

Management of African elephant populations in small fenced areas: Current practices, constraints and recommendations



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How to cite this article:

Selier, S.A.J., Slotow, R. & Balfour, D., 2018, 'Management of African elephant populations in small fenced areas: Current practices, constraints and recommendations', *Bothalia* 48(2), a2414. <https://doi.org/10.4102/abc.v48i2.2414>

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The history of elephant management in South Africa differs in a number of significant ways from that of range states to the north. This led to the country facing specific challenges in relation to the management of its elephant populations (Pretorius et al. 2018; Slotow et al. 2000, 2005). In most range states, although increasingly fragmented, elephant populations persist in unfenced landscapes – including those in protected areas – where the main threats to their survival are poaching, habitat loss or transformation and human–elephant conflict (Thouless et al. 2016). In South Africa, elephant populations, the vast majority of which are in relatively small privately owned fenced areas, face an additional suite of threats. These include concerns over the genetic viability and loss of genetic heterogeneity in small isolated populations (of the estimated 78 discrete elephant populations in the country, over 75% have fewer than 100 individuals) (Pretorius et al. 2018) as well as concerns over the consequences of having fenced populations in relatively small areas (median area excluding Kruger National Park = 14 200 ha; Elephant Specialist Advisory Group [ESAG] database 2015). The impact of elephants on vegetation in small fenced areas has resulted in the intensive management of these populations (such as through reducing the numbers or removing individuals, slowing population growth rates or excluding elephants from areas) aimed at reducing the rate of habitat impact and attempts by individual elephants to breach the fence (Carruthers et al. 2008; Delsink et al. 2013; Lagendijk et al. 2011; Slotow et al. 2005). The South African model for conserving elephants, although currently the exception, has a strong chance of becoming more common in Africa as the growing human footprint accelerates transformation of the natural landscape in Africa (Montesino Pouzols et al. 2014), and increases the opportunity for human–elephant conflict (Selier, Slotow & Di Minin 2016). For this reason, it is useful to understand it better.

In 2006, the South African government convened a 'Science Round Table' – a think tank – which was mandated to provide advice to the state on managing the impact of elephants on vegetation and ecosystems. In light of the current ecological thinking, this group advised against the prevalent management rationale of managing (mainly culling or translocating individual elephants) elephant populations based on their numbers and crude habitat metrics (Scholes & Mennell 2008). Deliberations arising from this new approach, which was based on a stronger recognition of the social structure and behavioural attributes of elephant populations, led to the publication of the National Norms and Standards for the Management of Elephants in South Africa in 2008 (Government Gazette no. 30833, 29 February 2008). These norms and standards currently guide the management of elephants in South Africa.

As elephant numbers have increased in South Africa over the past two decades, so too have the number of populations of elephant, and new insights and challenges are emerging in relation to their management. In part, these new insights and challenges are a consequence of the new approaches (such as preferentially using contraception [over culling]) to manage elephant population growth, and a consequence of advances that have been made in managing the impacts of elephant on vegetation and infrastructure. There is a need to review the norms and standards to update them in light of new knowledge and to enable them to appropriately regulate the new situations that are arising.

This special edition of the *Bothalia: African Biodiversity and Conservation* is aimed at providing a platform for documenting recent advances in research undertaken on the monitoring and management of elephant in a conservation context in South Africa. The papers included in this edition discuss contemporary methods for managing elephants, such as various forms of contraception, as well as problems experienced pertaining to implementing the norms and standards. They additionally provide recommendations from expert workshops held to address issues related to elephant management in South Africa.

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In the short communication, Garaï et al. (2018) provide feedback on the outcomes of an expert workshop on non-lethal elephant population control methods with recommendations to policymakers and for further research. Bertschinger et al. (2018) review the use of *Porcine zona pellucida* (PzP) vaccine as a means of immunocontraception of elephant cows, while Zitzer and Boulton (2018) examine the behavioural implications of vasectomies on elephant bulls. Smaller reserves seldom have an intact bull hierarchical structure. In a number of these reserves, incidents with musth bulls have been reported, such as young bulls attacking rhinoceros or vehicles. While the introduction of mature bulls is recommended (Slotow et al. 2000), many reserves are apprehensive about the possible impact of big bulls on the vegetation structure of the reserve. Bertschinger and Leuders (2018), in their contribution, review the use of anti-gonadotrophin-releasing hormone (GnRH) vaccines in African elephants to control androgen-related behaviours, and provide recommendations for the improved use of the vaccine.

Faecal hormone metabolite measurements are a widely used tool for monitoring reproductive function and response to stressors in wildlife and are commonly used to assess elephant stress (Ganswindt et al. 2003; Jachowski et al. 2012; Millsaugh et al. 2007; Poole et al. 1984; Viljoen 2009). Despite the many advantages, the delay between defecation, sample collection and further processing can influence steroid concentrations as bacterial enzymes alter the steroidal composition in faecal matter even post-defecation. Webber et al. (2018) investigate the rate of change of faecal glucocorticoid (fGCM), androgen (fAM) and progesterone (fPM) metabolite concentrations in male and female elephant faeces over time, as well as different drying regimes, and provide recommendations for sampling faecal material for these purposes from elephants in the wild.

Protected area managers commonly face conflicting conservation objectives. Elephants introduced into an area to increase tourism potential may compromise other conservation objectives. Rushworth et al. (2018) highlight the complexities of managing elephants in small areas, while at the same time seeking to conserve highly threatened vulture populations. Blackmore and Trouwborst (2018) explore the evolution of South African regulatory jurisprudence applicable to wildlife and analyse the norms and standards in relation to international and national legislation and common law as it applies to elephants. They find that the norms and standards are not applicable to free-roaming elephants that have no owner and, therefore, do not fulfil their primary objective of regulating the management of elephants across South Africa in a uniform manner. This limitation of the norms and standards requires attention during the revision process.

We anticipate that the collation and publication of this research in this special edition of the journal will inform the upcoming revision of the National Norms and Standards for Elephant Management. We further anticipate that, as similar challenges are faced in other countries, the contents of this

special edition will be of interest to those involved in policy development as well as for the management of elephants in relatively small areas throughout their range in Africa.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

S.A.J.S. drafted the manuscript. R.S. and D.B. contributed to the manuscript.

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