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Abstract: In this long-term continuing study, lions and cheetahs are being re-introduced to Phinda Resource Reserve and other sites in South Africa by means of 'soft-release' techniques. All individuals underwent a pre-release captivity period of 6-8 weeks at the release site. The greatest cause of mortality to re-introduced felids was a result of human activity, particularly poaching.

# Large Felid Restoration: Lessons from the Phinda Resource Reserve, South Africa, 1992-1999

by Luke Hunter\*

**H**istorically, translocation and reintroduction of large African carnivores has been widely practised, but such efforts have been poorly researched and the little data which exist indicates these projects are largely unsuccessful. Daily monitoring of 13 lions *Panthera leo*, 15 cheetahs *Acinonyx jubatus* and their offspring which had been reintroduced into the Phinda Resource Reserve in northern KwaZulu-Natal was conducted for 40 months (May 1992-September 1995) to collect information on various aspects of their behaviour and ecology. The same populations have been monitored intermittently from September 1995 to the present. The study aimed to assess the success of such restoration attempts and to determine whether reintroduction is a viable method for the re-population of large felids in areas of their former distribution.

Two earlier reports (Cat News 24:15-16, 25:14) presented detail of the study site and preliminary findings from this study. This article is a summary of the author's completed Ph.D. thesis (Hunter 1998).

Most previous efforts to translocate or reintroduce large African felids were 'hard releases', usually lacking consideration for various factors which would be expected to influence the success of such procedures. Parameters such as trauma or disorientation associated with capture and translocation, the presence of resident conspecifics, the availability of space for released individuals, and the probability of individuals leaving the release site and encountering conflict with humans were often poorly known. During the present study, significant effort and resources were invested to attempt to address these factors and overcome at least some of the problems typically associated with carnivore translocation.

Following experience from Europe and North America (largely with non-felids), the Phinda study adopted 'soft-release' techniques, the first large-scale project to do so with African cats. All individuals in the present study underwent a pre-release captivity period of 6-8 weeks at the release site. Additionally, release events were staggered and took place from different locations within Phinda to: 1) allow individuals sufficient time and space to establish home ranges before the potentially disruptive effects of subsequent releases, and 2) reduce the chances of newly released individuals encountering territorial conspecifics soon after release by locating later release sites outside the home ranges of established individuals. Finally, the reserve lacked resident lions and cheetahs and was entirely surrounded by 2.2m high electrified fencing to attempt to discourage reintroduced cats from leaving the site.

All reintroduced lions and cheetahs remained at the reserve. Animals generally did not display 'homing' behaviour characteristic of many previous carnivore translocations. Three groups of lions and cheetahs (largely young males) showed evidence of homing for two months following release, but all subsequently established home-ranges at Phinda. The reserve's boundary fence was a critical factor in restricting post-release movements of felids. The study also demonstrated that, when co-housed during the pre-release captivity period, unfamiliar and unrelated individuals of each species established enduring relationships which persisted long after release. This has important implications for translocation attempts where individuals are frequently captured opportunistically, usually when they leave conservation areas and come into conflict with humans. This technique facilitated the formation of socialised groups composed of such 'problem animals', which – for social carnivores – are probably better suited for reintroduction purposes than lone individuals.

Reintroduced lions and cheetahs at Phinda which survived the crucial early post-release period established home ranges in the reserve, most of which endured for the duration of the study. This suggested that reintroduction may be a viable method for re-establishing resident felids. Lions (of both sexes) and male cheetahs were territorial whereas female cheetahs showed no signs of establishing territories and, in some cases, used the entire reserve as their home range. Lion individuals and groups used between 27.56km<sup>2</sup> and 130.20 km<sup>2</sup> as their home-ranges in Phinda. Mean home range size of female groups was 52.83 km<sup>2</sup> ± 35.68 km<sup>2</sup> (range: 27.56 km<sup>2</sup> – 105.60 km<sup>2</sup>, n = 3). Male home-ranges reflected their attempts to encompass as many female territories as possible and were as extensive as 78.7% of the entire reserve (which is 180 km<sup>2</sup> in size). Lions showed evidence of home-ranges shrinking during the dry winter, probably reflecting the distribution of artificial water sources in the reserve. The placement of such waterpoints may be an important issue for the management of predator-prey relationships in small reserves.

Mean size of the territories of male cheetah coalitions was 92.89 km<sup>2</sup> ± 59.39 km<sup>2</sup> (range 56.79 km<sup>2</sup> – 161.44 km<sup>2</sup>, n = 3). Territories were fiercely contested and fights between rival coalitions resulted in four deaths of males during the study. The 'patchiness' of available preferred habitat may have increased the likelihood of conflict between male cheetah coalitions. Such habitat, particularly open grassland, formed the core areas of both male and female cheetahs' ranges. In 'reclaimed' conservation regions, such as Phinda, where historical human influences, such as cultivation, intensive livestock farming and the extirpation of indigenous bulk grazers and browsers (for example, elephants) may radically alter the structure of habitats, the planning of a restoration attempt of cheetahs must include consideration of available suitable habitat. The 'rehabilitation' of human-altered landscapes may be an important factor affecting project success.

The greatest cause of mortality to reintroduced felids was as a result of human activity, particularly poaching. Five reintroduced lions and two cheetahs were killed in wire snares. Other human-mediated causes of mortality included road-kills and poor boundary security, which allowed individuals to leave the reserve and enter farming communities where they were ultimately killed by humans. Practitioners of reintroductions need to be aware of the influence of human activity on carnivore re-establishment and allocate resources accordingly to moderate its effect.

Inter and intra-specific conflict with other large carnivores was also a significant cause of deaths of reintroduced cheetahs and their offspring. While this is inevitable in any natural system, practitioners of multi-species reintroductions, such as at Phinda, should consider establishing competitively vulnerable carnivores prior to releasing ecologically dominant species. Delaying the release of lions until reintroduced cheetahs have had a chance to reproduce and their offspring have dispersed and established home ranges may ameliorate the effects of lion predation on cheetah re-establishment.

Despite mortalities, population characteristics suggested that lions and cheetahs are rapid and effective in re-colonising vacant areas. Most lions and cheetahs survived the critical early post-release stage (three months) and a minimum of 60% of females of both species survived to reproduce. Three lionesses bore litters before their third birthday and five male lions sired cubs at 26-28 months old, which is generally earlier than in established populations. Cheetahs at Phinda probably also had opportunities to reproduce younger than elsewhere, though this is based on circumstantial evidence. The opportunity for hastened reproduction may have arisen as a result of low population density allowing normally subordinate individuals to breed earlier than in established populations. This was probably a significant factor in rapid population growth at Phinda.

At least 47 lion cubs and 48 cheetah cubs were born during the study. Seventy-seven per cent of lion cubs and 63% of cheetah cubs reached independence during the study, and high rates of cub and sub-adult survival was a further factor contributing to rapid population growth. Increased cub survival (compared to other studied populations) was probably due to low density of established predators (conspecifics and competing species) and a high density of non-migratory prey. Population modelling suggested that low mortality rates for juveniles and sub-adults is a critical factor for rapid re-establishment.

Re-introduced lions and cheetahs foraged successfully following their release, and the post-release survival of reintroduced felids was clearly unaffected by their ability to acquire prey. Certain ungulates were preferred prey of cheetahs and lions, to the extent

that some species experienced severe population declines as a result of predation. Wildebeest *Connochaetes gnou* were the most important species for lions and were killed at three times their availability, despite the greater abundance and availability of species such as nyalas *Tragelaphus angasi* and impalas *Aepyceros melampus*.

Predation by reintroduced lions on wildebeest resulted in a population decline of an estimated 30% during the study period. Similarly, cheetahs preyed upon reedbuck *Redunca arundinum* at eight times their availability at Phinda and reedbuck numbers declined by an estimated 53%.

Given its small size (180 km<sup>2</sup>) and total enclosure by electrified fencing, Phinda probably lacked predation-free refuges, so that preferred prey species were unable to migrate to areas of decreased predation pressure. The decline of wildebeest and reedbucks at Phinda prompted intensive population management (capture and removal) by the reserve's owners of cheetahs and especially lions, and is clearly one of the most pressing concerns of re-establishing predator-prey relationships in small, enclosed conservation areas.

The study of the Phinda lions and cheetahs is continuing. Other sites of large felid re-introduction in South Africa have been added to the project which aims to unify efforts to re-establish large carnivores in the region. Further information of the ongoing research can be accessed at:

<[www.lionresearch.org/current/reintro.html](http://www.lionresearch.org/current/reintro.html)>.

## Reference

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