

Livestock Predation and its Management in South Africa: A Scientific Assessment

Editors

Graham Kerley, Sharon Wilson and Dave Balfour



2018

Year of publication:

2018

Editors:

Graham I. H. Kerley, Sharon L. Wilson and Dave Balfour

Publisher:

Centre for African Conservation Ecology, Nelson Mandela University, South Campus, University Way, Summerstrand, Port Elizabeth, South Africa (P O Box 77000, Port Elizabeth 6031, South Africa).

<http://predsa.mandela.ac.za>

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ISBN

978-0-620-78763-5(print)

978-0-620-78764-2(e-book)

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Design, layout, typesetting and reproduction by Mike Swanepoel of Design Legends, Port Elizabeth

Printing and binding by Valmac Printers

Recommended citation:

Kerley, G.I.H., Wilson, S.L. & Balfour, D. (Eds) 2018. *Livestock Predation and its Management in South Africa: A Scientific Assessment*. Centre for African Conservation Ecology, Nelson Mandela University, Port Elizabeth.

HISTORY OF PREDATOR-STOCK CONFLICT IN SOUTH AFRICA

Lead Author: Carruthers, J¹

Author: Natrass, N²

¹Department of History, University of South Africa, Pretoria, South Africa

²Institute for Communities and Wildlife, Centre for Social Science Research, School of Economics, University of Cape Town, Cape Town, South Africa

INTRODUCTION

This chapter provides an historical account of the longer-term predator-livestock interaction within what is now the Republic of South Africa, against an abbreviated summary of socio-political and economic changes. Our arrangement is chronological, and the methodology is that of the humanities and social sciences by way of utilising existing primary and secondary sources to construct a coherent, explanatory narrative. This is an assessment of currently available published knowledge, which has its limitations, and we have not conducted in-depth primary archival and other research for this purpose.

ALTHOUGH the interface between pastoralists and predators has a long history in southern Africa (indeed, across the world), the background against which this has occurred has evolved over time. A motivation for this chapter, therefore, is to analyse the documentation relating to predation and livestock in the wider complex and regional political history of the country. When human and livestock population numbers in the subcontinent were low, the frontier open, and farms unfenced, predator management by pre-colonial people and early colonial settlers was informal and without regulation by the state. With the rise of effective colonial government, particularly in the Cape Colony in the mid-nineteenth century, the closing of the frontier with fenced farms and the invasion by settlers into the highveld interior, the state began to assist white farmers with predator control.

The value of agricultural products to colonial society,

especially woolled sheep, motivated government to support and subsidise 'progressive', or commercially productive, farmers who promoted the local economy through the export of wool. Despite variations over the decades in the price of fleece, state assistance to white farmers to counteract damage-causing animals continued into the twentieth century, declining only with liberalisation of government agricultural policy from the 1980s and the transition to democracy in the 1990s. Waning government support mirrored the dwindling contribution of the agricultural sector as a proportion of South Africa's GDP from 21% in 1911 to 2.4% a century later. Between 1946 and 2011, the economic contribution of sheep farming to the overall economy by way of wool, lamb and mutton declined from 17% of gross agricultural output to 3.7%. Real mutton and wool prices in 2011 were almost at the same level as they had been in 1911. Moreover, the number of commercial farms in South Africa has generally declined: from a

Recommended citation: Carruthers, J. & Natrass, N. 2018. History of Predator-Stock Conflict in South Africa. In: *Livestock predation and its management in South Africa: a scientific assessment* (Eds Kerley, G.I.H., Wilson, S.L. & Balfour, D.). Centre for African Conservation Ecology, Nelson Mandela University, Port Elizabeth, 30-52.

highpoint of 112,453 in 1946 to 39,966 in 2007 (Nattrass & Conradie, 2015; Nattrass *et al.*, 2017a). Naturally, the political influence of this sector has diminished too and it therefore no longer has the influence to secure state funding for predator control. In areas where African people controlled the land over the last century, it seems that predators have been less of a problem. These areas were largely in the eastern half of the country where rainfall is higher and cattle usually the most important element in livestock holdings. African communities were generally more densely settled in these regions and kept predators at bay through herding and regular hunting. As far as African farmers were concerned, the segregationist and apartheid state was little involved in assisting livestock production for the market or for export, although services such as dipping and other veterinary health regimes were provided. Certainly, the state was interventionist, forcing Africans into restricted reserves, homelands, Bantustans and other segregated 'tribal areas' (the vocabulary varied over time). The form of land-holding in these localities was communal, with power of allocation vested in the hands of the chieftain; there was no private property. Moreover, apartheid policy meant that the population in the 'homelands' grew with the forced removal of 'surplus people' into them. Indeed, even agriculture (cultivation) in the 'homelands' was unable to support a sustainable food-producing sector and many parts of South Africa, including the Eastern Cape and parts of the Northern Cape, are unsuitable for crop production (Platzky & Walker, 1985; Dubow, 2014).

Since the 1990s, the national policy has reduced direct support for agricultural activity in historically white areas with land reform and land restitution initiatives, the rise of game ranching, and farm worker activism becoming the norm. On the other hand, the development of the communal areas, neglected by previous governments of South Africa as 'reserves', 'Bantustans' and 'homelands' has become a priority, but predation on livestock in this sector has been little studied.

The current assessment is, in addition, coincident with the growing importance of ethical treatment of non-human animals in South Africa and internationally (Pickover, 2005). Wildlife conservationist sympathies, as well as recent advocacy of animal rights are at odds with some of the traditional values of livestock farmers. Moreover, the scientific environment has also changed with more reliable ecological knowledge available from specialist research in tandem with the growth of the public environmental lobby (Nattrass *et al.*, 2017b). Policies, previously shaped largely by the interests of

white commercial farmers, are now required to mediate conservation and animal rights perspectives, to take account of scientific knowledge, and also to attend to the concerns of rural communities more broadly (Kerley *et al.* 2017). After many years of discussion and consultation, the central government passed the 'National Environmental Management: Biodiversity Act: Norms and standards for the management of damage-causing animals in South Africa' in 2016. The present assessment aims to take the process further.

This chapter outlines the changing scientific paradigms and ecological thinking in terms of attitudes to animals that were once described as 'vermin', emphasising in the main the impact of their predation on stock farming (large and small livestock). It needs also to be appreciated that predator extermination and/or control has an ideological and political, as well as an economic and scientific, rationale. Approaches to predator-livestock conflict have recently also revealed differences between those claiming observational and experiential knowledge (mainly white farmers and hunters) and those claiming scientific authority (nature conservation officials and academic conservation biologists). Nattrass and Conradie (2015) describe these as 'contested ecologies', rivalling one another through different values and politics and by emphasising different aspects of predator ecology. They explain how, in the contemporary Western Cape Province, the debate over how best to control predation became emotional and overtly value-laden, yet potentially open to being shaped by ongoing research (Nattrass *et al.*, 2017a). This, too, is vital background to the issue as people talk past each other from totally divergent paradigms. Conservationists, and to some degree, scientists, have changed their language from discourses about 'vermin' to 'problem animals' and recently to 'damage-causing animals'. At one extreme, writers identify a 'genocide' against a particular species (Van Sittert, 2016). We have not done research on local, farmworker or African knowledge systems in respect of mesopredators and livestock in this chapter and there is little published material.

The black-backed jackal *Canis mesomelas* has been seen as a prime culprit for predation on livestock in the sheep-farming areas over the last couple of centuries. Despite foregrounding this species in this assessment, our knowledge of it is far from extensive. The survey compiled by Nattrass, Conradie, O'Riain & Drouilly (2017b) underscores the level of ignorance about

this species, but also collates published knowledge of an extremely adaptable taxon, provides selected literature, and suggests implications for management. In general, however, the literature on the black-backed jackal and caracal *Caracal caracal* on smaller domestic animals is not only scanty and uneven, but it has also mainly focused on what was formerly the Cape Colony (1814-1910), and Cape Province (1910-1994), and that area itself has been divided into Western, Eastern and Northern Cape Provinces since 1994. The little attention that environmental historians and historians interested in changing agricultural and pastoral practices have paid to the matter has been concentrated in mostly white farming areas in private ownership that are suitable for sheep-farming and thus vulnerable to predation, viz. the Cape region. It is for that reason, together with the fact that it is here that the volume of small livestock is greatest, that attention is devoted mainly to that part of South Africa.

From the perspective of this assessment, it is regrettable that the literature has focused on predation by jackal and caracal on sheep in the Cape region in the commercial farming districts. This is largely because of the rich historical detail that deals with these areas and the centrality of predation in shaping debates about farming practices and conservation. Published data on the situation in the communal areas around the country does not exist in equal measure. In addition, the impact of predation on other agriculturally significant species, such as goats *Capra aegagrus hircus* that are common in communal areas around the country, has also not been determined. For obvious environmental and historical reasons, species like jackal and caracal are numerous in many parts of South Africa and always have been (Skead, 1980, 2007, 2011; Boshoff & Kerley, 2013). Although there are accounts of larger predators like lion *Panthera leo* and leopard *Panthera pardus*, or smaller predators like Cape fox *Canis vulpes*, African wild cat *Felis sylvestris*, and feral dogs *Canis familiaris*, taking livestock in other areas, this happens far more seldom.

The available literature indicates that predator-livestock conflict is more of an issue in the lives of commercial farmers rather than subsistence farmers on communal land, but this may not be an accurate reflection of the real situation in all parts of the country. Nonetheless, the weight on the former may be that commercial sheep farms tend to be extensive, with few

workers, whereas communal farming areas are densely populated (and where dogs are close to small stock). However, communal land near formal protected areas may have problems with predators if labour is unavailable for herding; more research is needed.

PRE-COLONIAL PERIOD TO 1652: GENERAL INTRODUCTION

It is a truism that livestock-keepers from time immemorial have felt the need to protect their flocks and herds from predators to which all vulnerable animals are prey. In Africa, large, or apex, predatory carnivores abounded in bygone eras and over wide areas. Therefore, from the dawn of pastoralism on the continent it has been necessary to provide protection from wild predators for domestic livestock (Smith, 1992). Owing to its particular environmental opportunities and constraints, southern Africa was settled widely by African hunter-gatherers and then by pastoralists in the western parts, and mixed farmers (those who practised pastoralism and planted crops) in the north and east (Mason, 1969; Derricourt, 1977; Inskip, 1979; Peires, 1981; Lewis-Williams, 1983; Pollock & Agnew, 1983; Shillington, 1985; Hamilton, 1995; Laband, 1997; Mitchell, 2002; Huffman, 2007; Swanepoel, Esterhuysen & Bonner, 2008). However, predator-livestock conflict became a matter of governmental concern in the colonial era when an ideology of private land ownership and a market economy, and subsequently a capitalist economic system, were introduced.

Political and economic outline

Precolonial southern Africa had a multi-layered pattern of economies, lifestyles and communities and this is not the place for a full discussion of them. The area of the modern polity of the Republic of South Africa has been inhabited by modern humans for millennia. Archaeologists are currently in agreement that the earliest modern human inhabitants were bands of hunter-gatherers and foragers, generally referred to as San (or Bushmen). It is known that they kept no livestock and cultivated no crops and that their society was based on small, mobile, egalitarian, and generally co-operative, communities or band structures.

Predation on stock/mixed farmers in the interior in the pre-colonial era

Over time, the San foraging and hunting economy was displaced in many regions by intruding societies whose economies and political structures differed markedly. For the purposes of this chapter we identify two of these societies and differentiate between them on the basis of their lifestyles. Broadly interpreted, Bantu-speaking communities can be appreciated for being mixed farmers and skilled iron-makers – and often traders – with sophisticated political hierarchies and economic and social resilience. These traits came into existence owing to the ability to store food (mostly grains) and to husband livestock – almost exclusively cattle but also goats and sheep – and to use the food resources and by-products of those herds. Certainly, it must be surmised that there were many occasions on which humans suffered predation on their livestock from dangerous wild animals.

Evidence from Silver Leaves, Broederstroom, and other sites of the Early Iron Age suggest that these communities settled in fairly large numbers in areas that were good for cattle-raising, where nutritious grassland savanna was available and where livestock diseases were not limiting. The arrival and settlement of cattle keepers and mixed farmers of various communities (e.g. Nguni, Sotho, Tswana – the Late Iron Age) in what are now the provinces of Limpopo, North West, KwaZulu-Natal and the Eastern Cape is well documented (Mason, 1969; Hammond-Tooke, 1974; Maggs, 1976; Maylam, 1986; Huffman, 2007). We have, however, little detail about their relationships with predators of their cattle, but again, it appears from what is known that traditional techniques such as shepherding and night kraaling together with the technical ability to hunt large predators in organised groups may generally have been sufficient to protect their herds from predation (Lye, 1975).

Khoekhoen (Western and Northern Cape)

Unlike the Bantu-speaking mixed farmers, the Khoekhoen (Khoikhoi, sometimes Khoisan) of the south-western and northern parts of what are now the Western Cape and the Northern Cape Provinces can be described as pure pastoralists with fat-tailed sheep as the main form of livestock. They did not cultivate grain or other crops (Smith, 1987). Certainly, it seems that careful shepherding

and stock outposts were the means by which these communities managed their herds. Because of their reliance on livestock as the basis of their lifestyle – their political, religious and economic systems were entirely predicated on the acquisition and ownership of livestock – they lacked the resilience effectively to confront the intrusion of the colonial order. As is well recorded, some groups, the ‘Strandlopers’, who inhabited coastal areas for some or all of the year, relied on marine resources, but the centre of political power more usually resided in the person who owned the largest number of livestock (Elphick, 1985).

Khoekhoen herds were substantial; in 1653, a French sealer recorded ‘thousands of cattle and sheep’ on the plains around St Helena Bay (Smith, 1987:396). Cattle and sheep require different grazing: cattle are less eclectic in their diet than sheep and are bulk grazers and, for this reason, patterns of transhumance (the seasonal movement of livestock) in some parts of the Cape were complex (Smith, 1987: 399). Population records for this era are lacking but certainly the level of human density was low. Records are fragmentary, and information is gleaned mainly from later, often unreliable, accounts left by early European explorers and visitors to southern Africa. What was occurring in parts of the subcontinent in terms of livestock and predator interrelationships in places such as what are now Limpopo Province and KwaZulu-Natal particularly before c.1850 is not known with any certainty, and even the fragmentary oral records are unclear.

It appears that a number of breeds of sheep were kept by the Khoekhoen. In the late 1770s Scottish plant collector William Paterson noted a different variety of sheep in Namaqualand from those nearer Cape Town (Forbes & Rourke, 1980). The ability of the Khoekhoen to combat livestock disease through many natural remedies is well attested (Elphick, 1985). As explained by Elphick (1985), and relying on contemporary sources such as Kolb (1727), at night cattle and sheep were kept within the circular enclosure of the huts or just outside it, with their legs tied so that they could not roam freely. Apparently, lions, and presumably other carnivores and mesopredators, trailed the Khoekhoen bands and were unafraid of attacking the stock enclosures at night (Elphick, 1985). However, it seems relatively clear that Khoekhoen herds were not often allowed to wander without supervision.

Khoekhoen society, grounded as it was on the fragility of livestock ownership (herds could be decimated by disease or drought) and with political leadership the prerogative of those with the largest herds, was extremely vulnerable to the loss of livestock. Despite their fierce resistance, the power of the herders was broken by the combined factors of settler technology, colonial expansion, and the introduction of diseases, particularly smallpox. Their ancestral lands were appropriated by the expansion of white settlers and their stock, and their lifestyle has not survived intact (Elphick, 1985).

COLONIAL/REPUBLICAN PERIOD 1652-1910: THE CAPE, NATAL, TRANSVAAL AND ORANGE FREE STATE

Political and economic outline

The southern part of South Africa was settled in 1652 by a small outpost of employees of the Dutch East India Company (DEIC) as a victualling station for its ships as they plied the route around the Cape of Good Hope to the spice islands of the Far East. At that time there was no intention to establish a colony or even to start a permanent settlement. The Company, based on principles of monopoly, mercantilism, direct profit and minimum investment, envisaged a small station that could provision ships through growing vegetables and other crops that would combat scurvy. They also intended to barter livestock with the Khoekhoen so as to provide fresh meat for ships as they lay in harbour. As is, however, well known, the vision of a contained settlement centred on intensive agriculture and friendly relations with the Khoekhoen soon gave way to an extended area of settler livestock holdings in the interior, fierce opposition from these indigenous people, the introduction of slavery, the establishment of large wheat and wine estates and, in short, a permanent and expanding European foothold in southern Africa that led to hostile relationships with the Bantu-speakers in the eastern parts of the Cape region (Elphick & Giliomee, 1989). By the time that the DEIC collapsed towards the end of the 1700s, local administration and ideas of a contained settlement had broken down completely. The boundaries of the colony were permeable and almost indefensible, and hostilities with the Xhosa on the east were becoming intractable. At the core of this conflict was competition for grazing land

for livestock, particularly cattle which was the economic base of both communities (Peires, 1981).

Moreover, the European context had changed and, with the outbreak of the Napoleonic Wars, and the position of the Netherlands in those conflicts, the Cape became a prize of war. Having been taken by the British in combat in 1795, restored to the Batavian Republican administration between 1802 and 1806, the Cape reverted to Britain in 1806 with permanent occupation confirmed in 1814. With this political change from DEIC control into a formal colonial possession, and the abolition of slavery some years later (1834), one can argue that the modern capitalist era began in South Africa, and with it, formal government structures and 'progressive' pastoralism (Ross, 1986; Beinart, 2003).

As for the interior region, there were, eventually, three settler polities; the Transvaal (the South African Republic, 1852), the Orange Free State (1854), and Natal (1843). Natal was a British colony while the other two were self-governing and fractious Boer republics in which civil war between factions was often rife (Giliomee, 2003). The colonial order arrived in Natal and in the interior around the middle of the nineteenth century together with considerable violence and resistance from African communities. The period from the 1840s to c.1902 saw confrontation between settlers and groups such as the Sotho, Zulu, Tswana and Pedi. Major upheavals included the Mfecane of the 1820s and later wars against the Sotho in the areas that became the Orange Free State and Lesotho, the Zulu in the east, and the Ndebele, Pedi and Tswana in the Transvaal. Dispossession and conquest by the invading settlers occurred on a grand scale, leaving only pockets of land in the possession of its pre-colonial occupiers. Despite strong opposition, eventually the majority became subservient vassals of the whites or migrant labourers on the mines (Keegan, 1986; Beinart, Delius & Trapido, 1986; Davenport & Saunders, 2000). Needless to say, strong government – as was the case in the Cape by this time – did not exist in the interior and thus state support for the settler farming community was absent. In these regions, the very different climatic and ecological conditions in comparison with the Cape militated against successful fleece-bearing sheep at the same scale. Moreover, white settlement, private land ownership and modern agricultural practices arrived later in these places.

Despite British efforts to negotiate some form of confederation from the 1870s, divisions and acrimony

persisted among these political units and the Cape. Further complicating the matter in this period was the discovery of gold and diamonds, and the transformation of, especially, African society and its farming practices to cater for the growing numbers of miners and other immigrants. The mining revolution altered South Africa's history irreversibly. It was not until after the South African War between Britain and the two Afrikaner republics (Orange Free State and South African Republic) in 1902 that effective government was imposed on the region as a whole.

In 1909, a complex and contested Constitution united the four colonies into the Union of South Africa which came into being in 1910. Legacies from the colonial era remained, including some of the powers of the colonies that were transferred onto the provinces. Some of these were by way of dual competencies, e.g. education, health and agriculture, and this dualism has bedevilled the administration of various arms of government to this day.

THE CAPE 1652-1910

The Cape under the Dutch East India Company

Once the DEIC had established an outpost in what is now Cape Town, it began to build up its own herds of livestock, particularly sheep, rather than continuing to barter with the Khoekhoen. Various travellers' accounts record interactions with dangerous large mammals and their predation on domestic stock. Many refer to lion that took horses, sheep and other livestock (Raper & Boucher, 1988). As has been explained, these accounts need to be approached with caution as to their indication of numbers or extent because exciting narratives of lion predation made good stories and sold books (Beinart, 1998). Large predators like lions are a threat to big herbivores like cattle and oxen and it is probable that smaller, adaptable mesopredators like jackal were more of a persistent problem for small stock, including sheep and goats. During the DEIC period protecting livestock generally followed Khoekhoen tradition by way of kraaling and shepherding. According to the settler historian G.M. Theal writing in 1888, the DEIC paid bounties for dead predators, but this was to protect human life and crops as well as livestock (Van Sittert, 2005).

Burchell (1822; 1824) was only one of many contemporary travellers who recorded that the presence of wild animals deterred people from cultivating crops but presumably these were herbivores or grazers, and perhaps also bushpigs *Potamochoerus larvatus* and baboons *Papio ursinus*. He noted also that the Khoekhoen constructed temporary kraals for their sheep when they travelled to fresh pastures, and cattle were tied together to ensure that they did not stray. Noting that lions were around in pursuit of their oxen, Burchell's party lit fires and frightened them away with muskets. Jackals were reported to scavenge on what the lions had left (Burchell, 1822; 1824).

Under the DEIC regime various push and pull factors forced or enticed burghers (freemen) and disaffected company employees to expand beyond the confines of the Cape peninsula. DEIC administration seldom followed them and a culture of self-reliance and independence took hold, together with wariness, indeed abhorrence, of any administration that limited the liberty of a farmer to do as he wished on 'his' land, either privately owned or legally occupied. Intensive agriculture failed outside the confines of the wheat and wine belt around Cape Town and the lure of the interior with its abundant land and opportunity for self-reliance as a livestock farmer was an attraction. Colonists sought to acquire flocks and herds of their own to increase their personal wealth. Burrows has explained how indigenous Cape sheep, providing meat, fat, skins, and currency was a lifeline for the itinerant farmers, referred to as *trekboers* (Burrows, 1952). Colonial expansion in this period was mainly towards the Xhosa-held eastern parts of the Cape where good seasonal grazing was plentiful, but also into the more climatically inhospitable northern Cape. Trekboers were little hampered by organised government and where they met resistance from autochthonous communities they generally took matters into their own hands, thus escalating frontier violence. Access to land for settlers was plentiful by way of the loan farm system, properties for which no fee was required, and that could be occupied or abandoned at the will of the occupier. In addition, herders could be hired relatively cheaply from the impoverished Khoekhoen communities. Trekboers hunted (and even exterminated) wildlife as they travelled, indeed, it was a major form of subsistence (Beinart, 1982; Beinart & Bundy, 1987; Penn, 1987; Van der Merwe, 1995; Penn, 2005).

The colonial experience of the first two hundred years of European rule of the Cape was a process of unrelenting dispossession of land from autochthonous people, a record of livestock raiding and counter-raiding, and endemic violence. It was also the period during which the enormous herds of wildlife and large predators were virtually exterminated from the southern regions of South Africa. By the late 1700s most free-roaming large mammal wildlife had been deliberately extirpated through firearms that had been introduced into southern Africa by Europeans (Skead, 2007; 2011). Even by the 1830s an expedition into the Karoo was needed in order to see any large fauna at all. In this way, the southern part of South Africa was increasingly being made safe for domestic stock held as private property by white settlers. In South African law, domestic stock is private property and can be owned by persons or corporations. However, wildlife is *res nullius*, an object that is unowned. But wild animals can be captured, alive or dead, and a person who captures a wild animal becomes the animal's owner, through a process of acquisition of ownership known as *occupatio*. Such an animal in captivity is the sole property of the captor, or of anyone who subsequently acquires it from the captor. In the 1970s, when wildlife ranching was becoming established and game farmers sought assistance from the Department of Agriculture, a Directorate for Game Farming was set up. As a result of the report of its Committee, although actual 'ownership' of wildlife was not conferred on landowners, a matter for which there was a strong lobby, a concession was made in that if farmers could prove to the authorities that they had fenced in their wildlife satisfactorily, they were eligible for a 'Certificate of Adequate Enclosure' from each of the provinces, a move that entitled them to state subsidies as well as to other benefits (Carruthers, 2008).

What was becoming clear was that sheep-farming by white settlers could prosper in the drier areas of the southern sub-continent (Beinart, 1998) and that by the early 1800s the time was propitious for importing other breeds of sheep into the Cape, particularly wool-bearing varieties. Burrows (1952) records that in 1789 Robert Jacob Gordon, the last DEIC Cape governor, clandestinely imported six Spanish sheep from the Netherlands and that the Van Reenen brothers Jan, Sebastian Valentijn and Dirk Gysbert acquired them and crossed them repeatedly with Cape sheep. This strain was

hardy and less disease-prone than pure-bred Merinos. In 1804, the Batavian regime that had moved away from the DEIC's mercantilist economic policies, having formally proclaimed the colonial boundaries and begun to introduce organised administration, encouraged stock-farming, by way of an investigation under W.S. van Ryneveld. His initial report led to the *Commissie ter verbetering van veeteelt en landbouw* (Commission for the improvement of stock-farming and agriculture) comprising 14 government officials and farmers. Van Ryneveld's recommendations included replacing fat-tailed sheep with Merino, but although Groote Post (near Darling) was established as an experimental farm, the Batavian authorities concentrated on improving agriculture rather than pastoralism. Under British rule the commission's name was changed to the Agricultural Board (Plug, 2004:3-4).

At this time, fewer than 8 000 of the 1.34 million sheep in the Cape were wool-producing Merinos and almost all of them belonged to the Van Reenens (Burrows, 1952). Their form of modernised pastoralism began to spawn a viable rural economy and towns such as Bredasdorp and Caledon were founded on it (Burrows, 1952; Beinart, 1998). This happened despite the fact that many settler sheep-farmers were reluctant to have pure-breed Merino sheep with their lessened resistance to disease (Freund, 1989). In addition, while fat-tailed sheep bunched together when confronted by a threat, Merino scattered, thus making themselves more vulnerable to predators (Beinart, 1998:184).

Freund (1989) explains the change that occurred in the Cape with the formal cession of the colony to Britain in 1814. Thereafter, securely situated in the British Empire, the Cape was catapulted into international trade and benefited economically from the influx of British merchants and the increase in British shipping. As part of an international network of colonial possessions (including those in Australia and New Zealand) the Cape entered the global community. Prior to that time, owing to the unsettled political situation and the frontier wars with the Xhosa, cattle numbers in the colony decreased between 1798 and 1806, perhaps by as much as 25%. But by 1815 numbers burgeoned to more than there had been in 1798. As far as sheep were concerned, already in 1807 there were more than there had been in the 1790s. Colonial sheep numbers peaked in 1811 (Freund, 1989).

The DEIC extensive loan farm system that virtually gave unoccupied land to trekboers was not conducive to large-scale woolled sheep farming because trekboers moved, almost constantly, from one new farm to another. In 1813 the British government introduced the quitrent freehold system that entailed regular rental payments for surveyed farms that had to be productively used and could be sold. This encouraged a more settled white rural community. Eventually, this measure brought a denser pastoral community into being and private land became the norm (Freund, 1989). Between 1814 and 1823 the predator bounty that had existed under the Dutch was revived, but this may not have been related to sheep farming in particular. Van Sittert (1998) asserts that jackals were not included in this bounty system, but this is refuted by Beinart (1998). Moreover, it was not policed. According to Van Sittert (2005), this form of bounty was discontinued in 1828 owing to financial stringency at the Cape.

The situation altered in the 1850s (Nattrass *et al.*, 2017a). There was a wool boom in 1853 and in that year the Cape received Representative Government and thus began partly to manage its own affairs without the requirement to refer every aspect of governance to Britain for approval. The need to nurture wool farmers at this time was extremely important because by 1872 the ever-increasing wool exports had peaked at the huge sum of £3 million (Beinart, 1998). In 1850 in the eastern Cape, Thomas Baines mentioned farmer Currie carefully counting his sheep as they were led into the kraals and he noted that the shearers on Pringle's farm were Africans (Kennedy, 1961; 1964). As Peires (1981) has explained, during this period settler farmers were desperate for labour, particularly after the introduction of woolled sheep, and dispossessed Xhosa, and what were termed 'native foreigners', were permitted to squat on farms as labour-tenants.

Coming from Europe, settlers were familiar with the idea of 'vermin' as a group of predators. In 1889, the Cape parliament (Responsible Government had been granted to the Cape in 1872) instituted a bounty system for specified 'vermin'. This remained in place for more than 50 years. Divisional Councils (the arm of local government in the Cape Colony/Province) were empowered to oversee the process, and hunting clubs were founded and grew in number (Van Sittert, 2005).

Poison was also used; the first Wild Animal Poison Club was established in Jansenville in 1884 and the example was followed in many other districts. Until well into the 1890s there were regular annual congresses of these clubs in the Cape, their activities subsidised by the state (Beinart, 1998; Van Sittert, 1998).

Within a few short decades, woolled sheep were the mainstay of the Cape economy and government protected and supported this industry assiduously. Improved methods of transport, including refrigeration, meant that meat could be transported around the British Empire – mutton was a favourite. Together with increased immigration to South Africa and urbanisation after the 1870s with the mineral revolution in the interior, the sheep farming community of the Cape expanded (Archer, 2000; Cripps, 2012). The mineral revolution wrought even greater changes to African society than it did to settlers. The migrant labour system disrupted communities irreversibly. Some managed to adapt and supply agricultural produce on a basis competitive with white farmers and imports; sometimes as independent farmers, sometimes as sharecroppers (Bundy, 1988). The effect of predation on African-owned livestock in these changing circumstances has yet to be examined.

As was to be expected, once the larger mammals and predators had been extirpated from the Cape, together with the herds of antelope, it was the smaller opportunistic predators, particularly black-backed jackal that had been harassing sheep farmers from the start, that expanded to fill this ecological niche to become the bane of sheep-farmers' lives, affecting their profits. In 1865 one-third of the settler population (58 000) lived in the sheep-farming districts and, as outlined by Archer (2000), technology, notably the industrial production of wire fencing, enabled the industry to burgeon and sheep density to increase. From the 1870s artificial water supplies (drawn from aquifers by windmills) in the drier regions meant that camps within which the sheep ranged freely could be constructed out of imported wire fencing. While the need for kraaling was lessened, the need to protect against predators grew (Archer, 2000). Absolute stock numbers in the Cape grew too: in 1865 there were 10 million sheep and 16.7 million in 1891 (Nattrass *et al.*, 2017a) although numbers fell again during the next 15 years due to war and drought.

The sheep-farming industry had been transformed from nightly kraaling (with its attendant dangers of

disease and veld degradation) with the slow introduction of industrial wire fencing from the 1870s that may have been extensive only by the time of the Second World War. The Fencing Act in the Cape in 1883 (amended in 1891) required farmers to co-operate in the construction and maintenance of fences along common boundaries. Jackal-proof fencing (wire mesh fencing with a packed rock apron) started spreading in the 1890s and fence-making equipment came into play in 1902 (Beinart, 1998). From 1905 subsidies for jackal-proof fencing were paid in the Cape. Cape farmers' cries about 'vermin' and the depredations that they had to suffer on their account were never-ending and owing to the importance of wool exports as a mainstay of the Cape economy, the government continued to listen and to support wool producers. Van Sittert (1998; 2002) cites the fact that fencing tripled between 1891 and 1904 from 4.1 million morgen enclosed to 12.5 million. The situation among African sheep farmers in the communal areas (particularly the eastern Cape) at this time is not known. What is, however, clear, is that dispossessed and displaced Africans and Khoekhoen in the eastern Cape were increasingly being employed as shepherds and herders on white-owned sheep farms at this time.

The bounty system that relied on the production of 'a tail' for reward lent itself to fraud. Consequently, requirements for bounty receipts were constantly tightened. From 1895 vermin tails had to include the bone, in 1896 proof was needed that the tail emanated from the Cape Colony, in 1899 a bounty payment required tail, scalp and ears and the signature of a Justice of the Peace or landowner, and in 1903 the whole jackal skin had to be produced. Select Committees looked at the matter. One report was published in 1899, *Report of the Select Committee on the Destruction of Vermin*, but the outbreak of the South African (Anglo-Boer) War prevented further action until a second Select Committee sat in 1904 (*Report of the Select Committee on the Destruction of Vermin*). Predator control was clearly high on the government agenda (Beinart, 1998).

The bounty expenditure was considerable. In 1898-1899 bounties on jackal tails (7 shillings each) amounted to the not inconsiderable sum of £28 000 and thus represented more than 50,000 jackal that were killed (Beinart, 1998). But in 1908, mainly because of fraud, vermin bounties were abolished in the Cape.

The post-war depression of 1904 to 1907 affected all four colonies as the export price for wool collapsed and evidence of veld degradation became ever more apparent (Beinart, 1998). Van Sittert (1998) argued that the bounty system was helpful not only in controlling vermin but also in alleviating poor white poverty. It may also have created cohesion among whites of all classes and the establishment of farmers' associations assisted this process further. How many black people were paid out for proofs is not a matter that is formally recorded for this period. Beinart (1998; 2003), however, notes that African areas were relatively free of jackal because communal areas could be controlled by groups of people, not individual owners, and there was consequently no consideration of private property or issues of trespass. In addition, the large numbers of dogs kept by Africans were destructive to smaller predators like jackal and caracal and it may even have been that black farmworkers and independent hunters killed predators for the bounty.

No 'scientific ecological research', as currently understood, was conducted on predators like jackal and caracal by museums or university colleges. Natural history societies proliferated in the late nineteenth century but the ethos of the time was on teaching the type of zoology that was current in Europe (if it was taught at all), on the collection of specimens, and on close taxonomic study. The place of predators in any kind of what would now be called an 'ecological system' was limited to a few voices that need to be understood in the context of their time and the emphasis on introducing a modern agricultural economy. One of them was F.W. Fitzsimons, Director of the Port Elizabeth Museum from 1906 (Beinart, 1998). The demands of politically powerful Dutch- and English-speaking farmers (Tamarkin, 1995) for the persecution of predators like jackals held sway.

As indicated, the main characteristic of this pre-Union period in the Cape was the dispossession of local communities from ancestral lands and their replacement by a private property regime, settler farming practices and a market economy. The Khoekhoen herders were unable to sustain themselves as a cohesive society once they had lost their cattle, and despite numerous wars, in time, the Xhosa of the eastern Cape were pushed eastwards. Certainly, they continued to husband livestock and grow crops, but they had access to ever-decreasing areas of land. How this influenced the predation of their livestock

has not been examined. However, African cultural practices such as loan cattle (*mafiso*, where shepherds cared for the livestock of a chief or headman in exchange for some of the progeny of the herd), may have increased the number of herders and shepherds. For example, the large herds of a chief were not protected by him alone, as was the case with settler farmers. Practices such as loan cattle, the use of the youth etc. meant that labour for shepherding and herding was generally always available.

Natal, Transvaal (South African Republic 1852-1902) and Orange Free State (1854-1902, Orange River Colony 1902-1910)

Natal was annexed by Britain in 1843 primarily to prevent permanent settlement by the Voortrekker groups who had vacated the Cape in the 1830s during the 'Great Trek'. This was not sheep-farming country. Hot summers and high rainfall were detrimental to woolled sheep and a special type that might have acclimatised was not bred. The presence of predators was a far lesser threat than worms and other sheep ailments and diseases. Sheep could not range freely in the veld (as they could in the Cape) but had to be confined in camps. Unlike in the Karoo, there was a shortage of mineral salts in the soils of Natal, and careful veld burning was required. In the seasonally very hot Natal, flocks had to trek onto the cooler Highveld in summer (Anon., 1929). Zululand, nominally independent until 1897 when it was annexed by Natal, is also not suitable for sheep-rearing but has always been well known for cattle-keeping, the main economic resource of the Zulu (Guy, 1982).

In comparison with the Cape with its longer history of white settlement, large game remained plentiful in Natal until well into the 1800s. Predator control among the Zulu in the pre-colonial and colonial periods is not well studied but it is likely that cattle were protected from lion and other predators as a matter of course. Struthers, in 1854, relates how 'tigers' (probably leopards) in a tree near the wagons attacked six dogs, only one of which returned three days later with 'fearful holes in its neck and shoulder' (in Merrett & Butcher, 1991:49). At a similar time, Delegorgue explained how Zulu cattle were penned every night into a kraal with a circular hedge, fairly close to the huts and all surrounded by an external fence for protection against attack from 'hyaenas and

panthers who are so bold that they enter huts and seize the dogs sleeping at the owner's feet' (Delegorgue, 1997). In the 1890s Tyler recorded lions in the Zulu cattle folds (Tyler, 1971).

Of jackal and other predators and livestock (particularly small stock) in the growing agricultural economy in the greater area of KwaZulu-Natal before Union in 1910, the historical record is mostly silent. It seems likely that predation on small livestock as hampering productive livestock farming has historically been an issue in the Cape rather than evenly country-wide although we cannot be sure.

As the Cape became more densely settled and with the enclosure (fencing of farms) movement gaining pace, intrepid missionaries, explorers and land-hungry settlers – and the Voortrekkers for different reasons – ventured into the interior. Initially, Britain claimed these territories, but during a period of financial stringency, it granted independence to the Transvaal in 1852 (the South African Republic or ZAR) and to the Orange Free State in 1854 by the Sand River and Bloemfontein Conventions, respectively. Many travellers and explorers between the 1830s and 1860s commented on the large herds of wildlife and the abundance of predators. The hunting literature is extensive, and this genre spawned an appreciation of the 'excitement' of the interior regions as well as providing a record of the decimation of elephant *Loxodonta africana* and other large wildlife (Gray, 1979). Not for many years was settled agriculture and property ownership consolidated in the Transvaal and Orange Free State. Moreover, this was generally cattle country, although Sandeman, travelling in the Free State in 1878 on his way to Pretoria, described wool as the staple article of the republic (Sandeman, 1975). It is not clear how many sheep there were, nor the herding practices or mesopredator losses. In 1850 Baines, then on the Marico River among the Tswana in what is now the North West Province, described how a lion had been among the cattle and badly injured them (Kennedy, 1964). Selous, one of the most famous of the sport-hunters, recorded that predators, when encountered, had to be driven off by specifically employed African herders otherwise they would attack donkeys and horses (Selous, 1999). Apparently, in 1833 near Clocolan (now in the Free State) a group of missionaries heard jackal and 'tigers' one night and the following morning one of their

sheep was missing (Boshoff & Kerley, 2013). There is not sufficient anecdotal evidence such as this to reliably inform a coherent account of the situation before the twentieth century in the interior of what was to become South Africa (but see Keegan, 1986).

After the South African War had ended in 1902 and the two republics had become British colonies – the Transvaal Colony and the Orange River Colony – the government established Departments of Agriculture on the same basis as was the case in the Cape and Natal. Progressive agricultural expert Frank B. Smith became head of the Department in the Transvaal and Charles M. Johnston (a keen and knowledgeable ornithologist) in the Orange River Colony. An early edition of the *Transvaal Agricultural Journal* (1904) posted a notice on the 'Destruction of Vermin' instituting bounties for targeted animals among which jackal were included. Leopards (often referred to as 'tigers' following the Dutch and Afrikaans terminology), then still existing in the more remote localities were worth 10 shillings, wild dog *Lycaon pictus* 7 shillings and 6 pence, silver and red jackal (the side-striped *Canis adustus* and black-backed jackal – not 'maanhaar' jackal, viz. insectivorous aardwolf *Proteles cristatus*) 5 shillings, and caracal, 5 shillings. In order to obtain the reward, the tail and the skin of neck and head of the destroyed animal had to be presented to the Resident Magistrate together with a written declaration that the creature was killed within the boundary of the colony. If the animal was young, the whole skin had to be shown. If required, poison (strychnine) was made available from the Resident Magistrate at cost price. It is clear that this notice followed very closely the situation in the Cape at that time (Anon., 1904). No analysis of the records of Resident Magistrates has been done to ascertain how many rewards were paid, to whom, or when. The few records in the National Archives of South Africa accessed using the keywords 'vermin' and 'ongedierte' (for the Transvaal database accessed via NAAIRS – the National Automated Archival Information System) provides only minimal information about the destruction of stock by domestic dogs.

The guiding philosophy of settler farming in the post-war colonies, particularly in the Transvaal under Smith, was to recover from the destruction of the countryside that had occurred over the three years of hostilities and

to restock farms, introduce new grasses and crops and formalise agricultural policy. The colony also needed to attract English-speaking settler farmers. To these ends, Smith employed qualified staff such as Joseph Burt Davy, Illtyd Pole Evans and Charles Legat, and he retained veterinarian Arnold Theiler (later Sir Arnold) who had been employed by the Transvaal republican government. In 1902 he initiated the *Transvaal Agricultural Journal*, published in both English and Dutch. Smith's difficulties in guiding these processes and dealing with placating the vanquished and still hostile Boer population were immense.

One of the problems at this time regarding sheep farming in the wetter parts of the interior was endemic livestock disease, of which southern Africa has many and that have been augmented by some Australian sheep diseases. The challenges in dealing with them were extremely difficult and only with time, and the invention of appropriate pharmaceuticals and strategies, have some of them been overcome. The ecological role of jackal in disease transmission has not been fully elucidated, nor has the effect of the rinderpest epizootic of the 1890s on sheep been adequately explored (Jansen, 1977; Bingham & Purchase, 2002).

AFTER UNION IN 1910-1990

Political and economic outline

Because, traditionally, the issuing of hunting licences, determining closed seasons, and advertising 'royal' game and 'vermin' species was a responsibility of the four colonies and was regarded as merely an administrative function, 'Game and fish preservation' remained in the hands of the provinces under the Union constitution by Section 85 of the South Africa Act 1909, 85(x). Game reserves were then few in number and southern Africa could boast only one national park, in Natal, founded in 1906 (Carruthers, 2013). Game and fish preservation and game reserves were administered within the general ambit of provincial management.

This changed as a consequence of the Financial Relations Consolidation and Amendment Act 38 of 1945 that obliged the provinces to reformulate their nature conservation and other structures. Responses to this obligation in the Transvaal, Orange Free State and the Cape resulted in 'nature conservation' (the terminology

had changed from 'game and fish preservation') departments or divisions being formed within the existing provincial government structures in the late 1940s and finally in the Cape in 1952. In Natal a semi-independent parastatal with the title of the Natal Parks, Game and Fish Preservation Board was established in 1947. Somewhat ironically in the light of later environmental thinking and the stricter interpretation of 'nature conservation' in South Africa, the introduction and management of trout *Oncorhynchus mykiss* and brown trout *Salmo trutta* continued to be the responsibility of these authorities as did vermin control. Moreover, it was only after the post-war environmental revolution of the 1960s that the biological sciences began to respond to conservation matters, including ideas around 'threatened' or 'endangered' species, (Carruthers, 2011).

However, one needs to bear in mind that much of the legislation was directed for the benefit of white people, not Africans. Indeed, the Natives Land Act 27 of 1913 restricted the amount of land at their disposal. Many segregationist and apartheid laws impacted negatively on African farmers. 'Betterment' philosophies enabled the state to interfere directly in African farming. Livestock herds were limited and, at best, subsistence, but not sustainable, agriculture and pastoralism continued to limp on. Africans expelled from white-owned property added to the numbers evicted from those forbidden by law to seek livelihoods in the city (Platzky & Walker, 1985; Davenport & Saunders, 2000). Whether black-backed jackal and other mesopredators survived in these generally desolate, overcrowded homelands to prey on African-owned cattle, goats and sheep is not a matter of record.

From the outset of Union, vermin destruction was in a somewhat anomalous position in government. Certainly, hunting permits came from game and fish preservation authorities, but a strong interest in the matter came from the national Department of Agriculture, the arm of government tasked with promoting effective and profitable farming. As defending the private property of farmers, and with agriculture and pastoralism being in the national interest, the Department had a duty to support farmers and to assist in protecting their property. Moreover, the farming, or rural, vote was critically important to politics. Until 1990 all four provinces had programmes to manage predation by black-backed

jackal, but from the 1980s there were concerns in this regard. Animal rights, financial stringency, and the growth of wildlife ranching – together with greater ecological understanding – initiated new thinking about predator control (Bergman *et al.*, 2013). These factors have been responsible in later years for raising the profile of livestock predation in the Cape and the involvement of national government.

The Cape Province 1910-1990

In the Cape, the neglect and disruption of the country during the South African War had allowed jackal numbers to rise. Apparently, Sir Frederic de Waal, Administrator of the Cape from 1911 to 1925, took on the 'jackal question' with enthusiasm. His energy in counteracting the activities of the 'free-booting jackal' was as much, it seems, an exercise in creating harmony between the Dutch and English farmers as it was to nurture the sheep farmers at a time when the price of wool and mutton were rising (Beinart, 1998). The number of woolled sheep in the Cape Province rose from 13.3 million in 1918 to 18.6 million in 1927, peaking at 23.5 million in 1930 before being affected by the fall in wool prices in the Depression (Beinart, 1998:204).

Owing to the fact that the outbreaks of scab meant that kraaling was discouraged, more Cape sheep roamed in large paddocks than before. This may well have made them easier prey. The jackal bounty was raised, hunting and poisoning this species on state land was prioritised, while hunting hound packs were subsidised and poison supplied to white farmers, but not to Africans (Beinart, 2003). The bounty system was revived in 1913 and remained operative until 1957. In 1917 the Cape's foundational Vermin Control Ordinance established 17 effective 'Circle Committees' in the 85 Divisional Councils (a form of local government specific to the Cape) that relied on local government structures for their effectiveness in compelling the establishment and maintenance of hunting clubs, ignoring trespass traditions and otherwise penalising farmers who did not control jackal effectively. At almost regular intervals the Vermin Control legislation was updated, with a major alteration in 1946 that even classified dassies *Procavia capensis* (rock hyrax) as vermin. Over the years, the definition of 'vermin' was widened to include animals that damaged fences or were otherwise detrimental to

sheep farmers. Thus, together with fencing and windmill and other government subsidised technology between 1914 and 1923, allied to state assistance with eradicating predators (including the use of poison from 1929), the tide turned on the jackal and numbers began to decrease, although their disappearance was geographically uneven (Beinart, 1998; Natrass & Conradie, 2015; Van Sittert, 2016; Natrass *et al.*, 2017a).

A significant change in philosophy and management took place after the institution of the Nature Conservation Department in 1952 and with Douglas Hey, a trout scientist, in charge of it. Given Hey's familiarity with new environmental thinking, the discourse altered from old-fashioned 'vermin' to 'problem animals' and 'extermination' gave way to 'control'. Hey explained how extermination was neither desirable nor practicable and that predators should be regarded as useful animals integral to South Africa's natural heritage (Hey, 1964).

Hey began to dismantle the bounty system in the early 1950s and ended it finally in 1957 (14 species had been on the list in 1956). The province turned towards 'technical aid' to farmers to control problem animals, i.e. improved subsidies to hunt clubs, better training, and an improved breed of hounds. Near McGregor, at Vrolijkheid (currently a nature reserve), a Hound Breeding and Research Station was established in 1962 where hunting packs were trained. In 1966 another training depot began in Adelaide, where environmental and climatic conditions were different. According to Stadler (2006), Adelaide 'gradually developed into a fully independent functional unit and the centre of all Problem Animal Control activities for the Eastern Cape'. Moreover, to serve the northern Cape where hunting with hounds was not possible, training courses on the use of traps began and, in 1973, a third Problem Animal Control Station was established at Hartswater. This facility focused on the provision of advice and training – no hunting hounds were maintained. There was great demand for the hunting hounds from these stations, but farmers also benefited from training courses that included ethical nature conservation, trapping and the translocation of problem animals (Stadler, 2006).

By the mid-1960s, the jackal was still the major predator of sheep, but was regarded as 'relatively well controlled' through hunting, trapping and poisoning (Hey, 1967). By contrast, the caracal was increasing

in range and in some places becoming the dominant predator of sheep, small antelope and game birds, prompting Hey to comment that there would thus 'seem to be some ecological relationship between these two animals'. Hey also commented on the rise of baboons as a predator of sheep, linking this to declining leopard populations (Hey, 1967).

Hunting club data from the Ceres Karoo and the Eastern Cape revealed that most livestock loss at the end of the 1970s was caused by caracal. Analysis of these data indicated that killing stray dogs reduced stock depredation the following year, whereas culling caracals and leopards increased future losses – suggesting that hunting these predators made the problem worse for farmers, presumably through compensatory breeding and immigration (Conradie & Piesse, 2013).

Predation on sheep continued to have a high profile in the Cape, resulting in a further 'Commission of investigation on vermin and problem animal control in the Cape' being appointed in 1978. There were 30 recommendations, including the reduction of the list of 'declared vermin' to just three (caracal / lynx, black-backed jackal and vagrant dogs). However, the remaining recommendations were implemented only in 1984 and, according to Stadler (2006), the most important of these was the replacement of an older vocabulary including 'extermination, exterminate, destruction, destroy, vermin' with that of 'control, problem animal, combat and combating'. Hey retired in 1979 and nearly a decade later, in 1987, his Problem Animal Control Section was dismantled and its functions relegated to other sections. This was part of a wider process of deregulation and the withdrawal of government assistance in agriculture in the 1980s. In 1988 the subsidy of hunt clubs ended, in 1989 the facilities at Vrolijkheid and Adelaide were given over to the private sector (*viz.* the farmers themselves) for research and management, and free training courses ended in the mid-1990s (Stadler, 2006; Van Sittert, 2016).

The Transvaal, Natal and Orange Free State 1910-1990

As has been explained, predation by meso-carnivores on livestock was far more important in the Cape region than elsewhere. It was, however, a central theme in the woolled sheep-farming districts of South Africa (including in the Orange Free State) and farmers there had for many decades called on the state for assistance in combating predators, particularly, but not exclusively jackal. In the 1930s, for example, a farming journal reiterated that most of the Transvaal bushveld region was 'livestock country' in which Merino could not survive, although there was an experimental station at Pietersburg (now Polokwane) working on a cross-breeding project to develop an appropriate mutton sheep variety (Anon, 1930).

Nonetheless, the other three provinces all had various iterations of predator legislation in the years after Union. In 1983, for example, there was the Natal Ordinance 14 of 1978, the Orange Free State Ordinance 11 of 1967, and Section c.II of the Transvaal Nature Conservation Ordinance 11 of 1967. Moreover, the Administrators of these provinces had the power to declare any species of wild animal to be a 'problem animal' in the whole or part of the province (Fuggle & Rabie, 1983).

An agricultural census of the Transvaal in 1918 showed that there were 637,000 head of sheep producing some 4.5 million kg of wool, mostly in Ermelo, Wakkerstroom and Standerton on the temperate highveld. The census of 1993 recorded 458 000 head of cattle and 598 000 sheep that yielded nearly 7.8 million kg of wool. However, it was also noted that after 1950 the number of farms had declined from 10,000 to 5,400 (Schirmer, 2007). The matter of predation was not highlighted in the census. Although Africans had restricted access to land and markets – and worked within a hostile political environment – some made entrepreneurial economic contributions either within the 'homelands' (if they had access to land there) and also as tenants on white-owned farms. Nonetheless, the comment has been made for Mpumalanga (at that time part of the province of Transvaal) that by the late 1980s African agriculture (cultivation) had all but ceased but probably livestock keeping had not. With 60% of Africans living in the reserves it is unlikely that free-ranging mesopredators were a substantial problem (Schirmer, 2007:311). In socio-economic terms,

paternalism and dependency were created by apartheid and the legacy of this era endures.

There are no detailed historical accounts of vermin extermination or control in these three provinces thus flagging the fact that it had, for many reasons, a lower profile in these areas. Beinart (1998) mentions that the first detailed studies of jackal diets took place in the Transvaal between 1965 and 1971. Some 400 jackal stomachs were analysed. Of those killed in game reserves 6% had sheep remains in their stomachs, of those in farming districts, 27% (Beinart, 1998). Determining whether the jackal had actually killed the sheep or merely fed on the carcasses of already dead animals is not possible.

Even if numbers were low, farmers were not deterred from addressing the matter, presumably taking their lead from the Cape. Perhaps the most famous hunting club in recent years has been Oranjejag that operated with government subsidies, and notoriety, from 1966 to 1993 in the sheep-farming districts of the Orange Free State and western Transvaal (Faure, 2010). The existence of Oranjejag was mandated by the Free State Problem Animal Control Ordinance and between 1966 and 1993 it killed some 87,570 animals in the Orange Free State alone but, alarmingly, some 70% (60,340) were Cape (silver) foxes *Vulpes chama* that take insects and other small prey (Daly *et al.*, 2006). In the western Transvaal a problem animal station for hounds and farm training was set up at Panfontein, near Bloemhof, in what is now the North West Province and the S.A. Lombard Nature Reserve.

1990 TO PRESENT

In the early 1990s, a loose consultative structure known as the National Problem Animal Policy Committee (NPAPC) appears to have been fairly successful at drawing together government officials from nature conservation authorities, the old regional services councils, hunters and industry organisations such as the Red Meat Producer's Organisation (RPO) and the National Wool Growers Association (NWGA). At a conference in the Orange Free State in 1993, delegates reportedly emphasised the need for ongoing government support for predator control given the imminent demise of Oranjejag, the last remaining hunt-club, due to the cessation of state funding. This process, however, reportedly 'faded' as it was overtaken by political events, notably the creation of

nine new provinces (with new administrations) as South Africa transitioned to democracy in 1994 (De Waal, 2009).

Generating new institutions and legislation (especially regarding land reform and security of tenure of farm workers) dominated the agricultural agenda for the rest of the decade. Matters of interest to stock farmers were divided between the new departments of Agriculture, and Environmental Affairs and Tourism. Managing 'damage-causing animals' was left to the provinces, although over time their scope was restricted by national legislation. In 1995 the NPAPC recommended that in updating and creating appropriate legislation, the provinces refrain from assigning problem animal status to any species, that animals causing damage be dealt with through translocation and regulated hunting, that problem animal hunters be required to undergo some training (e.g. attend an accredited course). In addition, it was suggested that landowners should not be compelled to join hunt clubs, and that hunt clubs not be allowed to access private property without permission (Stadler, 2006). In the Western Cape, Cape Nature Conservation (subsequently known as CapeNature) started a process in 1996 to revise the legislation (notably Ordinance No. 26 of 1957 as amended) around the control of damage-causing animals. This involved consultation with animal rights groups, environmental organisations, farmers and academics. This lengthy process was shaped also by changing national legislation, notably the National Environmental Management Biodiversity Act (Act 10 of 2004) which *inter alia* further restricted the use of poison and hunting with dog packs. Additional regulations (in terms of the 1947 Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947) were passed in 1996 and 2003 outlawing the use of pesticides and other remedies to poison predators (Predation Management Forum, 2016).

The use of poison was curtailed in the 1970s by the Hazardous Substances Act 15 of 1973. From then onwards, sodium monofluoroacetate (also known as 1080) was restricted for use on toxic collars only (and the sellers of such collars had to be licenced) and other hazardous substances like strychnine were regulated (and subsequently outlawed). Cyanide was limited for use in the coyote getter (and producers had to be licenced to sell them). Farmers wanting to use such methods also had to comply with provincial legislation and regulations

from local conservation bodies. The Firearms Control Act 60 of 2000 outlawed previous models of coyote getters (the ones with firearm ammunition) but allowing newer models that projected poison capsules. In 2005, CapeNature obtained legal opinion on its emerging draft regulations and decided to end the provision of training in the use of the coyote-getter with immediate effect (given its potential to kill many non-target species) and started investigating further restrictions on the use of gin traps (as these are increasingly regarded as cruel and non-specific). In 2007, CapeNature formed a partnership with an environmental non-governmental organisation to work towards the elimination of gin traps and to promote 'holistic' non-lethal predator control methods. Then, in late 2008, CapeNature announced that from January 2009, various control methods, including night-hunting of jackals, would no longer be allowed. By this stage, however, small stock farmers and their organisations were complaining vociferously about what they were experiencing as a sharp increase in predation (especially by black-backed jackals) from the mid-1990s, and a bitter contestation emerged (Nattrass & Conradie, 2015). The Western Cape government subsequently backed down in the face of industry pressure, making it easier for farmers to obtain permits to shoot jackals and caracals provided that data detailing mortalities were provided.

The issue also played out at on the national stage as the NPAPC engaged with the then Department of Environmental Affairs and Tourism (DEAT), resulting in a meeting in January 2009, that, in the eyes of one observer, 'may have caused more discord than synergy' (De Waal, 2009). DEAT then released draft 'Norms and Standards for the Management of Damage Causing Animals', which the agricultural industry regarded as 'biased', demanding that both agricultural and environmental departments be involved (De Waal, 2009). It also prompted the National Wool Growers Association and the RPO to join with the South African Mohair Growers Association and Wildlife Ranching South Africa to form the Predation Management Forum (PMF) in 2009. This organisation remains a powerful lobby for the industry, providing advice online and over the phone, and most recently, producing a booklet on how to identify predators and what methods can be used to control them. The booklet provides an overview of key national legislation, but given the complexity of the relevant provincial legislation and

related ordinances, simply directs farmers to their local government offices to 'familiarise themselves' with the precise legal context they face with regard to managing predators on their land. At the end of 2016, the legal environment for managing damage-causing animals remained bewilderingly fragmented.

On 10 November 2016, the minister of Environmental Affairs finally published the 'Norms and Standards for the Management of Damage-Causing Animals in South Africa' (RSA, 2016). It begins by stating that everyone has a 'general duty of care to take reasonable measures to prevent or minimise damage caused by damage-causing animals (4.1), and this sets the tone for a set of guidelines that present lethal control as a strategy of last resort. The legal framework for methods regularly used by farmers (cage traps, foothold traps, call and shoot, poison collar, hounds, poison firing apparatus and denning) remain unclear, with guidelines stating that these methods 'may require a permit, issued by the issuing authority, in terms of any applicable legislation' (8.1). It also includes specific 'minimum requirements' for the use of traps, collars etc. Those engaging in 'call and shoot' activities have to be adequately trained, 'comply with the conditions applicable to the use of the call and shoot method, as determined by the relevant issuing authority', submit records of call and shoot events and 'must target only specific individual animals known to cause damage' (12 (1)). The latter requirement is onerous (and thus likely to be ignored) given that it is impossible to know which individual predator is causing damage.

CONCLUSIONS

The above outline of the history of the management of predation on livestock has highlighted how uneven and complex this matter has been and remains. This is so, whether the issue is considered ecologically (in terms of various parts of South Africa), or in terms of impact on different farmers and communities (regionally, racially, and economically); philosophically (in terms of societal attitudes towards predators/vermin), and politically (meshing national and provincial structures over the long history of the subcontinent). A reality emerging is that whatever methods applied in attempts to curb or halt the onslaught on mainly small stock by jackal and caracal over the past 350 years of colonialism, these have proved ineffective over the longer term, although

there were periods in which management in whatever form was more successful than others in certain regions. Moreover, in a global context of volatile wool and meat prices, and an ever-changing national context in which agriculture has a declining share of GDP and urbanisation is burgeoning, the future policy environment is bound also to be difficult and complex. In addition, as explained by Nattrass *et al.* (2017b), and that will emerge from the chapters that follow, formal scientific knowledge of mesopredators is far from extensive and many of these species are elusive and highly adaptable. Policy-making at a national level under these circumstances is bound to be difficult. The issue at the heart of this assessment is whether the state has an obligation to protect livestock farmers in South Africa from certain species of predators. Protecting livestock from errant individual large fauna, such as elephant or lion that may escape from protected areas, is very different from providing regulations for a specific section of the population that farms with sheep.

Box 2.1 Important knowledge gaps

From a historical perspective and at a high level, the following knowledge gaps can be identified:

- » Predator control in the precolonial era (Khoekhoen, Early and Late Iron Age)
- » Detailed historical evidence relating to livestock predation and its management in provinces other than the Cape Colony/Cape Province/Western Cape/Eastern Cape.
- » Historical information in respect of predator control in African communal areas in 19th and 20th centuries.

TIMELINE

- » c. 2 000 BP Evidence of livestock keeping in southern Africa.
- » 1652 Arrival of the DEIC (Dutch East India Company) at the Cape.
- » 1656 DEIC pays rewards to kill lion, 'wolves' and leopard.
- » 1783 DEIC rewards for killing elephant, rhinoceros, giraffe, eland, lion and zebra.
- » 1795 Cape taken over by Britain. DEIC bankrupt, Battle of Muizenberg.
- » 1802 Cape returned to the Netherlands under Peace of Amiens. Ruled by the Batavian Republic that had nationalised the DEIC.
- » 1806 Cape reverts to rule by Britain after renewed Napoleonic Wars. Battle of Blaauwberg.
- » 1814 Cape formally ceded to Britain by the Netherlands and comes under the formal permanent control of Britain by Convention of London. Vermin bounty introduced.
- » 1828 Vermin bounty discontinued.
- » 1843 Natal annexed as a British Colony.
- » 1852 Transvaal gains independence from Britain as the Zuid-Afrikaanse Republiek.
- » 1853 Cape Colony receives Representative Government.
- » 1854 Orange Free State gains independence from Britain as a republic.
- » 1865 Approximately one-third of the settler population (58 000) lived in the sheep districts. 13 million stock of all kinds.
- » 1870s Introduction of cheaper wire fencing.
- » 1872 Peak of wool exports at over £3 million.
- » 1872 Cape Colony receives Responsible Government.
- » 1883 Fencing Act finally passed in the Cape Colony (amended 1891)
- » 1884 First Wild Animal Poison Club established in Jansenville. Many followed in subsequent years. Subsidy offered for vermin tails.
- » 1886 Cape Game Act 36. Jackal exempted from hunting restrictions.
- » 1887-1890s Annual congresses of Wild Animal Poisoning Clubs
- » 1890s Vermin-proof fencing introduced.
- » 1895 Cape bounty restricted to vermin tails with bones.
- » 1896 Cape bounty payment required proof that the skin came from the Cape Colony.
- » 1896 Rinderpest epizootic
- » 1899 Cape bounty payment required tail, plus scalp and ears and signature of Justice of the Peace or landowner.
- » 1899 Select Committee instituted in the Cape Colony to investigate the reward system.
- » 1899-1902 South African (Anglo-Boer) War.
- » 1902 Fence-making machines introduced.

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- » 1903 Cape bounty payment required whole skin.
- » 1904 11 million woolled sheep in the Cape Colony. 30 000 jackal killed for reward.
- » 1904 Select Committee instituted in the Cape Colony to investigate the reward system.
- » 1904 Vermin bounty regulations published in the Transvaal Agricultural Journal, vol. 3
- » c. 1904-1907 Economic depression in southern Africa. Collapsing export wool price and veld degradation.
- » 1905 Assistance from the Cape Colonial government for vermin-proof boundary fencing included in Fencing Act.
- » 1908 Vermin bounties abolished in the Cape Colony mainly on account of fraud.
- » 1910 The Cape, Orange River, Natal and Transvaal colonies amalgamate to form the Union of South Africa. 'Game protection' established as a provincial competency.
- » 1911 Division of Sheep established in the national Department of Agriculture.
- » 1911-1925 Cape Administrator Sir Frederic De Waal took active personal interest in the 'jackal problem' and prioritised sheep farming over other forms of agriculture.
- » 1912 Fencing Act 17. State subsidy available for fencing.
- » 1913 2 8 million woolled sheep in the Cape Colony. Wool exports second only to gold.
- » 1913 Cape Province revives bounty system.
- » 1914-1918 First World War.
- » 1917 Cape Vermin Control Ordinance established 17 'Circles' based on electoral districts (not Divisional Councils) under committees. Bounties subsidised by the Province.
- » 1917-1921 Annual Vermin Extermination Congress held under the 1917 Cape Ordinance.
- » 1918 First agricultural census
- » 1918-1927 Number of woolled sheep in the Cape Province between 13.3 million and 18.6 million.
- » 1920s Shepherding plus kraaling on commercial farms generally replaced by artificial water provision and fenced camps.
- » 1923-1924 Vermin Extermination Commission
- » 1923 Cape Vermin Extermination Ordinance revised.
- » 1923 Drought Investigation Commission.
- » 1929 Poisoning of vermin allowed in Cape Province.
- » 1930s Economic depression in southern Africa. Fall in wool prices.
- » 1930 Peak of woolled sheep numbers in the Cape Province at 23.5 million.
- » 1939-1945 Second World War.
- » 1946 Cape Vermin Extermination Ordinance revised and extended. Wide powers.
- » 1940s-1952 Establishment of nature conservation authorities in all 4 provinces.
- » 1950s-1960s Shifting environmental philosophy towards understanding ecological systems.
- » 1951 Cape Province phases out bounties to replace them with 'technical aid'.
- » 1955 Administration of vermin removed from the General Section of the Cape Provincial Administration to the newly formed Department of Nature Conservation.
- » 1955 Douglas Hey's Commission of Enquiry, report published in 1956. 'Predator control' rather than 'vermin extermination'.
- » 1957 Cape provincial bounty system ended.
- » 1957 Cape Province Problem Animal Control Ordinance 26.
- » 1950s Favourable wool, pelt and meat prices encourage continued sheep farming in the Cape.
- » 1954 Hound-breeding station established at Panfontein. S.A. Lombard Game Reserve, near Bloemhof.
- » 1958 Hound-breeding station established, Vrolijkheid, at Robertson.
- » 1961 South Africa becomes a Republic.
- » 1961 Introduction of poison 1080 (sodium fluoroacetate), disallowed after 1973 with Hazardous

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- Substances Act.
- » 1965-6 Hound-breeding station established at Adelaide.
 - » 1966 Oranjejag established.
 - » 1967 Transvaal Province Problem Animal Ordinance 11
 - » 1967 Orange Free State Province Problem Animal Ordinance 11
 - » 1972 Hound breeding station begun at Hartswater to serve the Northern Cape.
 - » 1973 Hazardous Substances Act limits the use of certain poisons, including those previously used on carnivore predators.
 - » 1978 Second Commission of investigation on vermin and problem animal control in the Cape. List of vermin restricted to caracal/lynx, black-backed jackal and vagrant domestic dogs.
 - » 1978 Natal Province Problem Animal Ordinance 14
 - » 1979 Orange Free State 'Verslag van die Kommissie van Ondersoek na Ongediertebestrijding en Rondloperhonde in die Oranje-Vrystaat'.
 - » 1980 81 registered and subsidised vermin-hunt clubs in the Cape. Hey unable to abolish them owing to political pressure.
 - » 1987 Problem Animal Control Section abolished in the Cape and distribution of poison, coyote-getters and baits discontinued.
 - » 1988 Subsidies to Problem Animal Management Hunt Clubs discontinued.
 - » 1989 Discontinuation of hound breeding and training in the Cape.
 - » 1990s Inter-provincial Problem Animal Control Committee established. Prior to 1990 all four provinces had programmes to manage black-backed jackal.
 - » 1992 Peter Kingwill, Chairman of the National Problem Animal Policy Committee called for a national policy and strategy for problem animal control.
 - » 1994 Oranjejag officially disbanded.
 - » 1994 Constitutional change in South Africa to a fully democratic republic. Four provinces converted into nine.
 - » 1995 Recommendations to the provinces from the Inter-Provincial Problem Animal Control Committee.
 - » 1996 Officials of CapeNature conclude that problem animal legislation outdated. Draft regulations for the Cape completed in 2002.
 - » 2009 Widely representative task team to formulate Norms and Standards for management of damage-causing animals established. Formation of Predation Management Forum.
 - » 2010 Publication of 'Draft Norms and Standards for Management of Damage-Causing Animals in South Africa' in *Government Gazette* 33806, Notice 1084, 26 November 2010.
 - » 2016 Publication of 'Norms and Standards for Management of Damage-Causing Animals in South Africa' in *Government Gazette* 40412, Notice 749, 10 November 2016.

REFERENCES

- Anon. (1904). Destruction of vermin. *Transvaal Agricultural Journal*, 3, 403.
- Anon. (1929). Sheep-farming in Natal. *Farming in South Africa*, 303-304.
- Anon. (1930). Mutton sheep in the Transvaal bushveld areas. *Farming in South Africa*, 505-508.
- Archer, S. (2000). Technology and ecology in the Karoo: a century of windmills, wire and changing farming practice. *Journal of Southern African Studies* 26, 675-696.
- Beinart, W. (1982). *The political economy of Pondoland 1860-1930*. Johannesburg, South Africa: Ravan Press.
- Beinart, W. (1998). The night of the jackal: sheep, pastures and predators in the Cape. *Past & Present* 158, 172-206.
- Beinart, W. (2003). *The rise of conservation in South Africa: settlers, livestock and the environment 1770-1950*. Oxford: Oxford University Press.
- Beinart, W. & Bundy, C. (1987). *Hidden struggles in rural South Africa: Politics and popular movements in the Transkei and Eastern Cape, 1890-1930*. Johannesburg, South Africa: Ravan Press.
- Beinart, W., Delius, P. & Trapido, S. (1986). *Putting a plough to the ground: Accumulation and dispossession in rural South Africa 1850-1930*. Johannesburg, South Africa: Ravan Press.
- Bergman, D.L. De Waal, H.O., Avenant, N.L., Bodenchuk, M., Marlow, M.C. & Nolte, D.L. (2013) 'The need to address black-backed jackal and caracal predation in South Africa'. Wildlife Damage Management Conferences – Proceeding Paper 165.
- Bingham, J. & Purchase, G.K. (2002), Reproduction in the jackals *Canis adustus* Sundevall, 1846, and *Canis mesomelas* Schreber, 1778 (Carnivora: Canidae), in Zimbabwe. *African Zoology*, 37(1), 21-26.
- Boshoff, A.F. & Kerley, G. I. H. (2013). *Historical incidence of the larger mammals in the Free State province (South Africa) and Lesotho*. Port Elizabeth, South Africa: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University.
- Bundy, C. (1988). *The rise and fall of the South African peasantry*. Cape Town, South Africa: David Philip.
- Burchell, W.J. (1822, 1824). *Travels in the interior of Southern Africa*. 2 vols. London: Longman, Hurst.
- Burrows, E.H. (1952). *Overberg outspan: A chronicle of people and places in the south western districts of the Cape*. Cape Town, South Africa: Maskew Miller.
- Carruthers, J. (2008). "Wilding the farm or farming the wild": the evolution of scientific game ranching in South Africa from the 1960s to the present. *Transactions of the Royal Society of South Africa*, 63(2), 160-181.
- Carruthers, J. (2011). Trouble in the garden: South African botanical politics ca.1870-1950. *South African Journal of Botany*, 77(2), 258-267.
- Carruthers, J. (2013). The Royal Natal National Park, Kwazulu-Natal: mountaineering, tourism and nature conservation in South Africa's first national park c.1896 to c.1947', *Environment and History*, 19, 459-485.
- Conradie, B. & Piesse, J. (2012). The effect of predator culling on livestock losses: Ceres, South Africa, 1979 to 1987. *African Journal of Agricultural and Resource Economics*, 8 (4), 265-274.
- Cripps, E.A. (2012). *Provisioning Johannesburg 1886-1906*. (Unpublished M.A. dissertation). Pretoria, South Africa: University of South Africa.
- Daly, B., Davies-Mostert, H., Davies-Mostert, W., Evans, S., Friedmann, Y., King, N., Snow, T. & Stadler, H. (2006). *Prevention is the cure: Proceedings of a workshop on holistic management of human-wildlife conflict in the agricultural sector of South Africa*. Johannesburg, South Africa: Endangered Wildlife Trust.
- Davenport, T.R.H. & Saunders, C. (2000). *South Africa: A Modern History*. 5th ed. Basingstoke: Macmillan.
- De Waal, H.O. (2009). Recent advances in coordinated management in South Africa. *Merino Focus*, 44-45.

CHAPTER 2

- Delegorgue, A. (1997). *Travels in southern Africa*. Volume 2. Durban and Pietermaritzburg, South Africa: Killie Campbell Africana Library and University of Natal Press.
- Derricourt, R.M. (1977). *Prehistoric man in the Ciskei and Transkei*. Cape Town, South Africa: Struik.
- Dubow, S. (2014). *Apartheid 1948-1994*. Oxford: Oxford University Press.
- Elphick, R. & Giliomee, H. (1989). *The shaping of South African society 1652-1840*. Cape Town, South Africa: Maskew Miller Longman.
- Elphick, R. (1985). *Khoikhoi and the founding of white South Africa*. Johannesburg, South Africa: Ravan Press.
- Faure, J.C. (2010). Roofdiere: Die jakkals kom weer ... *Landbouweekblad*, June 2010. Retrieved from: <http://m24lbargo01.naspers.com/argief/berigte/landbouweekblad/2010/06/04LB01.html>
- Forbes, V.S. & Rourke, J. (1980). *Paterson's Cape travels, 1777 to 1779*. Johannesburg, South Africa: The Brenthurst Press.
- Freund, W.M. (1989). The Cape under the transitional governments 1795-1814. In R. Elphick & H. Giliomee, (Eds), *The shaping of South African society 1652-1840* (pp.323-357). Cape Town, South Africa: Maskew Miller Longman.
- Fuggle, R.F. & Rabie, M.A. (1983). *Environmental concerns in South Africa: Technical and legal perspectives*. Cape Town, South Africa: Juta.
- Giliomee, H. (2003). *The Afrikaners: Biography of a people*. Cape Town, South Africa: Tafelberg.
- Gray, S. (1979). *Southern African literature: An introduction*. Cape Town, South Africa: David Philip.
- Guy, J. (1982). *The destruction of the Zulu kingdom*. Johannesburg, South Africa: Ravan Press.
- Hamilton, C. (1995). *The Mfecane aftermath: Reconstructive debates in southern African history*. Johannesburg, South Africa: University of the Witwatersrand Press and Pietermaritzburg, South Africa: University of Natal Press.
- Hammond-Tooke, W.D. (1974). *The Bantu-speaking peoples of southern Africa*. London: Routledge and Kegan Paul.
- Hey, D. (1964). The control of vertebrate pest animals in the province of the Cape of Good Hope, Republic of South Africa. Paper 11 in *Proceedings of the 2nd vertebrate pest control conference*. Retrieved from: <http://digitalcommons.unl.edu/vpc2/11>
- Hey, D. (1967). Recent developments in the control of vertebrate pest animals in the province of the Cape of Good Hope, Republic of South Africa. Paper 30 in *Proceedings of the 3rd vertebrate pest control conference* (pp.157-164).
- Huffman, T.M. (2007). *Handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa*. Pietermaritzburg, South Africa: University of KwaZulu-Natal Press.
- Inskeep, R.R. (1979). *The peopling of southern Africa*. New York, NY: Barnes and Noble.
- Jansen, B.C. (1977). The growth of veterinary research in South Africa. In A.C. Brown, (Ed.), *A history of scientific endeavour in South Africa* (pp.164-191). Cape Town, South Africa: Royal Society of South Africa.
- Keegan, T. (1986). White settlement and black subjugation on the South African Highveld: the Tlokwa heartland in the north eastern Orange Free State. In W. Beinart, P. Delius & S. Trapido, (Eds), *Putting a plough to the ground: Accumulation and dispossession in rural South Africa 1850-1930*, pp.218-258. Johannesburg, South Africa: Ravan Press.
- Kennedy, R.F. (1961,1964). *Journal of residence in Africa, 1842-1853 by Thomas Baines*. 2 vols. Cape Town, South Africa: Van Riebeeck Society.
- Kerley, G.I.H., Behrens, K.G., Caruthers, J., Diemont, M., Du Plessis, J., Minnie, L., Richardson, P.K., Somers, M.J., Tambling, C.T., Turpie, J., Van Niekerk, H.N. & Balfour, D. (2017). Livestock predation in South Africa: the need for and value of a scientific assessment. *South African Journal of Science*, 113 (3/4), 17-19.
- Kolb, P. (1727). *Naaukeurige en uitvoerige beschryving van de Kaap de Goede Hoop*. Amsterdam: Balthazar Lakeman.

CHAPTER 2

- Laband, J. (1997). *The rise and fall of the Zulu nation*. London: Arms and Armour Press.
- Lewis-Williams, J.D. (1983). *The rock art of southern Africa*. Cambridge: Cambridge University Press.
- Lichtenstein, H. (1928, 1930). *Travels in southern Africa*. 2 vols. Cape Town, South Africa: Van Riebeeck Society.
- Lye, W.F. (1975). *Andrew Smith's journal of his expedition into the interior of South Africa, 1834-1836*. Cape Town, South Africa: Balkema.
- Maggs, T.M. O'C. (1976). *Iron age communities of the southern Highveld*. Pietermaritzburg, South Africa: Natal Museum.
- Mason, R. (1969). *Prehistory of the Transvaal*. Johannesburg, South Africa: University of the Witwatersrand Press.
- Maylam, P. (1986). *A history of the African people of South Africa: From the Early Iron Age to the 1970s*. Johannesburg, South Africa: Ravan Press.
- Merrett, P.L. & Butcher, R. (1991). *Robert Briggs Struthers, hunting journal 1852-1856 in the Zulu kingdom and the Tsonga regions*. Durban and Pietermaritzburg, South Africa: Killie Campbell Africana Library and University of Natal Press.
- Mitchell, P. (2002). *The archaeology of southern Africa*. Cambridge: Cambridge University Press.
- Nattrass, N. & Conradie, B. (2015). Jackal narratives: predator control and contested ecologies in the Karoo, South Africa. *Journal of Southern African Studies*, 41, 1-19.
- Nattrass, N., Conradie, B., O'Riain, J. & Drouilly, M. (2017a). A brief history of predators, farmers and the state in South Africa. Centre for Social Science Research Working paper no. 398. Retrieved from: <http://cssr.uct.ac.za/pub/wp/398>.
- Nattrass, N., Conradie, B., O'Riain, J. & Drouilly, M. (2017b). Understanding the black-backed jackal. Centre for Social Science Research Working paper no. 399. Retrieved from: <http://cssr.uct.ac.za/pub/wp/399>.
- Peires, J.B. (1981). *The House of Phalo: A history of the Xhosa people in the days of their independence*. Johannesburg, South Africa: Ravan Press.
- Penn, N.G. (1987). The frontier in the western Cape, 1700-1740. In J. Parkington & M. Hall, (Eds), *Papers in the Prehistory of the Western Cape, South Africa*. British Archaeological Reports (BAR) International Series 332(ii), 1987, 462-503.
- Penn, N. (2005). *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century*. Athens, Ohio: Ohio University Press.
- Pickover, M. (2005). *Animal rights in South Africa*. Cape Town, South Africa: Double Storey.
- Platzky, L. & Walker, C. (1985). *The surplus people: Forced removals in South Africa*. Johannesburg, South Africa: Ravan Press.
- Plug, C. (2004). South African science in the year 1904 – 100n. *South African Journal of Science*, 100, 3-4.
- Pollock, N.C. & Agnew, S. (1983). *An historical geography of South Africa*. London: Longmans.
- Potgieter, T.D., Olivier, P.J.S., Prinsloo, H.F., Kok, O.B., Lynch, C.D., Van Ee, C.A., & Le Roux, P.J. (1979). *Verslag van die kommissie van ondersoek na ongediertebestrijding en rondloperhonde in the Oranje-Vrystaat*. Bloemfontein, South Africa: OFS Provincial Administration.
- Predation Management Forum (2016). *Predation Management Manual*, PMF AgriConnect.
- Raper, P.E. & Boucher, M. (1988). *Robert Jacob Gordon: Cape travels, 1777 to 1786*. Vol. 2. Johannesburg, South Africa: The Brenthurst Press.
- RSA (2016). Department of Environmental Affairs. National Environmental Management: Biodiversity Act: Norms and standards for the management of damage-causing animals in South Africa, *Government Gazette* 40412, Notice 749, 10 November.

CHAPTER 2

- Ross, R. (1986). The origins of capitalist agriculture in the Cape colony: a survey. In W. Beinart, P. Delius and S. Trapido, (Eds), *Putting a plough to the ground: Accumulation and dispossession in rural South Africa 1850-1930*, pp.56-100. Johannesburg, South Africa: Ravan Press.
- Sandeman, E.F. (1888). *Eight months in an ox-waggon: Reminiscences of Boer life*. 2 ed. fasc. repr.1888. Johannesburg, South Africa: Africana Book Society, 1975.
- Schirmer, S. (2007). Enterprise and exploitation in the 20th century. In P. Delius, (Ed.), *Mpumalanga history and heritage*, pp.291-350. Scottsville, South Africa: University of KwaZulu-Natal Press.
- Selous, F.C. (1999). *A hunter's wanderings in Africa*. Alberton, South Africa: Galago Publishing. (First published 1881.)
- Shillington, K. (1985). *The colonisation of the southern Tswana 1870-1900*. Johannesburg, South Africa: Ravan Press.
- Skead, C.J. (1980). *Historical mammal incidence in the Cape Province: Vol.1 – The Western and Northern Cape* (1980). Cape Town, South Africa: Department of Nature and Environmental Conservation, Provincial Administration of the Cape of Good Hope.
- Skead, C.J. (2007). *Historical incidence of the larger land mammals in the broader Eastern Cape*. 2nd edition. A.F. Boshoff, G.I.H. Kerley & P.H. Lloyd, (Eds), Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University.
- Skead, C.J. (2011). *Historical incidence of the larger land mammals in the broader Western and Northern Cape*. 2nd edition. A.F. Boshoff, G.I.H. Kerley & P.H. Lloyd, (Eds), Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University.
- Smith, A.B. (1987). Seasonal exploitation of resources on the Vredenburg peninsula after 200 BP. In J. Parkington and M. Hall, (Eds), *Papers in the prehistory of the Western Cape, South Africa* (pp.393-402). BAR International Series 332, 1987.
- Smith, A.B. (1992). *Pastoralism in Africa: origins and development ecology*. Johannesburg, South Africa: Witwatersrand University Press.
- Stadler, H. (2006). Historical perspective on the development of problem animal management in the Cape Province. In B. Daly, H. Davies-Mostert, W. Davies-Mostert, S. Evans, Y. Friedmann, N. King, T. Snow. & H. Stadler, (Eds), *Prevention is the cure: Proceedings of a workshop on holistic management of human-wildlife conflict in the agricultural sector of South Africa*. Johannesburg, South Africa: Endangered Wildlife Trust.
- Swanepoel, N., Esterhuysen, A. & Bonner, P. (Eds) (2008). *Five hundred years rediscovered: Southern African precedents and prospects*. Johannesburg, South Africa: Witwatersrand University Press.
- Tamarkin, M. (1995). *Cecil Rhodes and the Cape Afrikaners: The imperial colossus and the colonial parish pump*. Portland, OR: Frank Cass.
- Tyler, J. (1971). *Forty Years among the Zulus*. Cape Town, South Africa: Struik. First published 1891.
- Van Der Merwe, P.J. (1995). *The migrant farmer in the history of the Cape Colony, 1657-1842*. (Translated by Roger B. Beck.) Athens, Ohio: Ohio University Press.
- Van Sittert, L. (1998). "Keeping the enemy at bay": the extermination of wild carnivora in the Cape Colony, 1889-1910. *Environmental History*, 3, 333-356.
- Van Sittert, L. (2002). Holding the line: the rural enclosure movement in the Cape Colony 1865-1910. *Journal of African History*, 43, 95-118.
- Van Sittert, L. (2005). Bringing in the wild: the commodification of wild animals in the Cape Colony/Province c.1850-1950. *Journal of African History*, 46, 269-291.
- Van Sittert, L. (2016). Routinising genocide: the politics and practice of vermin extermination in the Cape Province c.1889-1994. *Journal of Contemporary African Studies*, 34, 111-128.



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CAPE WOOLS SA



Predators are valued as part of South Africa's natural heritage, but are also a source of human-wildlife conflict when they place livestock at risk. Managing this conflict ultimately falls to individual livestock farmers, but their actions need to be guided by policy and legislation where broader societal interests are at stake. The complexity of the issue together with differing societal perspectives and approaches to dealing with it, results in livestock predation management being challenging and potentially controversial.

Despite livestock predation having been a societal issue for millennia, and considerable recent research focussed on the matter, the information needed to guide evidence-based policy and legislation is scattered, often challenged and, to an unknown extent, incomplete. Recognising this, the South African Department of Environmental Affairs together with the Department of Agriculture, Forestry and Fisheries, and leading livestock industry role players, commissioned a scientific assessment on livestock predation management. The assessment followed a rigorous process and was overseen by an independent group to ensure fairness. Over 60 national and international experts contributed either by compiling the relevant information or reviewing these compilations. In addition an open stakeholder review process enabled interested parties to offer their insights into the outcomes. The findings of the scientific assessment are presented in this volume.

“Livestock Predation and its Management in South Africa” represents a global first in terms of undertaking a scientific assessment on this issue. The topics covered range from history to law and ethics to ecology. This book will thus be of interest to a broad range of readers, from the layperson managing livestock to those studying this form of human wildlife conflict. Principally, this book is aimed at helping agricultural and conservation policymakers and managers to arrive at improved approaches for reducing livestock predation, while at the same time contributing to the conservation of our natural predators.

NELSON MANDELA
UNIVERSITY