

South Africa Elephant Research Strategy



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



**South African
NATIONAL PARKS**



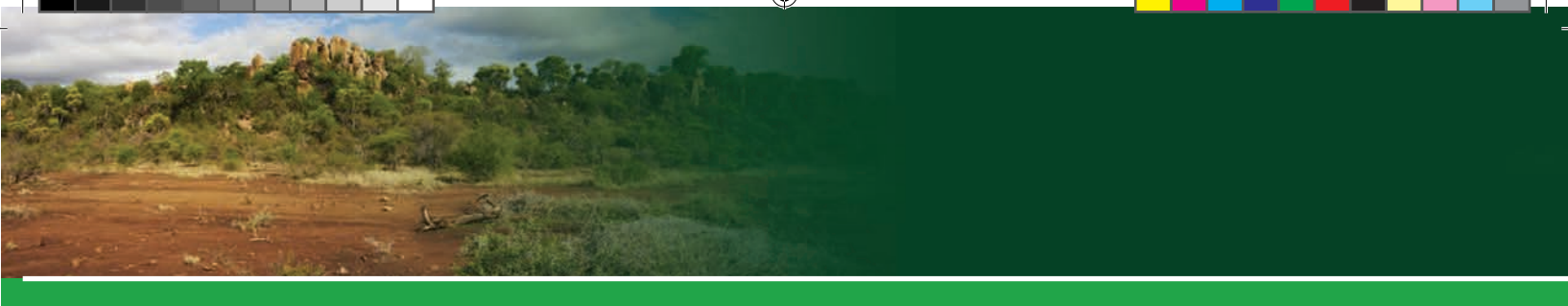


South Africa Elephant Research Strategy

2014-2024

Prepared by Department of Environmental Affairs and South African National Parks





FOREWORD

South Africa is blessed with abundant biodiversity. Loss of biodiversity inevitably leads to ecosystem degradation and subsequent loss of important ecosystem services. Our path towards sustainable development, poverty alleviation and enhanced human well-being for all, is therefore dependent on how well we are able to manage and protect natural resources including biodiversity.

Elephants are a keystone species in the South African landscape. They play a significant role in creating and maintaining ecosystems that allow or influence persistence of other species. Elephants are amongst the most magnificent but also problematic members of South Africa's wildlife population. They provide several economic opportunities, such as ecotourism. However, elephants also influence people's lives as they cause damage to their property and sometimes threaten human life.

The effects that elephants have on various ecological values are not solely related to their numbers. Such effects also depend on where elephants spend time, including factors influencing these, such as what elephants do when they are at a particular place. Managing the effects that elephants may have on these varied values comprises one of the most important decisions in wildlife management in South Africa. Our observation is that information about efforts to manage the effects that elephants have on these ecological values is generally not readily accessible to the relevant managers and conservation authorities in the country. Much of it is scattered in various reports and scientific papers or is part of the unwritten expert knowledge.

The main objective of this Elephant Research Strategy is to provide a framework that enhances implementation of the Norms and Standards for the Management of Elephants in South Africa. The document also aligns the Norms and Standards with needs defined by the Elephant Assessment as well as the African Elephant Action developed under the auspices of the Convention on International Trade in Endangered Species (CITES).

The document further summarises information gaps identified through collation of all published papers, as well as completed but unpublished work and ongoing projects, including evaluating how well research since 2008 has addressed identified information needs. To this end, the Department of Environmental Affairs (DEA) organised a joint workshop with South African National Parks (SANParks) that brought together various key stakeholders to deliberate on these gaps. The workshop, which was primarily directed at defining research programmes, sought to fulfill these needs and gaps. This research strategy which emanates from the workshop therefore supports the implementation of the present as well as future revised Norms and Standards for the Management of Elephants in South Africa.



In 2012, the Department of Environmental Affairs adopted the Environment Sector Research, Development and Evidence Framework which provides an approach to enhance sector

science policy interface and evidence-based policy making. This Elephant Research Strategy is thus informed by this framework. It has been developed in a manner that bridges the gap which currently exists between policy makers and researchers by promoting a clear dialogue to ensure that our elephant management policies are informed by the evidence produced by researchers. As such it is important that scientists and researchers endeavour to understand the decision making process as it links to policy making. In the same vein, it is also crucial that policy makers make an effort to understand the complexities of the scientific process and how it differs from the policy making process to be able to engage with scientists and researchers more effectively.

The Environment Sector Research, Development and Evidence Framework approach will in this regard ensure that evidence providers and policy makers jointly interpret the results of the research to be undertaken to inform policy options in the management of South Africa's elephant population. The findings of the implementation of this research strategy will add value to the conservation and management of the elephants in South Africa in accordance with the mandate of this department.

I acknowledge with gratitude the involvement of all contributors. These include SANParks, Provincial Conservation Authorities, members of the academia and Non-Government Organisations, as well as members of civil society for their time, energy and effort towards the development of this strategy. This demonstrates that by working together and forming effective partnerships, we can achieve more!

MRS B E E MOLEWA
MINISTER OF ENVIRONMENTAL AFFAIRS



EXECUTIVE SUMMARY

Managing the effects of elephants rather than elephants themselves was a key message from South Africa's Elephant Assessment. Such effects originate from how elephants use landscapes in the first instance, This is secondary to how many elephants there are. Within this context, managers of areas where elephants live seek to spatially and temporally alter the distribution of key resources, such as water, or alter the scale of resource availability like connecting areas or altering access to resources such as fenced exclusion. When lag-effects of elephant responses to the restoration of spatial and temporal limitations on landscape use materialise, or small areas prevent restoration of processes, managers seek non-lethal and ultimately lethal induction of spatial and temporal variation in elephant numbers.

The National Norms and Standards for the Management of Elephants in South Africa (DEAT, 2008) provide management guidelines. Information needs focus on several aspects including elephant dynamics, modulators of the effects of elephants, aspects of biodiversity reflecting on ecosystems, as well as rare and endangered species, human perceptions of elephants and tourist experiences. Previous defined research needs mismatched those required for the implementation of managing the effects of elephants. The South African Elephant Assessment had a large focus on societal values and expectations, while the African Elephant Action Plan had a focus on anti-poaching and human-elephant conflict mitigation issues pertinent in the rest of Africa.

The South Africa Elephant Research Strategy aims to guide research that will fulfill information needs that allow management authorities to implement Elephant Management Plans more effectively. Furthermore, it is in line with the

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), National Norms and Standards for the Management of Elephants in South Africa. A generalised framework recognises a continuum associated with scale, whether it is an area or the level of fragmentation associated with reserves where elephants live. Management interventions are most intense when areas are small or fragmented, while system integrity is most intact when areas are large and continuous.

Within this context a workshop and its participants identified four Research Programmes. The Scale Management Decisions Programme focuses on relevant scales for managing the effects of elephants. The Management Interventions Programme has four themes including risks associated with techniques, animal health and welfare risks, responses by elephants and risks associated with unintended consequences.

Often managers of the effects of elephants face difficult trade-offs in decision making. The Management Trade-offs Programme focuses on human perceptions and ethical trade-offs, strategic environmental optimisation risk and benefit assessment, and policy and regulatory impact assessment. The final programme is a key element directed at ensuring managers achieve objectives of managing the effects of elephants. The System Integrity Programme thus focuses on biodiversity, tourism and stakeholder outcomes.

The Department of Environmental Affairs (DEA) will oversee the implementation of the research strategy and will make use of a South African Elephant Research Advisory Committee providing evaluation of implementation.



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Acronyms

CITES – The Convention on International Trade in Endangered Species of Wild Fauna and Flora

DEA – Department of Environmental Affairs

DEAT – Department of Environmental Affairs and Tourism

EMPs – Elephant Management Plans

NEMBA – National Environmental Management: Biodiversity Act, 10 of 2004.

SAEON – South African Environmental Observation Network

SANParks – South African National Parks





1. RATIONALE

The moral dilemma of managing elephants may have dissipated substantially when the then Minister of Environmental Affairs and Tourism, Mr Marthinus van Schalkwyk, published South Africa's Elephant Assessment (Scholes & Mennell, 2009). It followed the recommendations of the Scientific Round Table (Owen-Smith, et al. 2006) and advised landowners to manage the effects of elephants rather than elephants themselves (Ferreira et al., 2012a). In essence, land managers now seek to restore spatial limitations on elephants and how they use landscapes, thereby addressing the cause of undesired effects of elephants (van Aarde et al. 2006). When the size of areas constrains the restoration of spatial limitations, conservation management seeks to mimic the outcomes similar to what the case would have been if ecological processes were taking place (Ferreira et al., 2011).

The National Norms and Standards for the Management of Elephants in South Africa (DEAT, 2008), hereafter referred to as Norms and Standards for the Management of Elephants in South Africa, provide legal guidelines and directions on how to implement such approaches that focus on managing the effects of elephants.

Several managing authorities have used the Norms and Standards for Management of Elephants in South Africa to develop Elephant Management Plans (EMPs) for protected areas. Managing the effects of elephants is best when conservationists focus on the mechanisms that lead to impact and human-elephant conflict as well as influence tourism or other potential sources of conservation revenue (van Aarde & Jackson, 2007).

When conservationists define underlying causes (Ferreira et al., 2011), they consistently suggest that elephant spatial use, driven by the distribution of, and access to, critical resources defines the intensity with which elephants use a landscape (e.g. time elephants spend in a specific habitat). This in turn most likely determines the effect that elephants have on ecological values, the damage they cause to human livelihoods, and how tourists and stakeholders experience elephants. Interference of these mechanisms accentuates the effects of elephants (van Aarde & Jackson, 2007).

Leading management authorities of protected areas in South Africa, thus focus on managing direct causes of the effects of elephants on ecological, human-elephant conflict and stakeholder values. They seek to: (1) spatially and temporally alter the distribution of key resources (e.g. water distribution); (2) spatially and temporally alter the scale of resource availability (e.g. removing fences); and (3) spatially and temporally alter access to resources (e.g. exclusion of elephants) (Ferreira et al. 2012a). In small reserves, however, elephant numbers may modulate the intensity with which elephants use landscapes

(Young et al. 2009). In addition, lag-effects of elephant responses to the restoration of spatial and temporal limitations may contrast reserve objectives and desired outcomes. In the short- to medium term, management authorities implement at appropriate places: (1) non-lethal induction of spatial and temporal variation in elephant numbers (e.g. contraception); and (2) lethal induction of spatial and temporal variation in elephant numbers (e.g. culling) (Ferreira et al. 2012a).

In addition, management authorities adhere to a strategic adaptive management philosophy (Biggs & Rogers 2003). This provides a scientifically robust approach to evaluate and learn about the causes of the effects of elephants on ecology, human-elephant conflict and stakeholder values. Furthermore, it enables evaluation of whether the management action leads to anticipated change in these values within the context of desired states and objectives for protected areas (Venter et al., 2008). Information needs should thus focus on: (1) aspects of elephant dynamics, including distribution, ranges, demography and population estimates; (2) modulators of the effects of elephants such as water distribution and fencing; (3) aspects of biodiversity that reflect ecosystem objectives; (4) aspects of biodiversity that are reflected in impacts on rare and endangered species; (5) human perceptions and elephant damages; and (6) tourist experiences (Ferreira et al., 2012a). Elephants provide revenue primarily indirectly through influence on tourism experiences (Kerley et al., 2003), but may also do so through other forms of financial gain.

This South African Elephant Research Strategy constructs a summary of information needs that the application of the Norms and Standards for the Management of Elephants in South Africa generated. The South African Elephant Research Strategy also compares these with the needs defined by the Elephant Assessment (Scholes & Mennell 2009), as well as the African Elephant Action Plan (CITES, 2010). The Elephant Assessment has a large focus on societal expectations and values associated with elephant management, while the African Elephant Action Plan has focal areas in anti-poaching and human-elephant conflict mitigation. A key purpose of the document is to identify information gaps through collation of all published papers as well as summaries of completed, but unpublished work and ongoing projects since 2008. It includes an evaluation of how well research since 2008 addressed needs generated by the application of the Norms and Standards for the Management of Elephants in South Africa.

In association with a focused workshop directed at defining research programmes to fulfill these needs, the document provides a research strategy to support the implementation of the present as well as future revised Norms and Standards for the Management of Elephants in South Africa.





2. REVIEW OF RESEARCH NEEDS

2.1 Approach

The management authorities provided available completed and draft EMPs. This allowed the construction of a summarised table of information needs as an outcome for the research and information requirements that the implementation of the Norms and Standards for the Management of Elephants in South Africa necessitates.

Comparisons between research and information needs identified by the Elephant Assessment and the African Elephants Action Plan with those requirements identified through the implementation of the National Norms and Standards for the Management of Elephants in South Africa allowed identification of overlaps, synergies as well as mismatches. The word mismatch, as used here, refers to requirements that are deemed to only have indirect relevance for implementation of the Norms and Standards for the Management of Elephants in South Africa.

Having defined requirements in the South African context, the DEA and SANParks invited all authors and contributors to the Elephant Assessment. This was to provide an update on research as well as completed but unpublished fieldwork. Requested information included a title and a brief summary that clarifies the key objectives of the specific research. In addition, scrutiny of research databases of managing authorities focused on projects currently in progress or those that have completed fieldwork. Using the search words “African elephant” in Science Citation Index Expanded (http://thomsonreuters.com/products_services/science/science_products/a-z/science_citation_index_expanded/) allowed extraction of all published peer-reviewed literature associated with elephants. As the Elephant Assessment summarised available information up to 2007, the focus of all three sources of information was on the period 2008-2012, inclusive.

The collated literature, reports and feedback allowed the evaluation of gaps in elephant research relevant to the implementation of the Norms and Standards for the Management of Elephants in South Africa. The collated EMPs were used to indicate within a defined summary of needs whether a specific plan had that requirement. This allowed the generation of a weighting of importance, as certain needs may carry higher priority and value than others. Secondly, each publication, and completed as well as ongoing projects were assigned to a category of research need that the specific publication or project addressed. Note that some research outputs may address more than one research need category of the relative contribution of overall research since 2008 was calculated as the number of studies expressed as a percentage of the total number of studies. Categories that had a high weighting of importance and a low percentage of studies were the key gaps that future research needs to fulfill.

The final part of reviewing research needs focused on evaluating the relative contribution that regional research activities are making. The focus was on what proportion of research needs Southern Africa and in particular, South Africa addressed. For this purpose, research projects irrespective of being published, completed or ongoing were categorised based on the scale of the study (zoo, local site, and country, regional or continental) as well as the key topics that each study focused on.

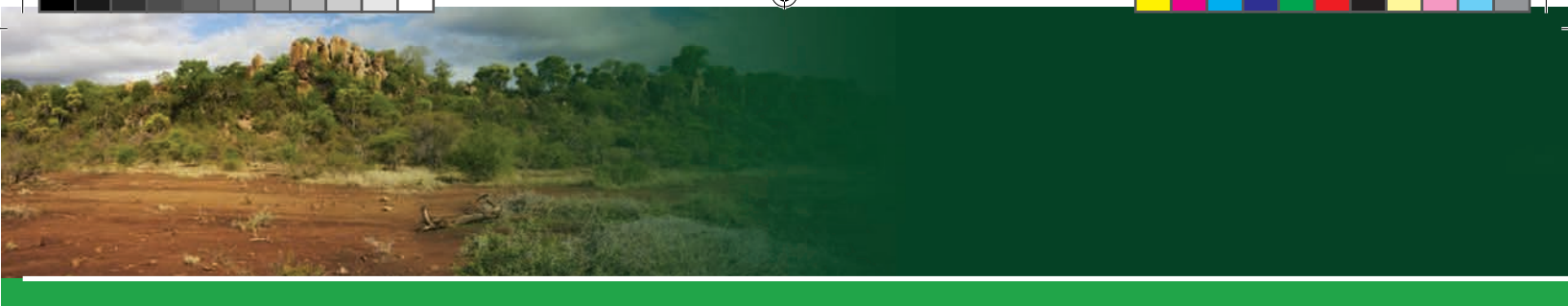
2.2 Research Needs

South Africa’s application of the Norms and Standards for the Management of Elephants in South Africa when developing several Elephant Management Plans identified the needs that can be categorised into describing features associated with elephants themselves as well as ecological, tourism and stakeholder aspects (Ferreira et al. 2012b). Adaptive planning (Biggs & Rogers, 2003) identified a suite of mechanisms on how elephants may influence ecological, tourism and stakeholder aspects. These define the focus of research requirements that will help understand relationships between elephants and the effects they have on various aspects. A major component of adaptive management is finding efficient ways to manage the causes that a mechanisms-based approach has identified.

The need is different for large populations where conservationists mainly seek to restore limiting and regulating mechanisms. For small populations they seek to mimic limiting and regulating mechanisms. Even so, for both cases, questions arise about efficiency, costs and animal welfare. The final requirement emanating from the application of the Norms and Standards for the Management Elephants in South Africa is the evaluation of outcomes on populations as well as ecological, tourism and stakeholder aspects.

The research needs extracted from South Africa’s Elephant Assessment only partially align with the requirements derived from the application of the Norms and Standards for the Management of Elephants in South Africa. Most notably is the focus on legal challenges, international economic values, stakeholder values and manager values, which only indirectly matches conservation priority needs. Alignment with the African Elephant Action Plan is even more sparse, primarily because most strategic directives are management responses. Two research directives directly align with South Africa’s needs (i.e. population studies and development of new techniques), although the detailed focus of these may be of less importance to South African conservation agencies.

The strategic research needs summary highlights three aspects. Firstly, the context of elephant management within South Africa has changed from primarily symptomatic to systemic (van Aarde et al. 2006, van Aarde & Jackson 2007). The South African



Elephant Assessment took place at a time, and made use of information, when elephant management approaches were primarily embedded in symptomatic approaches i.e. dealing with the cause of the problem primarily through a perception that controlling elephant numbers will mitigate elephant effects. For this reason, some research needs identified by the South African Elephant Assessment are of a lower priority than previously.

Secondly, the concerns associated with elephants vary from threats to their persistence mostly in Northern, Central and Eastern Africa (Wasser et al. 2009), to threats that elephants pose to ecosystems and people in Southern Africa (Owen-Smith et al. 2006). The African Elephant Action Plan weighs heavily towards threats posed to persistence of elephants resulting in relatively little overlap with South Africa's research needs.

Finally, South Africa's application of the Norms and Standards for the Management of Elephants in South Africa results in a focus on the cause of the problem and reflects the outcomes for National and Provincial Authorities, and may also reflect that of private land-owners' EMPs. The research needs and mismatches identified here, thus broadly reflect that of South Africa as a whole.

2.3 Recent Research Foci

A total of 193 publications, 16 completed projects (mostly South African associated) and 62 ongoing projects (mostly South African associated) inclusive of, and since 2008, provide insight into recent research focus (Ferreira et al. 2012b, Fig. 1).

Some projects were comparative and spanned larger regional or continental scales. These collated studies reveal that research activities since the completion of the South African Elephant Assessment have focused primarily on describing elephant populations and ecological impacts in both large and small populations (Ferreira et al. 2012b). Studies that sought to understand drivers of features or aspects also primarily focused on elephant populations and ecological impacts, but mostly associated with large populations.

Relatively few studies focused on research needs identified by the South African Elephant Assessment. This may be partly due to the elephant management contextual change, but may also be associated with specific interests of research providers and how authorities advocate research needs.

A key reason for the dearth of research in some categories is that some research requirements may carry higher importance than others. When Ferreira et al. (2012b) assessed this, they identified several research gaps of which most are associated with requirements for small parks as well as with non-traditional foci of elephant research i.e. drivers of tourism and other stakeholders and how management can deal with these with the associated responses. Note that indirect relevant research identified by South Africa's Elephant Assessment (Scholes & Mennell 2009) had relatively small requirements.

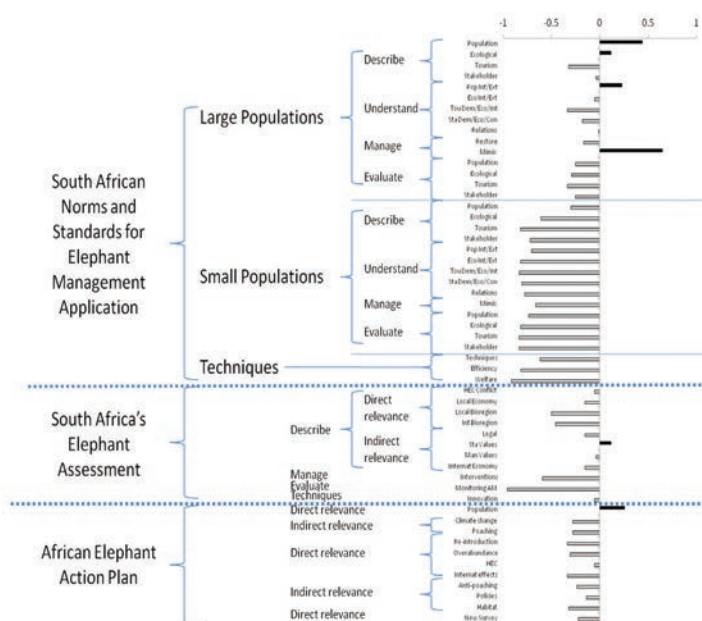


Figure 1. Research alignment with priorities derived from the South African National Norms and Standards for Management of Elephant; The South African Elephant Assessment and The African Elephant Action Plan. Grey bars reflect areas where research gaps are. See Ferreira et al. (2012b) for description of detailed analyses.



2.4 Research Contributions

The non-alignment and mismatch of research needs defined by the African Elephant Action Plan and the application of the Norms and Standards for the Management of Elephants in South Africa is also reflected in the focal topics of research outputs. The Southern and Eastern African sub-regions have been prolific in producing the bulk of the published literature regarding elephants. The focus, however, of Southern Africa and the rest of Africa vary significantly according to regionally identified research needs (Fig. 2). The rest of Africa tends to focus on topics reflecting threats to the persistence of elephants (Wasser et al. 2009) with behavioural studies most frequently undertaken. Aspects focusing on genetics, demography, poaching, reproduction and ivory trade also feature, usually in association with a perceived threat to an isolated or small population (Ferreira et al. 2012b).

In contrast, research in Southern Africa focuses on threats that elephants pose to ecosystems (Owen-Smith et al. 2006). Aspects that define mechanisms of how elephants may pose threats such as spatial use are also prevalent. This includes a number of topics associated with managing elephants regularly addressed (Ferreira et al. 2012b). Studies on human-elephant conflict in Southern Africa appear anomalously low, primarily because publications are dominated by South African based studies (56 of 83 publications for Southern Africa were based

in South Africa with 21 of those at Kruger National Park alone), whereby human-elephant conflict is not as rife as in other Southern African countries.

The above highlights three aspects. First, South Africa will continue to face challenges within the international community associated with elephants. This as a result of challenges associated with the effects of elephants which are at opposing ends of a spectrum of concerns in Southern Africa compared to the rest of Africa. Second, South Africa may need to extend the focus of their research to needs relevant to Southern Africa. Third, South Africa may do well to share expertise in the Southern African region, which carries similar challenges.

2.5 Summary

The above summaries illustrate that research as required by the implementation of the Norms and Standards for the Management of Elephants in South Africa, in some instances does not correspond with what the South African Elephant Assessment specified. The non-alignment of research requirements is large in the case of the African Elephant Action Plan. Key management authorities and academic institutions are playing central roles in addressing some of the shortcomings, although several gaps notably associated with small parks, and with tourism and stakeholder aspects, require attention.

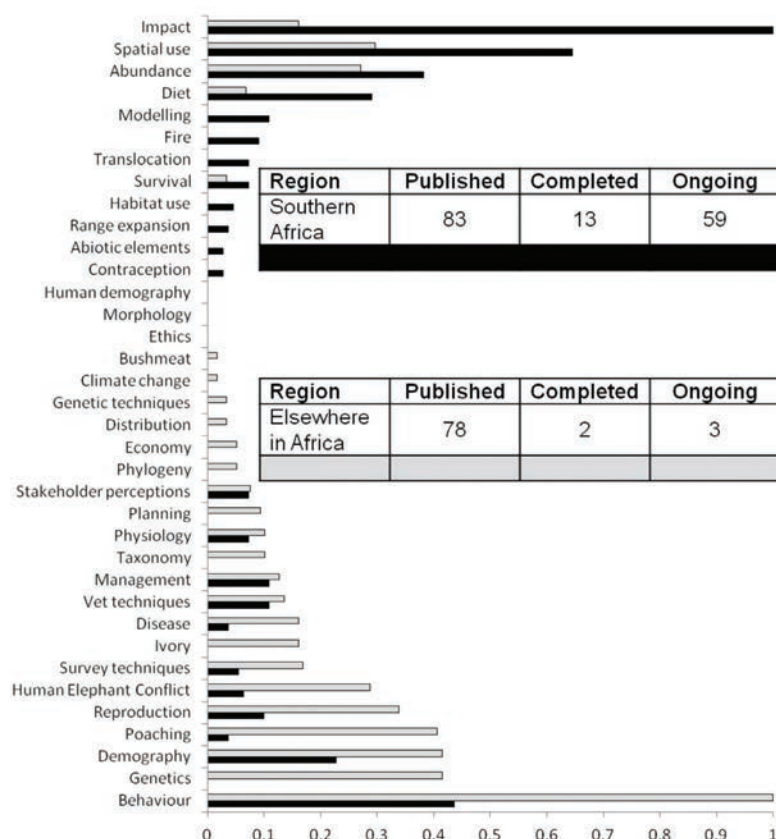
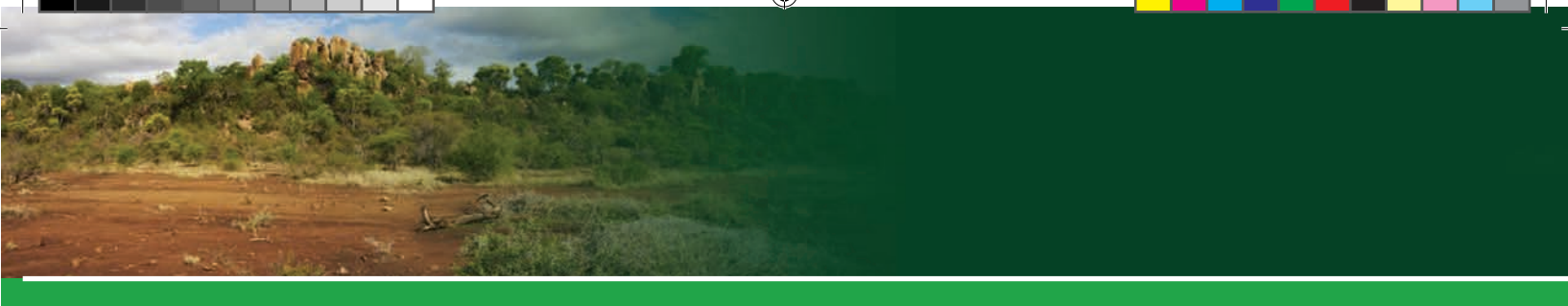


Figure 2. The focal topics of research outputs collated since and inclusive of 2008. Dark bars reflect focus in Southern Africa while black bars focus on elsewhere in Africa.



3. RESEARCH STRATEGY

3.1 Objective

The objective of this strategy is to guide research that will fulfill information needs, thereby allowing management authorities in accordance with the National Norms and Standards for the Management of Elephants in South Africa, to implement EMPs more effectively.

3.2 Research Framework

3.2.1 Elephant Research Workshop

An Elephant Research Workshop was hosted by the DEA and SANParks on 11 and 12 February 2013 at Skukuza, Kruger National Park. It sought a basis for an Elephant Research Strategy to inform elephant management in protected areas. Researchers and a broad range of stakeholders participated in the workshop to help mould the research strategy.

The workshop acknowledged that the context of elephant management has changed from a symptomatic approach focusing on managing elephants as outlined in the South African Elephant Assessment, to a systemic approach, focusing on managing the effects of elephants.

3.2.2 Generalised Framework

Although contextual changes may have reduced the moral complexity that previously plagued debates about elephant management, various challenges associated with elephant management persist. These translate into two broad categories of requirement. In small parks, spatial restrictions have removed landscape regulating factors on elephant dynamics. Elephant population size thus requires control or manipulation. However, to mitigate the effects of elephants, approaches that change elephant behaviour, in particular landscape use at local scales, need to accompany population control measures. In the only large contiguous conservation area, the Kruger National Park, elephant population size is a consequence of landscape influences that vary over time and space as a result of the restoration of large-scale ecological processes.

The lag effects of past approaches that removed population and spatial regulating mechanisms, generate localised effects of elephants which also require interventions directed at altering elephant spatial behaviour. The two broad categories of management requirements are best addressed within a framework that recognises important scale differences in management intensity - the highest intensity being required at small scales, and system integrity considerations being the highest at large scales (Fig. 3).

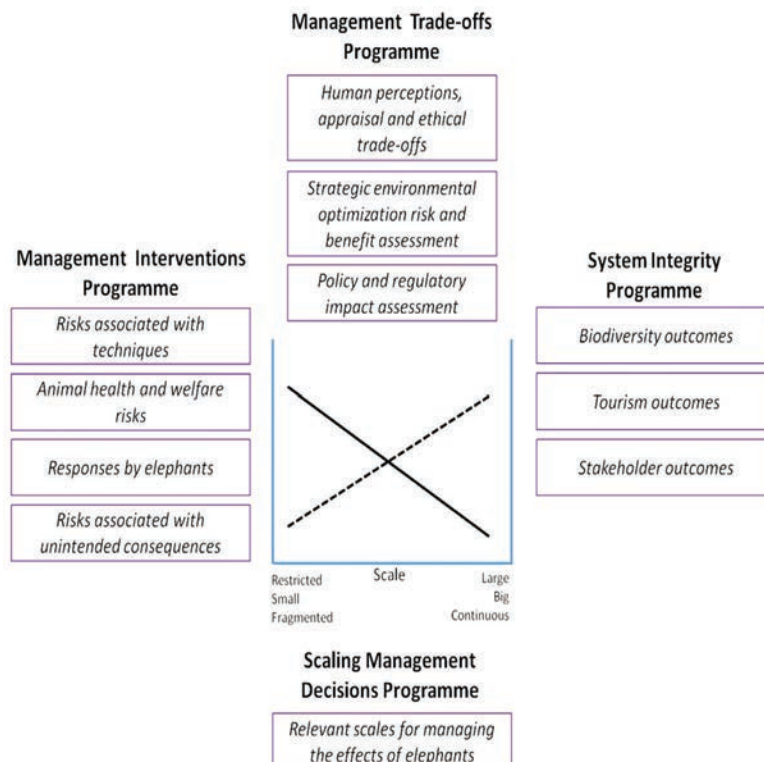


Figure 3. Diagrammatic summary of the elephant research requirements for South Africa directed at informing, guiding and evaluating the management of elephants. Also showing the effects they have on various conservation values as required by implementing the National Norms and Standards for the Management of Elephants in South Africa. The solid line reflects management intensity, while the broken line reflects system integrity.



3.3 Research Programmes

The research review and generalised framework provided guidance to establish four broad research programmes with themes captured within these. These carry equal priorities and South Africa should address them simultaneously.

3.3.1 Scaling Management Decisions Programme

In South Africa, most elephants live as a single population in a large conservation area, while the remainder live in many highly artificial and distinct populations in small and isolated reserves. There is therefore a continuum of management intensity with small and isolated areas requiring intensive management. Large areas require less management as the integrity of natural processes increases.

3.3.1.1 Theme: *Relevant scales for managing the effects of elephants*

This theme focuses on defining scaling in the context of management decisions. It should consider studies developing approaches that recognise scaling of elephants confined to small parks managed as individuals rather than populations. Where the areas have the capacity to provide for all tiers of social organisation up to the population as a unit, management no longer centres on elephants, but focuses on the landscape. In addition to spatial scaling, a key research focus should be on the temporal dimension of scaling. This includes temporal changes in threats such as poaching for ivory, as well as exploring approaches directed at increasing scales that reduce management intensity.

3.3.2 Management Interventions Programme

Several interventions form part of management options from *laissez faire* approaches to directly as well as indirectly manipulating elephants. Direct manipulation of elephants includes: (1) introduction and supplementation to change numbers, alter population structures or expand ranges; (2) removals through live capture, hunting and culling to change numbers and population structure; (3) contraception; and (4) several forms of disturbance such as noise or chemicals. Indirect manipulation primarily focuses on resource manipulation including: (1) provision of additional water; (2) enclosures to keep elephants away from focal areas; (3) fencing to keep elephants inside focal areas; (4) fire; (5) feeding; and (6) manipulation of competitors such as other herbivores. Some of these activities may take place outside protected areas.

3.3.2.1 Theme: *Risks associated with techniques*

This theme focuses on specific techniques that are available, as well as the development and evaluation of new techniques such as alternative reproductive control approaches. The theme carries high value, seeking evaluation on cost efficiency of techniques. This theme also includes human safety risks that are associated with a specific technique. Comparative reviews and meta-analyses may best provide insights.

3.3.2.2 Theme: *Animal health and welfare risks*

The application of direct manipulation is likely to have health and welfare consequences. This theme focuses on behavioural and physiological consequences of management interventions particularly considering spatial and temporal scaling. This is particularly relevant for stress consequences that may last a decade or longer or that have large spatial consequences as elephants communicate over large distances. Comparative reviews and meta-analyses of existing information may provide best insights regarding the former.

3.3.2.3 Theme: *Responses by elephants*

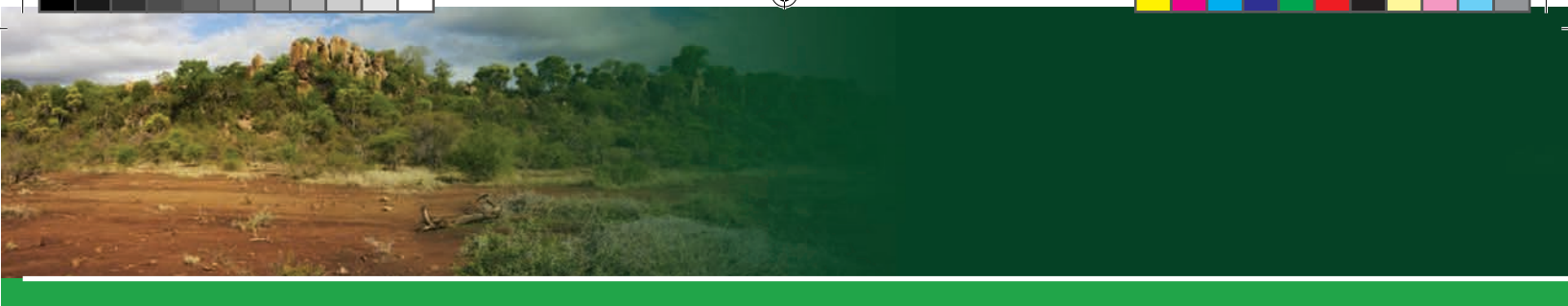
Management interventions are likely to have several consequences on elephant population demography as well as on how elephants use landscapes. This theme focuses on the effectiveness of management interventions on elephant populations, structure and spatial use. Meta-analyses and reviews of existing information should fulfill evaluations of the effects of population control on elephant dynamics. Population structure and spatial responses will require comparative approaches. The theme also accommodates research seeking to understand the drivers of elephant demographic and spatial use variability as pre-cursors to evaluating responses of elephants to management interventions. Comparative approaches may best serve this requirement.

3.3.2.4 Theme: *Risks associated with unintended consequences*

Various management interventions will have different environmental and social impacts, often unintended. Information on unintended and/or cascading consequences is lacking. The focus of this theme is to identify and define unintended consequences of a management intervention associated with impacts on the ecological system. These include vegetation and/or habitat change, impacts on other animals and impacts on threatened species. Focus should also be on additional unintended consequences that associate with influences on the quality of tourism experiences, as well as changed perspectives of key stakeholders and how these influence land-use economics.







3.3.3 Management Trade-offs Programme

The evolving context of conservation now recognises the importance of socio-economic-ecological complexity, embedded within accountability to a variety of expectations from several kinds of stakeholders (Hulme & Murphee 2001; Doyle & McEachern, 2008). This generates considerable trade-offs, in particular, those associated with humans regarding elephants and what they do to the landscape. Human dimensions typically dichotomise in beneficial consequences such as consumptive (*e.g.* Moore 2011) and non-consumptive tourism-based revenue (*e.g.* Kerley *et al.* 2003), and conflict associated with damage elephants cause to property (*e.g.* Lee & Graham 2006) or loss of land-use opportunities (*e.g.* Msoffe *et al.* 2011).

3.3.3.1 Theme: Human perception, appraisal and ethical trade-offs

This theme centres on trade-offs resulting from expectations and perceptions of humans. Three broad sub-themes emerge. The first relates to **trade-offs between indigenous ethics and western ethics**. Human-elephant conflict associated with cultivation or loss of opportunities such as livestock land-uses are central aspects. These act as external drivers that influence elephant-related conservation land-uses. Research should include appraisals of the perceptions of edge communities abutting protected areas, in particular perceptions about authorities wanting to protect elephants as well as how managing elephants affects the way people live. Comparative reviews and meta-analyses making use of extensive existing literature will best provide insights.

The second sub-theme relates to **trade-offs between economic and conservation values**. Ecotourism, both consumptive and non-consumptive, is a key revenue generator, but often the requirements associated with elephants generate conflicting needs. Some of these contrasting demands originate from varied perceptions of consumptive and non-consumptive tourism expectations associated with elephants. In addition, studies focusing on beneficiating edge communities because of elephant-related conservation have been of narrow focus. They need expansion into broader areas such as ecosystem services and associated benefits. Experimental, experiential and comparative analyses could best provide insights.

The final sub-theme relates to **human ethical trade-offs** resulting from a history of strong influences of ethical perceptions on management authorities' abilities to implement management interventions (Dickson & Adams, 2009). The contextual change associated with managing the effects of elephants, rather than elephants themselves (Ferreira *et al.* 2012a), places lower priority on this sub-theme, a key aspect of which focuses on the essence of elephant management. Indigenous knowledge is of great value in understanding the essence of elephants. Structured social studies may best provide insights.

3.3.3.2 Theme: Strategic environmental optimisation risk and benefit assessment

Trade-offs impose complex decisions on managing authorities, given the incorporation of elephants as a keystone species in a system of conservation planning that recognises socio-economic-ecological accountability (Roux & Foxcroft 2011). To fulfill this requirement, management authorities need better understanding of the options that exist to address a variety of objectives and how to make decisions. This is particularly relevant in small reserves. Such small reserves accentuate the consequences of conflicting objectives. Because trade-offs happen at many different scales, the theme focuses on various scenario planning approaches, including spatial aspects to evaluate trade-offs. Comparative reviews and meta-analysis may provide best insights.

3.3.3.3 Theme: Policy and regulatory impact assessment

Human perceptions and values influence policy (Hulme & Murphee 2001; Doyle & McEachern 2008). In addition, elephant management is embedded in an evolving societal context. This necessitates research on legislation guiding and influencing elephant management, particularly approaches that facilitate adaptive legislation responsive to emerging issues as well as animal welfare legislation. The theme also focuses on international regulatory challenges, given the split in issues and approaches of northern and southern African elephant range states (Ferreira *et al.* 2012b). The emerging trade-offs generated could require incorporation of new elements into legislation to inform policy associated with sustainable development.

3.3.4 System Integrity Programme

Elephants influence, and in some instances even drive, the socio-economic-ecological integrity of systems associated with protected areas (Ferreira *et al.* 2012b). The construction of systems and mechanisms diagrams (Ferreira *et al.* 2011) help describe the understanding of system integrity based on the best data available at the time. Furthermore, these provide predictions of responses to alternative management options. Such a strategic adaptive management approach (Biggs & Rogers, 2003) is a key element of learning by doing (Roux & Foxcroft, 2011). This programme requires investigations of the relationships between elephants and socio-economic-ecological features, including efficient ways to evaluate the outcomes of management interventions on system integrity.

3.3.4.1 Theme: Biodiversity Outcomes

This theme focuses on biodiversity relationships with elephants that could play out differently in large and small nature reserves. Construction of systems and mechanisms diagrams in the form of several kinds of models that focus on explaining spatial, temporal and demographic heterogeneity are key starting points. These could be well informed by comparative reviews.



Evaluating the likely outcomes that such models predict pose several challenges. In the first instance is the requirement to have appropriate indicators, followed by robust survey designs that allow the definition of variance and detection of change, usually a key requirement. Considerable information is already available. Mining existing data and making use of meta-analysis may thus provide key insights and direct additional comparative research, particularly in small reserves. Small reserves may impose case-specific descriptive investigations of aspects such as refugia within small parks where sensitive biodiversity elements can escape elephant impacts. Notwithstanding these various needs, a key focus is on evaluating the direct and indirect relationship between elephants and various biodiversity values, particularly where managing authorities seek to manage the effects of elephants rather than elephants per se.

3.3.4.2 Theme: *Tourism Outcomes*

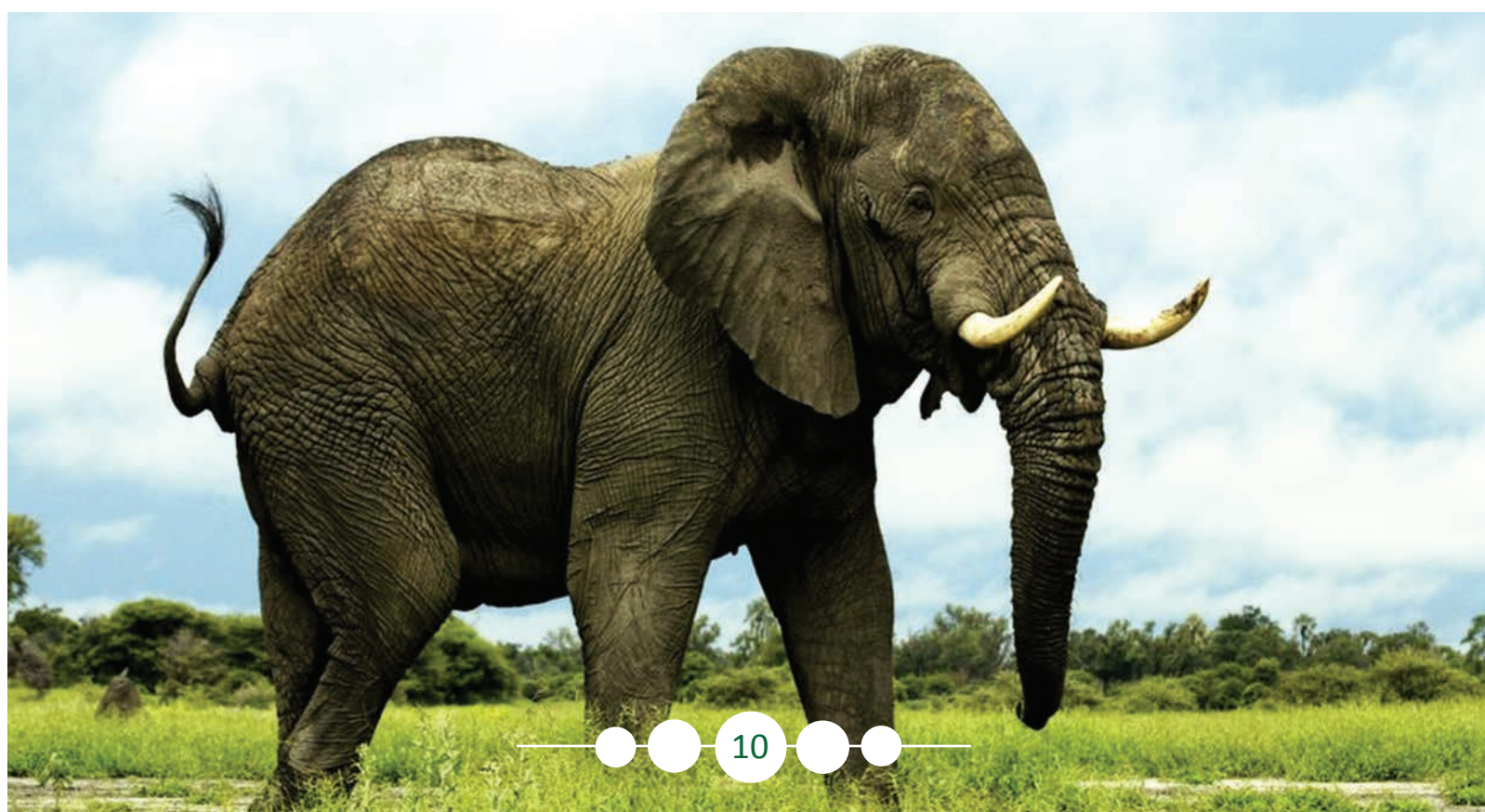
Tourism, and in particular ecotourism, is a key revenue generator in South Africa (DEAT, 2002). Wildlife-based tourism has strong elements of the Big Five experience (Di Minin et al. 2012) with elephants an important component (Kerley et al. 2003). Tourism outcomes, however, hinge on tourist expectations and experiences, with elephants forming only part of a suite of factors influencing this. The importance of elephant-based tourism requirements is likely to vary between reserves. It should be guided by reserve-specific objectives. This theme thus focuses on evaluating several assumptions associated with how elephant influence and determine tourist expectations and experiences in the context of reserve objectives. The theme also includes evaluation of changes in tourist expectations and

experiences in response to elephant management actions. A key element is evaluation of assumptions associated with comparative tourism economic models, with focus on direct as well as indirect costs and benefits and how these scale with the size of reserves. Structured social surveys within and beyond protected areas, and comparative economic investigations will best provide insight.

3.3.4.3 Theme: *Stakeholder Outcomes*

Stakeholder outcomes are traditionally associated with human-elephant conflict (Lee & Graham 2006). In South Africa a multitude of landowners border protected areas and reserves, while varied additional stakeholders distant from parks are also impacting on conservation management decisions (e.g. Dickson & Adams 2009). Numerous social surveys have focused on traditional communities abutting protected areas. Perceptions, expectations and effects associated with elephants may thus be best evaluated by reviews and meta-analyses. A key requirement relates to perceptions and expectations of evolving stakeholders abutting parks as well as distant stakeholders.

In these cases structured social surveys with a focus on defining expectations and perceptions as well as beneficiation trade-offs versus lost livelihood opportunities will provide insight into how elephants influence several stakeholders, as well as how management interventions change stakeholder perceptions and expectations.





4. FUNDING AND LOGISTICS

The DEA, as the primary custodian of the environment in South Africa, will be responsible for overseeing the implementation of the research strategy. Given the focus on specific requirements associated with achieving objectives, the process of funding allocations for elephant research needs should be addressed through negotiations with relevant authorities responsible for elephant management.

5. INSTITUTIONAL ARRANGEMENTS

The DEA will establish a South African Elephant Research Advisory Committee which, illustratively, could consist of an elephant population expert, elephant behaviour expert, biodiversity impact expert, human interaction expert, ethics expert and SANParks liaison. Membership can be of international origin and will be on a short-term basis with half of the members replaced every 5 years. Maximum membership is 10 years.

The Elephant Research Advisory Committee (Advisory Committee) will have the primary role of providing an interim evaluation of the achievement of the Elephant Research Strategy at 2-year intervals. The Elephant Research Strategy should be seen as an evolving strategy that accommodates contextual changes. Every 5 years the Advisory Committee will provide an extensive review of how South Africa performs in implementing the Elephant Research Strategy. After 10 years, the Advisory Committee will facilitate an external review directed at revising the Elephant Research Strategy.





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