out of the food chain (Vultures are included in the wildlife)	High	High	Effective
4. Support the work of the human-animal conflict group	Medium	High	Need More Info
5. Reduce the impact of lead on vultures to acceptable levels	High	High	Effective
6. Reduce mortality and mitigate other impacts of energy infrastructure	High	High	Effective
7. Increase biodiversity protection	Medium	High	Need More Info
8. Cross-cutting policies, legislation and actions	High	High	Effective
9. Species research and monitoring	Very High	High	Effective
10. Develop a marking and tagging system	High	Very High	Effective
11. Identify and prioritise research gaps to generate knowledge	High	Very High	Effective
12. *Ex situ* management practices	High	High	Effective

[1] The assessments will be workshopped annually to address the actions required in the BMP.

7. CURRENT CONSERVATION MEASURES

South Africa has a proud history of vulture conservation extending back several decades. Various conservation initiatives including monitoring, awareness and education, and research and advocacy have been implemented under the guidance of provincial conservation agencies and various NGOs, with the publication and implementation of the Biodiversity Management Plan for the Bearded Vulture (*Gypaetus barbatus meridionalis*) for Southern Africa, published on 8 May 2014 as Government Gazette Notice No 37620 (Krüger 2013) being the most notable. Ezemvelo KZN Wildlife has guided vulture conservation in KwaZulu-Natal through the adoption of a provincial conservation strategy and the adoption of formal monitoring programmes.

Other notable activities include:

7.1 **International Vulture Awareness Day (IVAD)**: (initially called the Sasol National Vulture Awareness Day) has been celebrated on the first Saturday of September each year since 2005. The aims of this day are to raise awareness of our threatened vulture species, and also to highlight the work done by all stakeholders to monitor populations and implement effective conservation measures for vultures and their habitats.

7.2 **The Bearded Vulture Recovery Programme**: An international collaboration between South Africa and Lesotho aimed at improving the conservation status of the species across its southern African range, guided by the Bearded Vulture BMP. Conservation activities implemented under the programme include a captive breeding programme, monitoring, awareness and advocacy.

7.3 **Vulture Safe Zones**: A new collaborative initiative, aimed at engaging with landowners and encouraging them to remove threats to vultures in key vulture foraging and breeding areas, as identified using tracking data. The success of the implementation of the Vulture Safe Zone concept relies upon the cooperation of all parties advocating such and underscores the need to establish a Vulture Safe Zone Alliance ("**VSZA**") to coordinate, establish, and effectively implement VSZ across South Africa.

7.4 **Poison response training**: Conservation Officers, game rangers, guides and other on-the-ground staff working in wildlife poisoning hotspots are trained to respond to poisoning incidents to *inter alia* limit the impact of poisoning events and to ensure that the necessary evidence is collected to ensure that criminal processes can be pursued.

7.5 **Tagging, marking and tracking**: Various agencies have implemented tagging, marking and tracking programmes to improve the understanding of vulture species' biology and movements to influence conservation action. However, a standardised method for performing tagging and marking needs to be developed to prevent harm to individuals.

7.6 **Awareness**: Various organisations are implementing awareness initiatives aiming to reduce the negative impact on vultures, ranging from, but not limited to, conservation entities, rehabilitation centres, non-governmental organisations, etc.

Unfortunately, some of these activities have been uncoordinated resulting in duplication of effort or confusing outcomes. This BMP is intended to ensure a coordinated approach to conservation activities, including education and awareness.

7.7 **Vulture rehabilitation and re-release**: Centres and individuals around the country collect injured or grounded vultures and provide veterinary and supportive care. VulPro is one such centre and has successfully rehabilitated and returned 383 vultures to wild populations over the past 10 years (VulPro Annual Report 2022). In a long-lived, late-maturing population, where birds do not begin to breed until 7 years of age, every individual returned to a population is significant."

7.8 **Ex situ breeding, reintroduction, and monitoring**: VulPro and Raptor Rescue both manage centres around the country that breeds captive vulture to supplement wild populations, non-releasable vultures and release offspring to supplement wild populations. To date, VulPro has released over 50 captive-bred vultures. These birds are also fitted with satellite transmitters before release, therefore contributing significantly to research knowledge (Jobson et al. 2021)".

8. RESEARCH INVENTORY AND SUMMARY

Previous research on vultures in South Africa has focused on diet (Brown and Plug 1990), movement ecology (Urios et al. 2010; Phipps 2012; Phipps et al. 2013, Krüger et al. 2014a; Pfeiffer et al. 2015; Thompson et al. 2020a), breeding parameters and nest-site selection (Kemp and Kemp 1975; Herholdt and Anderson 2006; Murn and Holloway 2014; Benson 2015; Krüger et al. 2015b; Murn et al. 2017; Pfeiffer et al. 2017; Thompson et al. 2017a, b), baseline health parameters (Naidoo et al. 2008a, b; Naidoo et al. 2016), longevity records (Paijmans et al. 2017), attitudes towards vultures (Hiltunen 2008; Brink et al. 2020a; Mashele et al. 2021a), the efficacy of supplementary feeding sites (Yarnell et al. 2015; Kane et al. 2016; Zimunya 2018; Brink et al. 2020b), parasites (Hoogstraal et al. 1968), population estimates (Anderson et al. 2002; Wolter et al. 2007; Murn et al. 2013; Krüger et al. 2014a; Murn et al. 2015; Benson and McClure 2020) and population declines (Krüger 2014; Thorley and Clutton-Brock 2017), distributions (Mundy 1978; Krüger et al. 2014b; Hirschauer et al. 2017), morphometrics (Mabhikwa et al. 2017, Hirschauer et al. 2018), conservation planning (Jarvis et al. 1974; Boshoff and Anderson 2007), the legislation protecting vultures (Loon 1995; Thompson and Blackmore 2020), vulture rehabilitation (Bartels et al. 2007), and observations of *ex situ* vulture behaviour (Naidoo et al. 2011; Hirschauer and Wolter 2017).

Research has also focused on the threats to vultures in South Africa, including drowning (Anderson et al. 1999), electrocutions (Ledger and Annegarn 1981; Boshoff et al. 2011), climate change (Simmons and Jenkins 2007; Phipps et al. 2017), NSAIDs (Anderson et al. 2005; Swan et al. 2006a,b; Naidoo et al. 2008c; Naidoo et al. 2009a,b; Naidoo et al. 2010; Fourie et al. 2015), lead poisoning (Naidoo et al. 2012; Naidoo et al. 2017; Krüger and Amar 2018; van den Heever et al. 2019), wind-farm collision risk (Rushworth and Krüger 2014; Reid et al. 2015); traditional medicine (McKean and Mander 2007; McKean et al. 2013; Mashele et al. 2021b), destruction of vulture nest trees by elephants (Vogel et al. 2014; Rushworth et al. 2018), various forms of poisoning (Van Wyk et al. 2001a, b; Ogada et al. 2016; Monadjem et al. 2018), and other threats (Thompson et al. 2020b).

9. THE SUMMARY OF THE PLANNING METHODOLOGY

The development of this BMP followed the process that is provided in the Standards for Biodiversity Management for Species (BMP-S) of 2009. That is, identification of stakeholders and appropriate stakeholders engagements towards the development of BMP. Development of the background document is based on the format provided in the Norms and Standards for BMP-S.

9.1 Identified key role players

Table 4 below provides the list of organisations which are key role players involved in the conservation and management of Vultures in South Africa. The list of all stakeholders involved in the development and the implementation of this BMP is provided for in Appendix 1 of this document.

Table 4: Organisations that are involved in developing and implementing various aspects of the Vulture species BMP for South African breeding vulture species

National Governments and their Entities	• Department of Forestry, Fisheries and the Environment (Biodiversity and Conservation, Legal Authorisations and Compliance Inspectorate (LACI) • Department of Agriculture, Land Reform, and Rural Development (DALRRD) • South African National Biodiversity Institute • South African National Parks • South African National Police Services • Department of Health • Eskom
Provincial Government and their Entities	• Eastern Cape Province: Department of Economic Development, Environmental Affairs and Tourism • Free State Province: Department Economic, Small Business Development, Tourism and Environmental Affairs • Gauteng Province: Department of Agriculture and Rural Development • Limpopo Province: Department of Economic Development, Environment and Tourism • Northern Cape Province: Department of Environment and Nature Conservation • CapeNature • Eastern Cape Parks and Tourism Agency • Ezemvelo KwaZulu-Natal Wildlife • Mpumalanga Tourism and Parks Agency • North West Department of Economic Development, Environment, Conservation and Tourism, and North West Parks and Tourism Board
Community Organisations and Programmes	• People and Parks Programme • Traditional Health Practitioners and Healers Organisations
Academic Institutions	• University of the Free State • University of Cape Town: Animal Demography Unit

	• University of Western Cape • Stellenbosch University • University of KwaZulu-Natal
Non-Government Organisations & Wildlife sector	• African Raptor Trust • BirdLife South Africa • Endangered Wildlife Trust • VulPro • Wildlife ACT • Traditional Health Practitioners and Traditional Healers • South African Hunters and Game Conservation Association (SA Hunters) • Confederation of Hunting Associations of South Africa • Wildlife Forum

9.2 Stakeholder engagements

South Africa, through the National Vulture Task Force (NVTF), initiated the development of this BMP for seven (7) South African vulture species. This was initiated in 2018 in a workshop to discuss the implementation of Resolution 11.14 of the CMS on the Vulture MSAP. Stakeholders at this workshop established a drafting team who developed the actions and a plan for the development of this BMP and a team to review the document before finalisation and take it through the public participation process. A background document consisting of all current information on vulture species was developed based on the Vulture MSAP and distributed to the drafting team for inputs and discussed at the National Vulture Task Force meeting in October 2019.

9.2.1 Drafting Bootcamp

The drafting team met in March 2020 to consider comments from the October 2019 workshop. The revised draft BMP was circulated to the NVTF members and other relevant stakeholders for inputs and comments before finalising for a formal public participation process as prescribed by the Biodiversity Act.

The drafting team consisted of the representatives from several sectors, namely Government (National department, provincial conservation Authorities and relevant entities), Non–Governmental Organisations (NGOs) and industry.

9.2.2 Identification of Lead Agency

The NVTF is to oversee the implementation of this BMP as per the action plan contained in the BMP.

9.2.3 Expert review of the BMP

An expert review panel was established consisting of officials representing the following organisations: DFFE, SANParks, EWT and SA Hunters

10 THE ACTION PLAN STATING THE OBJECTIVES AND ACTIONS FOR DEALING WITH EACH OF THE THREATS ADVERSELY AFFECTING THE SPECIES

In order to ensure that the decline of vulture populations in South Africa is halted and reversed, this BMP identifies a number of key actions that are required to address the threats facing these species. Actions are grouped according to the 13 objectives identified and include the responsible persons, collaborators, deliverables, measurable outcomes, and the timeframes within which such must be achieved.

Table 5. Objectives and actions

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
Objective 1: To reduce and eventually halt the practice of intentional poisoning of vultures and its impact * Cross-reference the NWPPWG work plan						
1.1To ensure risks to vultures are included in the work of the Agricultural Pesticide Task Team of the NWPPWG - Report to the National Vulture Task Force Annually	DFFE DARDLA DoH A designated NVTF member	Provincial Conservation Authorities, NGOs Agricultural Pesticide Task Team	Time, funding, social capital, inter-governmental platforms for engagement	Annual feedback report on activities of the group. A NVTF member is assigned to represent such on the Agricultural Pesticide Task Team.	Annually	Significant reduction in number of vultures poisoned each year as a result of agricultural pesticides (OBJECTIVE 1 and 2 of the NWPPWG Implementation plan).
Objective 2: To work alongside traditional medicine practitioners to ensure the implementation of responsible and sustainable practices that will contribute to the conservation of the species.						
2.1Use existing platforms e.g., MoUs nationally for engagement with all parties including Traditional	DFFE - Conservation Management/ BESU	DOH, NVTF Traditional Health Practitioners and Healers Communities	Funding	Minutes, agenda, presentations, TORs, constituted meeting, provincial structures, environmental monitors, Traditional Health Practitioners and Healers, and leaders A committee of Traditional Health Practitioners and Healers,	1-2 years, on-going after the publication of the BMP in the gazette	Relationship with communities, consumers, Traditional Health Practitioners and Healers and conservation organisations;

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
Health Practitioners and Healers government, traders etc.				Traditional Leaders, conservationists, and Lawyers to be established to deal with regulations to outlaw poisoning (combine section 24 and NEM: BA).		
2.2Create a database of all Traditional Practitioners and investigate feasibility of compulsory membership	DOH	DFFE Provincial Conservation Authorities Traditional Health Practitioners and Healers	Funding	Functional and working database	1 year after publication of BMP	Accessible database to conservation officials.
2.3Improve the understanding of the cultural value and demand for vulture parts and investigate the feasibility of sustainable use of vultures, through the formation of a	DOH	DOH, NVTF Traditional Health Practitioners and Healers Research Institution	Funding	Minutes of the sub-committee Awareness campaign implemented Demand and feasibility studies (*Understanding the turnover, usage, alternative to vultures, body parts used)*	1-2 years, on-going after the publication of the BMP in the gazette	Completed feasibility and demand study

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
sub-committee.						
Objective 3: To ensure that veterinary and human pharmaceuticals with a proven or suspected likelihood of impacting wildlife are kept out of the food chain. (Refer to the National Poison Prevention Working Group)						
3.1To ensure risks to vultures are included in the work of the NWPPWG - Report form the Chair of the NWPPWG	DFFE - the coordinator of the NWPPWG Implementation Plan	DoH, DARDLA Provincial Conservation Authorities, NGOs Veterinary institutions Member of the NVTF that are represented on the NWPPWG	Time, funding, social capital, inter-governmental platforms for engagement	Annual feedback report on activities of the group. A NVTF member is assigned to represent on NWPPWG	Annually and ongoing	Significant reduction in number of vultures exposed to harmful veterinary and human pharmaceuticals and capture drugs (OBJECTIVE 4 of the NWPPWG implementation Plan)
Objective 4: Provide environmentally friendly alternative measures to control damage causing animals to avoid causing harm to non-target species						
4.1To support the work of the NWPPWG	DFFE - the coordinator of the NWPPWG Implementation Plan	NGOs, Provincial Conservation Authorities, DARDLA	Time, funding, expertise	Information brochures, train the trainer/extension officer workshops	Annually	Proactive HWC mitigation tools and support in place. OBJECTIVE 3 of the NWPPWG Implementation Plan

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
Objective 5: To reduce lead exposure to vultures, preventing lead poisoning as well as related harmful side effects caused by the exposure to lead toxicity.						
5.1To support the activities of the lead task team of the NWPPWG	The Chair of the Lead Task Team	DFFE, NGOs, Provincial Conservation Authorities Lead Task team	Time, funding, expertise	Annual report on activities of the lead task team as they pertain to vultures A NVTF member is assigned to represent on the Lead Task Team	Ongoing	Significant reduction in vulture blood lead levels across all colonies. Significant reduction in bone lead levels from vultures found dead OBJECTIVE 10 and 11 of the NWPPWG Implementation Plan
Objective 6: To substantially reduce vulture mortalities caused by existing energy infrastructure and mitigate any losses to vultures from new energy infrastructure						
6.1Undertake a risk assessment of all new and existing energy infrastructure and implement mitigation measures	Eskom COGTA DFFE	DFFE, Municipalities NGOs, provincial authorities Eskom/EWT Partnership (or appropriate independent body)	Time, funding, capacity	Distribution power lines within a 2.5km radius of breeding sites, roosting sites, foraging sites and registered supplementary feeding sites must have bird friendly structures and/or be mitigated as necessary and where possible. Transmission power lines within a 2.5km radius of breeding sites, roosting sites, foraging sites and registered artificial feeding sites must be marked with visible bird flight diverter devices. EIA specialist studies must be conducted by SACNASP	1-5 years, ongoing	Percentage of bird friendly Distribution structures, spans of marked Distribution and Transmission power lines, number of EIA avifaunal specialist studies done for Transmission power lines and wind farms.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
				registered scientist, preferably with experience in vultures, for wind farms and power lines (132kv and above) within areas with vulture breeding sites, roosting sites, key foraging sites and Supplementary feeding sites and areas with flight corridors.		
6.2Assess the effectiveness of existing and proposed mitigation measures	Eskom COGTA	DFFE, Municipalities NGOs, provincial authorities	Time, funding, capacity	Comparing differences in fatalities and injuries between before and after a structure was mitigated; analysis of results	1-5 years, ongoing	Number of publications resulting from the analysis
6.3 Promote the consideration of vultures in planning, impact assessment and environmental management programmes for renewable energy infrastructure.	DFFE provincial authorities	Municipalities NGOs, environmental assessment practitioners, renewable energy industry (e.g. SAWEA)	Time, funding, capacity	Strategic Environmental Assessments, EIAs and Environmental Management Programmes (EMPrs) are informed by guidelines bird-friendly energy technology (e.g. CMS, IUCN guidelines and Birds and Renewable Energy Specialist Group endorsed guidelines). Commitments to protect vultures are reflected in environmental authorisations and EMPrs.	1-5 years, ongoing	Number of vulture fatalities per MW per year.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
				Implementation of these commitments are audited and enforced so that all high-risk unsafe energy infrastructure is mitigated. Fatalities of vultures at renewable energy facilities are monitored and reported.		
Objective 7: To use a range of conservation mechanisms for increasing the land under biodiversity protection						
7.1 Identify all known national nesting sites and key foraging areas which are not formally protected as well as areas for range expansion and then encourage participation in conservation stewardship programmes	DFFE (Biodiversity Planning and Stewardship) SANBI (coordination)	Universities, , SANParks NGOs landowners, Provincial Conservation Authorities	Funding, time, capacity.	Identification of previously unknown nest sites and key foraging areas, engagement with landowners, farmers and communities in areas surrounding nest sites and key foraging areas.	5 years, ongoing	Number of individuals and communities engaged in key areas, number of nest sites and key foraging areas identified.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
7.2 Ensure that vultures are included in both provincial and national Protected Area expansion strategies and other key conservation planning tools	DFFE - Biodiversity Conservation and Protected Area Systems Management	SANBI SANParks, Provincial Conservation Authorities, Conservation NGOs on the NVTF	Time	Nesting sites and key foraging sites nationally form part of Protected Areas Network	5 years, ongoing	Percentage of key areas (nest sites and key foraging areas) protected
7.3.1 Coordinate the establishment of the Vulture Safe Zone Alliance[2]	NVTF	SANBI Conservation NGOs/ Provincial	Funding, time, capacity	Vulture Safe Zone Alliance established though and MoU developed.	3 years and ongoing	Signed Vulture Safe Zone Alliance MoU

[2] A process of consultation involving various interested parties, including relevant government agencies from all three spheres of governance, non-governmental organisations, tertiary education institutions and relevant business sectors, underscored the need to establish a Vulture Safe Zone Alliance (VSZA) to coordinate, establish, and effectively implement VSZ across countries within South Africa. Various bodies have, to date, been involved and remain involved in the conservation and monitoring of vultures across southern Africa, and that these bodies should continue to be so involved with increasing effort to ensure coordination of their investments. The effectiveness of the VSZA requires a sound institutional framework to derive and govern the implementation of a VSZA Strategy.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
7.3.2 Coordinate the development and implementation of the Vulture safe zones	Vulture Safe Zone Alliance	Conservation Authorities DFFE- PASM (OECM) and the TFCA unit Landowners and communities	Funding, time, capacity	An online tool (developed using GIS modelling) identifying areas covering key vulture habitat that should be established as Vulture Safe Zones Establishment of areas identified in (1) as Vulture Safe Zones, including all protected areas that host vulture populations In collaboration with regional country partners, TFCAs that host vulture populations are established as Vulture Safe Zones.		A Vulture Safe Zone concept, and the implementation thereof, that helps drive the threat mitigation measures identified in this document
Objective 8: To support vulture conservation through cross-cutting policies, legislation, and actions to enable mitigation of critical threats						
8.1 Ensure that vulture breeding and roosting data (and risk models) are included in DFFE's EIA screening tool	DFFE and SANBI	Provincial Conservation Authorities, SANParks, Universities, Conservation NGOs	Funding, time, capacity	Spatial layer created Protocol for assessing and reporting impacts on cliff nesting vultures gazetted.	2 years and ongoing	The use of spatial layer in EIA process

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
8.2 Ensure that all national and provincial legislation is updated to address the current conservation status of all vultures.	DFFE and SANBI	Provincial Conservation Authorities, COGTA	Funding, time, capacity	Updated legislation	3 years and ongoing	Conservation status of all vultures assessed, and legislation amended
8.3 Ensure that there is no conflict between the BMP and new proposed environmental and biodiversity legislation	DFFE	NVTF	Funding, time, capacity	Amended BMP (where applicable) or comment submitted when conflict exists.	Ongoing	Compatible legislation
8.4 Creating an enabling and effective information sharing service for information exchange on	SANBI	NVTF	Funding, time, capacity	Effective information sharing service on vulture conservation developed and implemented	3 years and ongoing	Shared resources

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
vulture conservation.						
8.5 Update of the Red List assessment of vultures	SANBI	NGOs, Eskom	Funding, time, capacity	Updated Red list assessment	3 years	Updated Redlist Assessment for Vultures
8.6 Develop an effective law enforcement and judicial training programme	DFFE	NVTF Biodiversity Investigators Forum	Funding, capacity	Training schedule	2 years and ongoing	Trained Law Enforcement Officers with certificates
Objective 9: To monitor the status of all species of vulture that occur in South Africa at an appropriate interval to inform policy and conservation actions.						
9.1 Review and assess current gaps of all existing monitoring programmes being undertaken in South Africa	DFFE and SANBI	Provincial Conservation Authorities, SANParks, Universities, Conservation NGOs, Wildlife sector	Time, funding	Expand monitoring programmes to address gaps (all species and locations) but continue with existing monitoring	6 months post publication of BMP	Assessment report

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
9.2 Develop a monitoring plan for all Vultures in South Africa	DFFE and SANBI	Provincial Conservation Authorities, SANParks, Universities, Conservation NGOs	Time, capacity, funding	Development of a monitoring plan for each species	5-year plan	Completion and implementation of monitoring plans for each species
9.3 Create a national repository for all vulture monitoring	DFFE	Universities, Conservation NGOs, Provincial Conservation Authorities SANBI	Time, funding, networking, IT systems	National data spatially explicit data repository, with links to existing databases such as movebank (with protection options and restricted access to certain datasets)	Ongoing, December 2025	National functional, searchable database
9.4 Establish a monitoring subcommittee of the NVTF	DFFE, provincial nature conservation authorities	NGOs, Universities	Time	Establish a group of high reputable researchers, conservationists, and academics	1 year	Finalization of a monitoring sub-committee
Objective 10. Develop a standardised marking and tagging system for all vulture species						
10.1 Establish norms and standards (to be adopted by provincial conservation authorities who	DFFE – (TOPS and CITES sections)	NGOs, Universities, Provincial Conservation Authorities, animal welfare Institutions,	Time	Establish baseline sizes (dimensions and weight) of marking and monitoring devices per species Renew existing protocols based on published data	December 2022	Norms and standards are in place (and included as a condition in provincial permits).

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
issue permits) for the marking (tagging) of vultures.		SAFRING, IUCN SSC Vulture Specialist Group		Review the effects of monitoring techniques and methods on the welfare, survival and movement of vultures Inform all applicable ethics committees of the accepted standards		
Objective 11: Identify research gaps and conduct research to generate knowledge, create a centralised data hub and provide information relevant to conservation management requirements, both in situ and ex situ						
11.1 Establish a research sub-committee of the NVTF	DFFE	SANBI, Conservation NGOs, Universities	Time	Establish a group of high reputable researchers, conservationists. and academics	Year 1	Appointment of research sub-committee
11.2 Develop a national vulture research action plan	Research sub-committee of the NVTF	NVTF NGOs, Universities	Capacity, time	A research action plan document that identifies, lists, and regularly updates, priority research needed to fill important knowledge gaps (around key and emerging threats to vultures);	1 Year	Encourage research on vultures that addresses the identified priorities research areas and knowledge gaps
11.3 Investigate the feasibility of reintroduction of Egyptian Vulture	Research sub-committee of the NVTF, Breeding Steering Committee	NGOs, Universities, and partners	Funding, species, facilities	A formal state of knowledge assessment. Scientific papers and recommendations	Ongoing and yearly updates	Feasibility Report on the Egyptian Vulture

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
11.4 Continuously evaluate the research programme on use of vulture parts in African traditional medicine	Research sub-committee of the NVTF	Academic and Conservation Institutions and NGOs SANBI, Traditional Health Practitioners and Healers	Funding, Time Students	A formal state of knowledge assessment. Scientific papers and recommendations	Ongoing and yearly updates	Improved understanding of the use of vulture parts in African traditional medicine, recommendations
11.5 Develop an SOP for collection of Vulture samples for subsequent molecular analysis and BioBanking	SANBI	Provincial Conservation Authorities Academic Institutions NGOs	Funding, Time Students	An SOP for collection and storage for DNA analysis to conserve vulture genetic material developed	1 year	Collection and BioBanking of genetic samples
11.6 Co-ordinate the creation of genetic markers for all South African vulture species.	SANBI	Provincial Conservation Authorities Academic Institutions NGOs	Funding, Time Students	Complete genetic markers for all species Genetic management system, Vudis (Vulture DNA index system),	2 years	Complete understanding of genetic composition of South Africa's vultures VUDIS System in place and functional

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
Objective 12: Ensure appropriate ex situ management practices that benefit vulture conservation						
12.1 Develop vulture care and release protocols for rehabilitation facilities	Breeding Steering Committee	Provincial Conservation Authorities, CORE - Collaboration of all Rehab centres Welfare institutions	Funding, time, capacity	Basic minimum protocols workshopped and developed	Year 3	Rehabilitation and release protocols for all species in place
12.2 Establish a coordinated mechanism for the NVTF to receive and assess captive breeding proposals	DFFE	Conservation NGOs, SANBI - NZG Provincial Conservation Authorities BVRP SANBI - NZG	Funding, time, capacity	Terms of Reference for the establishment and the List of members Basic minimum protocols	1 year	• Established Breeding Steering Committee under the NVTF • Protocols for assessment in place
12.3 Develop ex-situ breeding programmes that support in-situ vulture conservation.	Breeding Steering Committee BVRP	NGOs, Provincial Conservation Authorities	Funding, time, staffing capacity, birds to breed with	Criteria to determine when a species requires captive breeding. Determine Identified species requiring captive breeding. Criteria as to when and how releases are planned	Ongoing	The number of species breeding pairs producing progeny to augment the wild population.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
Objective 13: Promote vulture conservation through effective education and awareness						
13.1 Establish an Awareness sub-committee to formulate an awareness strategy	DFFE and Sub-committee	NGO's, Provincial Conservation Authorities, Tertiary Institutions, Wildlife sector	Funding, time, expertise	An awareness strategy with appropriate awareness material	1 year	Approved and implemented Strategy
13.2 Provide information for members of the Traditional Health Practitioners sector and communities regarding the conservation status of vultures and the role they play within ecosystems	DFFE	THO[3] and the National Vulture Task Force NGO's, Provincial Conservation Authorities	Funding, time and expertise	Ensure that new appropriate material developed by the awareness strategy about vultures is shared with Traditional Health Practitioners and Healers through formal engagements. Ensure that new appropriate material developed by the awareness strategy shared with communities, through meetings, awareness campaigns and other initiatives	ongoing but reviewed annually	Awareness material available and displayed in communities and Traditional Health Practitioners and Healers meetings and establishments.

[3] There are about 44 organisations of Traditional Healers, but the THO is the largest organisation with 78 000 members.

Actions	Lead Party	Collaborators	Resources Needed	Deliverables	Timeline	Measurable Outcomes
13.3 Celebrate International Vulture Awareness Day (IVAD) each year (1st Saturday of September each year), by holding outreach activities.	DFFE	National Vulture Task Force	Funding	The IVAD is integrated into the awareness strategy and celebrated annually with increasing number of participants.	ongoing but reviewed annually	IVAD Annual report compiled by the National Vulture Task Force to assess reach and number of participants.

11. IMPLEMENTATION MECHANISM AND REPORTING FRAMEWORK

The DFFE established a NVTF to assist the country in dealing with Vulture Conservation issues including the development of the BMP for seven vulture species.

The main objectives of the NVTF amongst others are to:

- coordinate the implementation of the Multi-Species BMP for South Africa's Vultures
- promote the implementation of other relevant policies and plans that contribute to the conservation of vultures
- advise on vulture matters in the country
- facilitate resource mobilisation
- report on progress and monitor implementation of the BMP.
- Encourage Lead Parties to implement actions required within the BMP, and where progress is not made to initiate mechanisms to achieve such
- Funding mechanism and avenues to explore to secure funding for the implementation of the BMP
    - GEF7 and 8. Internal budgets. Grants, etc.

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APPENDICES:

Appendix 1: Miradi Sharesite Threat analysis

Threats were ranked using three criteria: Scope, Severity, and Irreversibility.

- **Scope:** proportion of the target expected to be affected by the threat within 10 years or three generations.

4 = Very High: The threat is likely to be pervasive in its scope, affecting the target across all or most (71-100%) of its occurrence/population.
3 = High: The threat is likely to be widespread in its scope, affecting the target across much (31-70%) of its occurrence/population.
2 = Medium: The threat is likely to be restricted in its scope, affecting the target across some (11-30%) of its occurrence/population.
1 = Low: The threat is likely to be very narrow in its scope, affecting the target across a small proportion (1-10%) of its occurrence/population.

- **Severity**: level of damage to the target expected if current trends continue.

4 = Very High: Within the scope, the threat is likely to destroy or eliminate the target, or reduce its population by 71-100% within ten years or three generations.
3 = High: Within the scope, the threat is likely to seriously degrade/reduce the target or reduce its population by 31-70% within ten years or three generations.
2 = Medium: Within the scope, the threat is likely to moderately degrade/reduce the target or reduce its population by 11-30% within ten years or three generations.
1 = Low: Within the scope, the threat is likely to only slightly degrade/reduce the target or reduce its population by 1-10% within ten years or three generations.

- **Irreversibility**: degree to which the target can be restored if the threat is removed.

4 = Very High: Effects of the threat cannot be reversed and it is very unlikely the target can be restored, and/or would take >100 years to achieve.
3 = High: Effects of the threat can technically be reversed and the target restored, but it is not practically affordable and/or it would take 21-100 years to achieve.
2 = Medium: The effects of the threat can be reversed and the target restored with a reasonable commitment of resources and/or within 6-20 years.
1 = Low: The effects of the threat are easily reversible and the target can be easily restored at a relatively low cost and/or within 0-5 years.

Scope + Severity = Threat Magnitude

		Scope			
		Very High	High	Medium	Low
Severity	Very High	Very High	High	Medium	Low
	High	High	High	Medium	Low
	Medium	Medium	Medium	Medium	Low
	Low	Low	Low	Low	Low

Threat Magnitude + Irreversibility = Threat Rating

		Irreversibility			
		Very High	High	Medium	Low
Magnitude	Very High	Very High	Very High	Very High	High
	High	Very High	High	High	Medium
	Medium	High	Medium	Medium	Low
	Low	Medium	Low	Low	Low

Appendix 2: Miradi Strategy ranking criteria

Strategies are ranked using two criteria: Potential Impact and Feasibility.

Potential Impact: Degree to which the strategy (if implemented) will lead to desired changes in the situation at your project site.

- Very High – The strategy is very likely to completely mitigate a threat or restore a target.
- High – The strategy is likely to help mitigate a threat or restore a target.
- Medium – The strategy could possibly help mitigate a threat or restore a target.
- Low – The strategy will probably not contribute to meaningful threat mitigation or target restoration.

Feasibility: Degree to which your project team could implement the strategy within likely time, financial, staffing, ethical, and other considerations.

- Very High – The strategy is ethically, technically, AND financially feasible.
- High – The strategy is ethically and technically feasible but may require some additional financial resources.
- Medium – The strategy is ethically feasible, but either technically OR financially difficult without substantial additional resources.
- Low – The strategy is not ethically, technically, OR financially feasible.

		Feasibility			
		Very High	High	Medium	Low
Potential Impact	Very High	Very Effective	Effective	Less Effective	Not Effective
	High	Effective	Effective	Less Effective	Not Effective
	Medium	Less Effective	Less Effective	Less Effective	Not Effective
	Low	Not Effective	Not Effective	Not Effective	Not Effective

LIST OF STAKEHOLDERS INVOLVED IN THE BMP DEVELOPMENT PROCESS

Organisation	Nominated representative
African Raptor Trust	Shannon Hoffman
BirdLife South Africa	Hanneline Smit-Robison Melissa Howes-Whitecross Linda van den Heever
CapeNature	Coral Birss Marienne De Villiers Deon L. Hignett Andrew Turner
Department of Agriculture, Forest & Fisheries (DAFF)	Morongwa Senyatsi
Department of Forestry, Fisheries and the Environment (DFFE)	Skumsa Ntshanga Mukondi Matshusa Humbulani Mafumo Tebogo Mashua Morongoa Pheeba
Eastern Cape Department of Economic Development, Tourism and Environmental Affairs (EC: DEDTEA)	Dean Ricketts
Eastern Cape Parks & Tourism Agency	Dean Peinke
Endangered Wildlife Trust	Gareth Tate, Lindy Thompson, Andre Botha
Gauteng Department of Agriculture, Rural Development & Environment (GDARDE)	Craig Whittington-Jones
Eskom	Kishaylin Chetty
Ezemvelo KwaZulu Natal Wildlife (EKZNW)	Brent Coverdale Sonja Krüger
Limpopo (LEDET)	Joseph Heymans
Maloti Drakensberg Transfrontier Programme	Joyce Loza
Mpumalanga (MTPA)	Theo Mol
North West (READ)	John Power, Nedick Bila
People & Parks: Community	Lulama Matyolo Daniel Motshegare
People & Parks: Youth in Conservation	Sicelo Mpemba
South African Hunters and Game Conservation Association (SA Hunters)	Lizanne Nel Boetie Kirchner
South African National Biodiversity Institute (SANBI)	Theresa Sethusa

South African National Parks (SANParks)	Danny Govender
Traditional Healers Organisation	Gogo Phephisile Maseko Gogo Bakhombisile Maseko
VulPro	Kerri Wolter
Wildlife ACT	Chris Kelly

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