

**Investigating private landowners' willingness to manage
and protect oribi antelope (*Ourebia ourebi*)**

by

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Declaration

I, Adrienne Joy Louw (Student number: 17402647) declare that the thesis/dissertation, which I hereby submit for the degree Master of Science at the University of Pretoria, is my own work and has not been previously submitted by me for a degree at this or any other tertiary institution.



Signature

18 July 2019

Date

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Thesis Summary

Oribi antelope (*Ourebia ourebi*), South Africa's most endangered antelope species, are predominantly found on privately-owned lands. As such, the implementation of conservation strategies on these lands is essential if the species is to avoid extinction in South Africa. In order to develop effective private land conservation strategies for oribi, it is necessary to go beyond the ecology of the species and possess an understanding of private landowners' attitudes towards and knowledge of oribi and oribi conservation efforts. To date, this information has not been collected in South Africa. In order to address this research gap, I analysed survey data from private landowners in the province of KwaZulu-Natal (where the largest proportion of oribi in South Africa are found) to investigate, 1) why landowners are willing to protect oribi, 2) landowners' perceptions of the threats facing the species, and 3) landowners' understanding of how lands should be managed for oribi. In general, landowners proved willing to protect and conserve oribi and other wildlife on their lands, largely due to a sense of moral obligation. Predation by jackal and illegal hunting with dogs were perceived to be the greatest threats facing oribi. Somewhat concerningly, however, was that most landowners had little knowledge of oribi and their habitat requirements, and did not know how to manage their lands for the benefit of the species.

Private land oribi conservation strategies have, thus far, been unsuccessful in ensuring the effective conservation of the species. The development of more effective conservation strategies requires an understanding of the factors that are likely to influence landowners' willingness to participate in these strategies. Yet, such information has not been collected for

oribi owners in South Africa. To address this research gap, I examined survey data collected from private landowners in KwaZulu-Natal in order to investigate factors that influenced their stated willingness to enrol in potential oribi conservation programmes. Certain landowner characteristics, such as their motivations for pursuing farming as a career, had some influence on their stated willingness to enrol in oribi conservation programmes. Programme design, such as the incentive offered, duration of programme enrolment and conservation practices required, also impacted landowners' willingness to enrol, dependent upon whether the features were liked or disliked by the individual landowners.

Despite the provision of incentives, formal conservation programmes proved unpopular amongst surveyed landowners, largely due to concerns over political autonomy. As such, alternative means of encouraging conservation efforts by private landowners, such as outreach and education programmes, should be explored. This study provides crucial insight into where gaps exist between landowners' and ecologists' understanding of oribi and how the species should be managed. Ultimately, the findings of my research can be used to inform further research into the design of private land oribi conservation programmes in South Africa, and potentially set the basis for additional programmes for other aspects of biodiversity.

Keywords: Conservation programmes, illegal hunting, incentives, natural grasslands, political autonomy, preference heterogeneity, semi-structured interview

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Thesis Structure

My thesis comprises four chapters: 1) an introduction and literature review, 2) a qualitative data chapter, 3) a quantitative data chapter, and 4) a conclusion chapter. Both the qualitative and quantitative chapters are structured as scientific papers. However, in order to ensure ease of checking in-text references and reduce repetition, I have combined references from all four chapters into a single reference list at the end of my thesis. References are formatted according to the APA format. Due to the nature of my research and the fact that both data chapters are structured as individual scientific papers, there is, unfortunately, some repetition between chapters two and three.

Chapter 1 provides a brief introduction to the study and includes my research aims and objectives. The literature review then provides a brief background on the value of private lands to conservation, the challenges facing private land conservation efforts, the importance of social information in conservation, designing effective private land conservation programmes, the costs and benefits of participating in conservation programmes, and information on oribi antelope (*Ourebia ourebi*). Based on a review of the literature, I then provide a list of broad predictions for my research.

In Chapter 2, I focus on qualitative data. It is widely recognized that possessing an understanding of why private landowners choose or choose not to participate in conservation efforts is essential if effective private land conservation programmes are to be designed and implemented (Langpap, 2004; Moon & Cocklin, 2011; Moon et al., 2012). Despite the importance of such information, landowners' attitudes towards the conservation of oribi on

their land has not been assessed in South Africa. In order to address this research gap, I analysed data collected during face-to-face interviews with farmers in the province of KwaZulu-Natal. I found that landowners' willingness to conserve oribi on their lands is largely motivated by non-financial factors. Furthermore, results indicate that landowners are unaware of how best to manage their lands for the benefit of their oribi populations.

In Chapter 3, I focus on quantitative data. In order to design effective conservation programmes for private lands, it is essential to possess an understanding of the factors that influence landowner enrolment in such programmes. In order to identify factors influencing landowners' stated willingness to enrol in potential oribi conservation programmes, I analysed quantitative data from surveys collected from farmers in KwaZulu-Natal. I found that landowner, property, and programme characteristics all influence landowners' willingness to engage in oribi conservation programmes. Finally, in Chapter 4, I provide a conclusion for the thesis and highlight the implications of this research for the development of oribi conservation programmes for private lands in South Africa.

Chapter 1

Introduction and Literature Review

Introduction

Oribi antelope (*Ourebia ourebi*) are considered to be South Africa's most endangered antelope species (Shrader et al., 2016; Manqele et al., 2018). The species has experienced, and is continuing to experience, severe reductions in both its population numbers and distribution. This is largely attributable to the fact that much of the grassland habitat on which it is dependent for survival has been lost through conversion to agricultural land uses, such as forestry and pastures for livestock (Marchant, 1991; Armstrong et al., 1998; Coverdale et al., 2006; Shrader et al., 2016). Furthermore, much of the remaining habitat is highly fragmented and in poor condition due to inappropriate grassland management practices (Coverdale et al., 2006; Shrader et al., 2016; Manqele et al., 2018). Finally, the ever-increasing threat of illegal hunting with dogs has been a major contributing factor to the decline of South Africa's oribi population (Coverdale et al., 2006; Shrader et al., 2016; Manqele et al., 2018).

South Africa's protected area network fails to ensure the effective conservation of oribi. In fact, 75% of the country's extant oribi population can be found outside of protected areas on privately-owned lands, usually in small populations on farmlands (Everett, 1991; Coverdale et al., 2006; Patel, 2015; Shrader et al., 2016; Lister et al., 2018). As such, private landowners play a key role in the conservation of the species (Coverdale et al., 2006; Patel, 2015). Private land conservation efforts and strategies are thus essential to prevent the extinction of oribi within South Africa. However, to date these efforts have been largely ineffective as 36% of

subpopulations of oribi on private lands in KwaZulu-Natal are declining, whilst only 27% are increasing, and 11% remain stable (Patel, 2015). As KwaZulu-Natal contains the majority of South Africa's oribi population, a decline in the province's oribi numbers is cause for major concern (Coverdale et al. 2006; Patel, 2015).

In order to design effective private land conservation programmes, it is necessary to possess an understanding of the factors that are likely to influence landowners' willingness to participate in these programmes, such as their attitudes, needs, land management practices, and constraints (Winter et al., 2007; Pasquini et al., 2010; Von Hase et al., 2010; Ma et al., 2012). To date, landowners' willingness to engage in oribi conservation programmes and factors that influence their uptake of these programmes have not been assessed in KwaZulu-Natal, or elsewhere in South Africa. In order to address this, I focused on the following aims and objectives:

Aims:

To investigate private landowners' willingness to protect oribi on their lands in KwaZulu-Natal. In addition, to investigate factors that influence landowners' stated willingness to engage in oribi conservation programmes.

Objectives:

1. Investigate landowners' perceptions of the threats to oribi antelope.
2. Investigate landowners' perceptions of how lands should be managed to benefit oribi.

3. Investigate why some private landowners are willing to incur costs to protect oribi on their lands.
4. Investigate the factors that influence landowners' stated willingness to enrol in oribi conservation programmes.

Literature Review

The importance of private lands to conservation

Despite conservation efforts, biodiversity continues to decline across the globe (Rands et al., 2010; Hanley et al., 2012). Moreover, it has become increasingly evident that the current global network of protected areas is not sufficient to ensure that biodiversity is effectively conserved (Brooks et al., 2004; Gallo et al., 2009; Pasquini et al., 2010). Protected areas are often unproductive tracts of land that are of little economic use to society and are, in fact, not ideal for successful conservation (Norton, 2000; Gallo et al., 2009). In contrast, the most productive areas of the landscape tend to be privately-owned as it is these areas that provide the greatest economic return (Norton, 2000; Gallo et al., 2009). As a result, privately-owned lands are at risk of biodiversity loss through conversion to more economically lucrative uses, such as agriculture, forestry and mining. This is a cause for great concern as productive private lands are also often those most ideal for conservation purposes (Gallo et al., 2009). Given the value of biodiversity to society, and the shortcomings of the current network of protected areas to ensure the conservation of biodiversity, many conservation efforts have begun to shift towards the use of private lands for conservation purposes (Polasky & Doremus, 1998; Newburn et al.,

2005; Gallo et al., 2009; Pasquini et al., 2010; Hanley et al., 2012; Archer, 2014). This shift has also been observed in South Africa (Winter et al., 2007).

In common with other countries, South Africa has largely relied on its network of state-owned protected areas to ensure biodiversity conservation (Pence et al., 2003). As such, the laws of the country have made little provision for encouraging conservation activities on privately-owned lands (Pence et al., 2003) – with the exception of laws that allow for extensive game ranching, which has the potential to conserve biodiversity and ecosystem services on large tracts of land (Cousins et al., 2008; Pienaar et al., 2017). However, much of South Africa's biodiversity, including many threatened and endangered species, exists outside of formally protected areas (Cadman et al., 2010). Thus, in South Africa, as in many other countries, private lands play a crucial role in the conservation of biodiversity.

Challenges to achieving conservation on private lands

There are a number of challenges to achieving conservation on private lands. For example, many private landowners choose not to participate in conservation activities owing to the opportunity costs of economic activities foregone (Kabii & Horwitz, 2006; Naidoo et al., 2006; Paloniemi & Tikka, 2008). Specifically, conservation activities often prevent landowners from engaging in more economically beneficial activities, such as forestry or agriculture (Polasky et al., 1997; Naidoo et al., 2006; Paloniemi & Tikka, 2008; Hanley et al., 2012). As such, landowners bear the costs of conservation (both in terms of the costs of implementing conservation practices and the loss of potential income), whilst receiving little to no economic return unless they engage in economic activities that depend on wildlife or habitat

conservation, (e.g. ecotourism; Polasky et al., 1997; Doremus, 2003; Pence et al., 2003; Hanley et al., 2012). This results in many landowners objecting to bearing the cost of conservation and choosing not to participate in conservation efforts as they believe these costs should be funded by society, which receives multiple benefits from conservation activities (Doremus, 2003; Kabii & Horwitz, 2006).

A further barrier to achieving conservation on private lands is that of political autonomy (Doremus, 2003; Kabii & Horwitz, 2006; Paloniemi & Tikka, 2008). Many landowners may be disinclined to participate in conservation activities for fear that they may lose their rights and freedom to make decisions regarding their land and resources, owing to interference by government and conservation authorities (Doremus, 2003; Kabii & Horwitz, 2006; Paloniemi & Tikka, 2008). Lack of trust in government and conservation organisations (including conservation NGOs) further reinforces landowners' concerns about engaging in conservation activities on their lands (Doremus, 2003; Paloniemi & Tikka, 2008; Kreye et al., 2017). As such, attaining private land conservation depends on possessing a clear understanding of the financial and non-financial costs private landowners incur from allocating land and resources to conservation efforts.

The value of social information in conservation

Despite conservation efforts, the rate of biodiversity loss across the globe has shown no sign of slowing down (Gallo et al., 2009; Moon et al., 2012). In fact, the rate of habitat conversion is far exceeding that of habitat conservation (Gallo et al., 2009; Moon et al., 2012; Watson et al., 2016). The failure to reduce biodiversity loss and halt habitat conversion on private lands has

largely been attributed to a lack of understanding of the social dimensions of conservation, rather than a lack of understanding of biological and ecological processes (Balmford & Cowling, 2006; Moon et al., 2012). Successful conservation on private lands is highly dependent upon understanding landowners' attitudes, management techniques, needs, preferences, perceptions, and limitations (such as budget constraints), as it is these factors that influence their land management decisions (Winter et al., 2007; Pasquini et al., 2010; Von Hase et al., 2010). Moreover, this information is needed to design effective conservation programmes that will be attractive to private landowners (Kabii & Horwitz, 2006; Ma et al., 2012). The social aspects of conservation may, in fact, be the primary determinants of whether conservation efforts on private land succeed or fail (Moon et al., 2012).

Despite evidence that social information is crucial to the development of effective conservation management plans and strategies, many biologists and conservation planners have been slow to collect and utilize this information efficiently (Knight et al., 2010; Pasquini et al., 2010). Most information on the social aspects of private land conservation has been collected in North America (Winter et al., 2007). This information is not, however, universally applicable as private landowners' attitudes towards conservation likely depend on the socioeconomic, cultural, and agroecological conditions of an area (Winter et al., 2007). Given the value of social information to conservation on private lands, it is of great concern that this aspect of conservation has received very little attention in South Africa (Winter et al., 2007).

Designing effective private land conservation programmes

Establishing why private landowners practice conservation activities, or, alternatively, why they do not, may allow government and non-government organisations to design programmes that more effectively encourage conservation efforts on private lands (Langpap, 2004; Moon & Cocklin, 2011; Moon et al., 2012). The decision of private landowners to participate in conservation programmes is thought to be dependent upon a number of factors, namely 1) landholder demographics and the type of land tenure, 2) the awareness and knowledge the landowner possesses regarding the programme, 3) landowners' financial situation, and 4) landowners' perceptions of the costs and benefits of the programme (Kabii & Horwitz, 2006). In designing conservation programmes, it is important to ensure that, 1) they are appropriate for the location in which they will be implemented (Cumming, 2007), 2) the incentive offered attracts target landowners (Langpap, 2004; Cumming, 2007; Moon & Cocklin, 2011), and 3) the programme attains the desired activities on the ground (Langpap, 2004; Moon & Cocklin, 2011). Landowners' willingness to participate in conservation programmes will likely depend upon, 1) the conservation incentive offered, 2) required conservation activities, and 3) the length of time that they are expected to participate in these conservation programmes.

Costs and benefits of participating in conservation activities

Determining the economic benefits, if any, that private landowners gain from participating in conservation activities has proven very difficult to quantify (Naidoo et al., 2006). The benefits that landowners gain from participating need not necessarily be financial. For example, Ma et al. (2012), as well as Pasquini et al. (2010), found that landowners often practice conservation

activities purely because they derive personal enjoyment from doing so. Understanding the costs that private landowners incur when practicing conservation, as well as the benefits they gain, could prove to be crucial information when designing programmes to motivate landowners to participate in conservation activities. Despite the usefulness of possessing such information, few studies have attempted to quantify the costs of conservation to private landowners (Naidoo et al., 2006), especially in South Africa. My study was set up to try to rectify this.

Oribi antelope (Ourebia ourebi)

Oribi are a small (7-17 kg; Skinner & Chimimba, 2005), territorial antelope (Brashares & Arcese, 1999) that are sparsely distributed throughout Africa (Figure 1.1). Their distribution ranges from Senegal to Ethiopia and Eritrea and south through eastern and western Africa to Angola and South Africa (van Teylingen & Kerley, 1995; Shrader et al., 2016). They possess very specific habitat requirements and are highly dependent upon grasslands for their survival (Stears & Shrader, 2015; Shrader et al., 2016). Oribi are ruminants that require short, highly palatable grass species that provide high-quality grazing, as well as longer grass species that provide food, refuge, and cover for the concealment of young (Everett et al., 1991; van Teylingen & Kerley, 1995; Stears & Shrader, 2015; Shrader et al., 2016). They are therefore confined to grasslands that are able to meet these requirements, thus accounting for their patchy distribution across their range (Grey-Ross et al., 2009a).

In South Africa, oribi are the most endangered of the antelope species, being listed as Endangered C2a(ii), and populations can be found in the Eastern Cape, Mpumalanga, Free

State, and KwaZulu-Natal provinces (Pfab et al., 2011; Shrader et al., 2016; Lister et al., 2018). Populations most commonly occur within KwaZulu-Natal and this province possesses 45% of South Africa's entire extant oribi population (Pfab et al., 2011; Patel, 2015; Lister et al., 2018). Oribe have experienced, and are continuing to experience, severe reductions in their distribution and declines in their population numbers, and it is estimated that the national population has declined by 13% over three generations (1996-2014) (Shrader et al., 2016).

One of the major threats facing oribi is habitat loss and fragmentation (Shrader et al., 2016). The grassland biome on which the species is dependent for survival is critically endangered with only 2.4% of this biome being conserved (Carbutt & Martindale, 2014). Throughout South Africa, natural grasslands are rapidly being converted to more financially lucrative land uses, such as timber and sugar cane, and 60% of the country's grasslands have already been irreversibly transformed (Shrader et al., 2016). These grasslands are further threatened by poor land management practices, such as intensive commercial farming, overstocking with domestic herbivores, and poor fire management (Shrader et al., 2016). The decline in oribi population numbers and distribution is also likely largely attributable to illegal hunting (Grey-Ross et al., 2009a; Pfab et al., 2011; Shrader et al., 2016).

Illegal hunting of oribi is on the increase and has, in some instances, resulted in the local extinction of subpopulations on private lands (Shrader et al., 2016). Most illegal hunting of oribi is done with the aid of domestic dogs and throughout South Africa taxi hunts are becoming increasingly popular (Grey-Ross et al., 2009a; Grey-Ross et al., 2009b; Grey-Ross et al., 2010; Shrader et al., 2016). Taxi hunts occur when groups of individuals and packs of hunting dogs arrive at private farms, usually at night or in the early morning, in mini-bus taxis (Grey, 2006).

Upon arrival, the hunting dogs are released onto the property, sometimes as many as 50, to hunt illegally and indiscriminately (Grey, 2006). Participants then place bets on the outcome of the hunt (Grey, 2006). These hunts are organised by gambling syndicates and have proven to be more destructive to the oribi population than the local hunting for sport or food that occurred in the past (Shrader et al., 2016). Other illegal hunting methods, such as snaring, are also a major threat facing South Africa's oribi population (Grey-Ross et al., 2010; Shrader et al., 2016). Oribi are further threatened due to the fact that the laws and legislation designed to protect them are poorly enforced (Coverdale et al., 2006; Shrader et al., 2016). A general lack of awareness of the oribi's endangered status, the threats they face, and the legal repercussions of hunting them is a further threat to the species (Shrader et al., 2016).

Nationally, 75% of the extant oribi population exists on privately-owned land (Lister et al., 2018). Given that the majority of South Africa's remaining oribi population exists on these lands, it is evident that cooperation between private landowners and conservation officials is essential if the species is to avoid extinction (Grey-Ross et al., 2009a; Grey-Ross et al., 2009c).

Broad Predictions

Based on the literature, I made the following broad predictions for my study:

1. Landowner characteristics, property characteristics, and programme characteristics will influence landowners' stated willingness to enrol in oribi conservation programmes.
2. Landowners' willingness to conserve oribi on their lands will be motivated primarily by their love of wildlife.

3. A financial incentive will more effectively encourage landowner enrolment in an oribi conservation programme than non-financial incentives.
4. Landowners with concerns about political autonomy will be unwilling to enrol in oribi conservation programmes.
5. Landowners who want to convert their lands to more economically lucrative uses will be unwilling to engage in oribi conservation efforts.



Figure 1.1: Oribi (*Ourebia ourebi*) distribution in Africa (The IUCN Red List of Threatened Species, 2016).

Chapter 2

Investigating private landowners' attitudes towards the conservation of the endangered oribi antelope (*Ourebia ourebi*) in KwaZulu-Natal, South Africa

Abstract

The endangered oribi antelope is highly dependent on privately-owned lands in South Africa for its continued survival. Despite the fact that conserving the species may result in both financial and non-financial costs to private landowners, there is evidence that farmers are willing to conserve oribi on their lands. I conducted 50 semi-structured interviews with private landowners in KwaZulu-Natal, South Africa, to investigate, (a) why farmers are willing to protect oribi, (b) their perceptions of the threats to oribi, and (c) their understanding of how land should be managed to benefit oribi. Landowners' willingness to conserve these endangered antelope was driven largely by non-financial factors, including an affinity for the species. Predators and illegal hunting were perceived to pose the greatest threats to oribi. While few farmers managed their lands specifically to benefit oribi, most reported that they did not know which land management practices would support oribi conservation. The findings of this research suggest that private landowners require education and legal support, in order to more effectively conserve oribi.

Keywords: Conservation programmes, illegal hunting, land management, semi-structured interviews, qualitative analysis, taxi hunts, threatened species

Introduction

South Africa, like many other countries, is largely dependent on its network of state-owned protected areas to ensure the conservation of biodiversity. However, only 5% of the country's land area is covered by protected areas (Cousins et al., 2008). These areas do not encompass all of South Africa's habitat types and much of the country's rare and endangered habitat is privately-owned (Cousins et al., 2008; Gallo et al., 2009; Cadman et al., 2010). As such, South Africa's network of protected areas fails to ensure the effective conservation of the country's biodiversity. In fact, many of South Africa's threatened species exist outside protected areas on privately-owned lands (Cousins et al., 2008; Cadman et al., 2010). Private landowners thus play a critical role in the conservation of these species in South Africa.

There are, however, a number of challenges to achieving the conservation of threatened and endangered species on private lands. Many private landowners choose not to participate in conservation activities owing to the opportunity costs of economic activities foregone (Kabii & Horwitz, 2006; Naidoo et al., 2006; Paloniemi & Tikka, 2008; Hanley et al., 2012). Conservation activities often prevent landowners from engaging in income-generating activities, such as forestry or agriculture (Polasky et al., 1997; Naidoo et al., 2006; Paloniemi & Tikka, 2008; Hanley et al., 2012). As such, landowners bear the costs of conservation (both in terms of the costs of implementing conservation practices and the loss of potential income), whilst receiving little to no economic return unless they engage in economic activities that depend on wildlife or habitat conservation, such as ecotourism (Polasky et al., 1997; Doremus, 2003; Hanley et al., 2012).

Concerns about political autonomy also form a barrier to achieving conservation on private lands (Doremus, 2003; Kabii & Horwitz, 2006; Paloniemi & Tikka, 2008). Landowners may be disinclined to participate in conservation activities for fear that they may lose their freedom to make land management decisions, owing to interference by government and conservation authorities (Doremus, 2003; Kabii & Horwitz, 2006; Paloniemi & Tikka, 2008). Lack of trust in government and conservation organisations (including conservation NGOs) reinforces landowners' concerns about engaging in conservation activities on their lands (Doremus, 2003; Langpap, 2004). Finally, private landowners may be disinclined to engage in the conservation of endangered species on their lands if doing so results in high anti-poaching security costs or risks to the safety of their families and staff (Rubino & Pienaar, 2018). For example, the high security costs and safety risks associated with rhino ownership has resulted in a number of private landowners removing rhinos from their lands (Rubino & Pienaar, 2018).

Despite the costs and challenges associated with participating in conservation efforts, many private landowners in South Africa have voluntarily engaged in conservation activities, (e.g. through the creation of conservancies; Krug, 2001; Downsborough et al., 2011). Landowners' willingness to engage in conservation may be motivated by financial and non-financial considerations. In South Africa, private landowners may own the wildlife on their land (Taylor et al., 2015a; Pienaar et al., 2017), which allows them to generate wildlife-based income and encourages sustainable use of wildlife (Kabiri & Child, 2014; Taylor et al., 2015a; Pienaar et al., 2017, Rubino & Pienaar, 2018). Cultural services may also motivate private land conservation activities (Baum et al., 2017). Landowners may conserve species and biodiversity as fulfilment of their spiritual or religious beliefs, and/or protection of their cultural heritage

(Daniel et al., 2012; Baum et al., 2017). Moreover, landowners' decision to participate in conservation activities may be motivated by a sense of responsibility or moral obligation to protect the environment (Hines et al., 1987; McDonald et al., 2018). Finally, landowners may engage in conservation efforts because they possess an emotional affinity towards nature or an emotional attachment to a specific species that drives their desire to protect it (Kals et al., 1999; Rubino & Pienaar, 2018).

Despite the creation of conservancies and other private land conservation efforts, increased conservation of threatened and endangered species and their habitats on private land is required to prevent species extinction. The most productive tracts of land tend to be privately-owned (Norton, 2000; Gallo et al., 2009). As a result, private lands remain at high risk of habitat loss through conversion to agriculture, forestry, residential and industrial development and mining (Cadman et al., 2010). Habitat fragmentation and illegal hunting on private lands are placing increased pressure on a number of threatened and endangered species (Pfab et al., 2011; Shrader et al., 2016), including the oribi antelope (*Ourebia ourebi*).

Oribi antelope are South Africa's most endangered antelope species and are heavily dependent on private lands for their continued survival (Shrader et al., 2016; Manqele et al., 2018). Oribi have experienced severe reductions in both their distribution and population numbers (Shrader et al., 2016), owing to habitat loss and fragmentation and illegal hunting (Pfab et al., 2011; Shrader et al., 2016, Manqele et al., 2018). At present, approximately 75% of South Africa's remaining oribi population exists on privately-owned lands (Lister et al., 2018). Interestingly, many private landowners have voluntarily engaged in oribi conservation efforts

on their lands, even though this may result in poaching threats and restrictions on land management activities.

My research was designed to investigate why private landowners are willing to incur these costs to conserve this small lesser-known antelope species. Additionally, I investigated landowners' perceptions of the threats to oribi, and how land should be managed to benefit the species. While successful private land conservation programmes depend on understanding, 1) landowners' attitudes towards conservation, 2) perceptions of conservation agencies, and 3) budget constraints (Winter et al., 2007; Pasquini et al., 2010; Von Hase et al., 2010; Ma et al., 2012), it is also essential to identify gaps between landowners' and ecologists' understanding of how species should be managed. Possessing such information is crucial for the development of appropriate conservation programmes, including education and outreach programmes, which may successfully encourage landowner participation in effective conservation practices.

Methods

Study Site and Study Population

In order to address my research questions, I conducted 50 semi-structured interviews with farmers in KwaZulu-Natal, South Africa from October 2017 to May 2018. KwaZulu-Natal contains 45% of South Africa's extant oribi population, with 46% of this population located on privately-owned lands (Lister et al., 2018). I interviewed farmers who had oribi present on their property, those who had had oribi on their property in the past, and farmers whose properties possessed suitable oribi habitat (but believed oribi had never been present on their property). See Figure 2.1 for the geographic locations of areas in which interviews were conducted.

Survey Instrument

I administered each survey in-person. The survey contained both closed- and open-ended questions and consisted of two sections. The first section contained 29 questions pertaining to farmers' socio-demographic characteristics, farming operations, land management practices, and oribi on their land. The second section focused on farmers' willingness to enrol in potential oribi conservation programmes. The survey was pre-tested with four experts in survey design and oribi conservation, and five private landowners prior to implementation (Berg, 2001). The survey was reviewed and approved by the ethics committee at the University of Pretoria prior to data collection (reference number EC171106-158).

Data Collection

I obtained an initial contact list of 10 farmers who own oribi from the Oribi Working Group (OWG; a committee based in KZN that works to manage the oribi population, address threats to oribi conservation, and develop relationships with private landowners who have oribi present on their lands) (Grey-Ross et al., 2009b; Patel, 2015). Thereafter, I used referral (snowball) sampling to contact potential research participants because oribi conservation is a sensitive topic, requiring trust between the researcher and research participant (Biernacki & Waldorf, 1981). I utilised referral sampling because farmers may be unwilling to disclose the presence of oribi on their property to strangers due to concerns about personal autonomy or poaching threats. Referral sampling relies on research participants to recruit or recommend new study participants (Bagheri & Saadati, 2015). A total of 50 interviews (98% response rate; one farmer declined to participate in the study) were conducted.

All interviews were conducted face-to-face on the farmers' properties or at locations convenient for the farmers. Responses were recorded in a survey booklet while the interviews were recorded with the aid of an audio device. A total of forty-five hours' worth of interviews were recorded. On average interviews lasted 54 minutes in duration (± 21 min SD).

Data analysis

The focus of this research was on the qualitative information collected during survey implementation. Qualitative research methods allow for the collection of in-depth information on people's perspectives, thoughts, motivations and actions (Bryman, 2001; Taylor et al., 2015b; O'Keeffe et al., 2016). I transcribed the interviews, and then both E. Pienaar and I independently analysed the transcripts to identify any key underlying themes and beliefs using open coding (Berg, 2001). Initially, 135 codes were derived from the data analysis and these were analysed and grouped into 94 themes. I then further grouped these themes into six broad topics (Appendix 1). To check for consistency in our results, we compared and discussed themes, prior to finalizing the findings in this chapter (Hesse-Biber & Leavy, 2011).

Results

Landowner characteristics

Respondents were aged between 30 and 79 years (mean age of 55, ± 12 year SD). In total, 49 respondents (98%, Table 2.1) were male and English was the first language of most (94%, Table 2.1). Forty-one respondents owned the properties on which they farmed and the majority of

these respondents (78%, Table 2.1) possessed a tertiary level education. Forty-one respondents (82%) had a farming heritage, whilst nine respondents (18%) were first generation farmers.

Properties ranged from 23 to 9300 hectares in size with an average property size of 1551 hectares (± 1842 hectares SD). Respondents engaged in a variety of farming activities on their properties (Table 2.1), with forty-six respondents (92%) engaged in multiple farming activities on their property (e.g. beef and sugar cane).

Forty-nine respondents (98%) possessed natural grassland on their properties. Thirty-nine (78%) currently had oribi present on their property, whilst seven (14%) had oribi on their property in the past. Three respondents (6%) believed that oribi had never been present on their property, whilst one (2%) was uncertain as to whether or not oribi may have been present on their land in the past. The number of oribi recorded by oribi owners on their lands ranged between two and 45 (mean of 10 oribi per property, ± 9 oribi SD).

Landowners' motivations for protecting oribi

Thirty-seven respondents with oribi on their properties (95% of oribi owners) displayed an interest in their oribi population and were aware of where on their properties these oribi could be found. These landowners held a number of perceptions about the oribi on their lands (Table 2.2). Three respondents (8% of oribi owners) expressed concern as to whether their populations were viable. One respondent stated, "Their numbers are so low. So even if we count 5 here, that's a lot." These perceptions were, however, not based on scientific studies.

Almost all respondents who owned oribi (n=35, 90% of oribi owners) reported that they were willing to protect and conserve the oribi on their lands. There was, however, no general

consensus as to why they were willing to do so. Most (n=32, 82% of oribi owners) stated that they were willing to conserve native species on their lands (with the exception of jackal) out of a compassion for, and interest in, all wildlife. These respondents also stated that they considered themselves to be custodians of the land, which meant that they had a moral obligation and social responsibility to protect the wildlife on their lands, including oribi. Some (n=8, 21% of oribi owners) expanded on this point, explaining that wildlife conservation is part of their farming heritage, and that it is important to conserve wildlife for the benefit of future generations. Example quotes included:

- "It's just the right thing to do"
- "It's a natural thing to look after something that's beautiful. It's love of wildlife."
- "[I don't manage my land] specifically for oribi, but for all wildlife. I would like to make sure that everything can live here happily"

A smaller share of respondents stated that they specifically focused on conserving oribi, but noted they conserved other wildlife on their lands as well. Some (n=6, 15% of oribi owners) possessed an emotional attachment to oribi, which drove their desire to protect the species. As one respondent noted, "...they're special. We can't let them down". Some respondents (n=20, 51% of oribi owners) were willing to protect oribi and other endangered grassland species (e.g. the wattled crane; *Bugeranus carunculatus*) precisely because these species were endangered, and they took pride in protecting endangered species on their lands. One respondent stated, "I like [oribi]. I know they are protected and it's nice having them on the farm". Another noted, "[Oribi are] a bit like the wattled crane. They're endangered, so you want to help something that's endangered, basically." The attitudes of these respondents suggested that they viewed

both oribi and wattled cranes as flagship species for the conservation of natural grassland ecosystems. In contrast, two respondents did not consider the oribi to be an endangered species. One noted, "I think there are more oribi than people think there are. I think it's one of those things where people jump up and down and make a fuss about it...but I don't think they are as endangered as everybody thinks".

Regardless of whether respondents agreed that the oribi were endangered, there was a general consensus that oribi were stupid animals that were largely defenceless against hunting dogs. One respondent noted, "Unfortunately they're not the cleverest animal out there so they're very prone to being poached and taken". Another said, "They're made to defend themselves against other predators, but not [hunting] dogs. They stand no chance against dogs". This perception of oribi as stupid and defenceless motivated some respondents (n=3, 8% of oribi owners) to protect the species out of pity. As one respondent said, "So, I will do whatever it takes to protect these animals. They are their own worst enemies. The oribi are so stupid".

Although most respondents conserved oribi and other species out of a love for and interest in all wildlife, some (n=3, 8% of oribi owners) had a more utilitarian approach to conservation. These respondents reported that they conserve and protect wildlife on their lands for their own personal hunting purposes. As one respondent noted, "Because I hunt animals, I want them to be here. I want them to be available". Another noted, "I want to shoot a buck, so I'm not going to let you shoot it". As a corollary to this point of view, some respondents (n=5, 13% of oribi owners) noted that their decision to protect wildlife on their lands from illegal hunters was commensurate with protecting their personal property. They

noted that they view their wildlife as their personal property and were thus unwilling to tolerate the theft of it. Example quotes included:

- "You let people in to just hunt indiscriminately on your farm and you're sending out a message that you don't mind people trespassing, you don't mind people hunting".
- "So, it's another asset. So, if you're not going to protect the oribi, why would you protect the maize or the timber? It's about setting a boundary and establishing a culture that this is not available for plundering".

Although almost all respondents were willing to conserve oribi and other wildlife on their lands, some (n=4, 10% of oribi owners) were less inclined to do so. Three respondents (6% of all respondents) possessed a defeatist attitude about oribi conservation, believing that it was already too late for the species. As one respondent noted, "There's hardly any oribi anymore so it's actually a closed chapter. It doesn't matter anymore".

Managing the threat of illegal hunting

Landowners held a number of perceptions regarding illegal hunting (Table 2.3). Eighteen respondents (39% of past and present oribi owners) reported that illegal dog hunting posed a severe threat to their oribi. As one respondent said, "[Illegal hunting] is *the* threat. You can forget all the other threats. It's the only threat". Taxi hunts were the most frequently reported method of illegal hunting with 20 respondents (40% of all respondents) reporting the occurrence of taxi hunts on their lands. Taxi hunting is a popular sport in KwaZulu-Natal and refers to groups of hunters and large packs of hunting dogs arriving at private farms, usually at

night or in the early morning, in mini-bus taxis and poaching on these lands (Grey-Ross et al., 2010). Participants then place bets on which dog will make the first kill (Grey-Ross et al., 2010).

There was a general consensus amongst respondents that taxi hunts pose a greater threat to oribi and other wildlife than hunting done by small groups of individuals. One respondent said of taxi hunts, "They come here once and take out 10 buck, which is nearly the entire population". It was noted by five respondents (10% of all respondents) that government and police corruption is sometimes associated with taxi hunts. These respondents reported that they had experienced situations in which law enforcement officials had been involved in the taxi hunts, either as participants or facilitators. Eight respondents (16% of all respondents) also reported that attempting to prevent or intervene in taxi hunts places one's personal safety at great risk. One noted of taxi hunts, "It's not a pleasant exercise hunting the hunters. We've had some close shaves. And they're armed nowadays".

Some respondents (n=11) believed that properties located near timber plantations are at greater risk of illegal hunting. These landowners felt that timber plantations provide illegal hunters with sanctuary. One respondent noted, "And [the timber corporation], for instance, allow people to hunt in their forest". Another noted, "So [the timber corporation] are, in our view, criminals because they are harbouring criminals". Properties located near human settlements and/or tribal lands were also frequently reported to be at greater risk of illegal hunting. Sixteen respondents (32% of all respondents) reported their belief that it is individuals from these areas that are responsible for hunting.

Some landowners (n=5, 10% of all respondents) reported that illegal hunting is more likely to occur on properties on which the owner or manager does not permanently reside,

rather than on properties on which there is a constant farmer presence. One respondent noted, "People won't hunt on my farm but they might go to my neighbour's farm and hunt there where he doesn't live".

Thirteen respondents (26% of all respondents) reported their belief that illegal hunting does not take place on their lands but felt that it was likely a severe issue on the properties surrounding them. One respondent stated, "[Illegal hunting] happens around me, not on me". Another said of illegal hunting, "...I don't have that. It happens on the neighbours". Although many respondents were of the belief that illegal hunting does not occur on their lands, six respondents (12% of all respondents) acknowledged the fact that hunting may be occurring on their lands without their knowledge. One respondent said of illegal hunting, "And you don't know because you're asleep and you go there in the morning and it looks fine, so you think nothing's happened".

Respondents engaged in a number of efforts to try and mitigate the threat of illegal hunting on their lands (Table 2.4). Thirty-two respondents (64% of all respondents) reported that they were willing to control hunting dogs on their lands, usually by shooting or poisoning these dogs. For example, one respondent noted, "I have no qualms about shooting a dog that's destructive". Some (n=6, 12% of all respondents) were of the belief that gaining a reputation for being willing to shoot hunting dogs helps decrease the occurrence of illegal hunting on their lands. As one respondent said, "You've got to create that persona and culture that [illegal hunters] know if they come here, we're going to kill their dogs". Some respondents (n=3, 6% of all respondents) noted that they choose not to advertise the fact that they control for hunting dogs for fear of retribution from the owners of the dogs. However, four respondents (8% of all

respondents) were completely unwilling to control hunting dogs on their lands for fear of retribution from the dogs' owners in the form of property damage or threats. As one respondent noted, "Most of the farmers turn a blind eye now. They get in trouble. They get arson. They get stuff burnt out. So, 80% of the guys turn a blind eye to poaching now". Another noted, "I've never shot the hunting gangs' dogs because I know there are repercussions".

Three respondents reported that they preferred to avoid police involvement in managing illegal hunting due to lack of trust of law enforcement officials. Thirty-one respondents (62% of all respondents) reported that the presence of security personnel on their lands helped protect their wildlife. Most (n=28, 56% of all respondents) did, however, note that security personnel were present to prevent the theft of livestock and personal property or for the personal safety of the landowner, rather than for the benefit of wildlife. A number of respondents (n=16, 32% of all respondents) reported that they were members of their local conservancies and noted that, as such, they had game guards that occasionally patrolled their lands, checking for snares and poachers. Finally, 12 respondents (24% of all respondents) noted that members of their local farming communities took turns to patrol the areas in which they live. They reported that this was done for security reasons but felt that these patrols likely helped to protect wildlife by creating a security presence in the area.

Managing the threat of snaring

Respondents held a number of perceptions regarding the threat of snaring on their lands (Table 2.5). There was, however, a general consensus amongst landowners that snaring posed little threat. Some respondents (n=10, 20% of all respondents) reported that if snaring were to occur

on their property, their own employees were most likely responsible. Other respondents (n=11, 22% of respondents) reported that snaring was often associated with the presence of contract labourers in the area. For example, one respondent noted, "I think it's opportunistic. If there's contractors coming in, then you see a big upsurge [in snaring]".

A number of respondents (n=18, 36% of all respondents) reported that although they do not actively check for snares on their lands, they are constantly alert for them. Some (n=6, 12% of all respondents) noted that they incentivise their employees not to snare on their lands. One respondent reported, "If we find snares they lose out. So, we give them a cow for Christmas and a cow for Easter, and if there's any hunting activity, be it dogs or snaring, they lose out on that cow". Another reported, "I also tell my staff that they will get fired if they get caught setting snares".

Managing the threat of predators

Landowners held a number of perceptions regarding predators and the threat they pose to oribi (Table 2.6). Many respondents (n=24, 52% of past and present oribi owners) considered predators (in particular, jackal) to be a severe threat to oribi. Although most respondents (n=30, 60% of all respondents) were in agreement that jackal pose a threat to oribi and other wildlife, there was no general consensus as to which other predators may be posing a threat.

Although a number of respondents (n=23, 46% of all respondents) reported that they engage in the culling of jackal, their motivations for doing so varied. Twenty respondents (40% of all respondents) reported doing so in order to protect their livestock, but felt that the removal of jackal protected their wildlife by default. In the absence of livestock, some

respondents (n=5, 10% of all respondents) reported that they do not control their jackal population. One said, "Because I'm not a cattle farmer I don't need to [control jackal]". Very few respondents (n=3, 6% of respondents) culled jackal solely to protect wildlife.

There was no general consensus about how jackal control should be done. Whilst some respondents were of the belief that all jackal found on their property should be eradicated, others (n=3, 6% of all respondents) reported that there should be selective control of jackal. These respondents were of the belief that there are "good" and "bad" jackal and that only "bad" jackal should be culled. As one respondent noted, "I subscribe to the idea that there are good jackal and bad jackal. The idea is that if your calves are not getting eaten, don't shoot any jackal".

Managing the threat of habitat loss

There was no general consensus about the level of threat posed by habitat loss to oribi. Over half of respondents (n=26, 52% of all respondents) were, in fact, of the belief that the conversion of natural grasslands to agricultural land uses, such as pasture or crops, had benefitted oribi and other wildlife. The majority of these respondents (n=24, 48% of all respondents) felt that the presence of pastures and crops provided wildlife with a constant, high-quality food source. As one respondent noted, "They probably thrive because they've got better quality food". Furthermore, seven respondents (14% of all respondents) felt that land conversions had provided wildlife with increased cover, and thus protection from predators. For example, one respondent noted, "With a lot of the maize lands you start getting cover. So, if [oribi] do get chased by dogs they can go in there and the dogs can't get hold of them". In

fact, 87% of past and present oribi owners interviewed felt that habitat loss was not a threat to their oribi population.

Some respondents (n=6, 13% of past and present oribi owners) did, however, consider habitat loss to pose a threat to their oribi populations. As one respondent noted, "The red grass [*Themeda triandra*] in the Natal Midlands is being threatened. Very severely threatened by agriculture. Which is a threat to oribi. That's the biggest threat to oribi". In order to mitigate the threat of habitat loss, three respondents (6% of all respondents) reported that they had rehabilitated some of their arable lands back to natural grasslands for the benefit of wildlife. While no other respondents reported engaging in any measures to mitigate the threat of habitat loss to oribi, a number of respondents (n=10, 20% of all respondents) reported that they had begun to shift to more environmentally-friendly farming practices, such as minimum or no-till and the planting of ley crops. As one respondent noted, "I honestly think that if we don't change the way we farm the world doesn't have a future".

Few respondents (n=6, 12% of all respondents) possessed a clear understanding of oribi and their habitat requirements, while some (n=8, 16% of all respondents) noted that they were uncertain how best to manage their lands for the benefit of oribi. However, 33 respondents (72% of past and present oribi owners) reported that they felt that their current land management practices were beneficial for oribi and other wildlife. A number of respondents (n=9, 18% of all respondents) reported that there was some way in which they managed their lands specifically to benefit oribi or other wildlife. For example, some (n=4, 8% of all respondents) reported that they burnt in such a way as to benefit their wildlife. Specifically, some reported engaging in patch burns, which are generally considered to be very labour

intensive, in order to provide their wildlife with areas in which to take refuge. One respondent noted, "And I leave areas for birdlife. Those areas I'd burn half one year and half another year so that they don't become totally moribund and there's refuge for francolin, guineafowl and buck".

Negative repercussions for protecting wildlife

Almost one third of respondents (n=16, 32% of all respondents) reported having faced negative repercussions for having protected the wildlife on their lands. Many of the respondents who had faced negative repercussions (n=9, 18% of all respondents) reported that the negative repercussions they had faced had been in response to having shot hunting dogs or having attempted to intervene in taxi hunts. The repercussions varied amongst landowners (Table 2.7). Some (n=6, 12% of all respondents) reported that attempting to prevent illegal hunting or shooting hunting dogs had placed their personal safety at risk. One respondent noted, "When you shoot peoples' dogs they don't like it...You shoot their dogs and they shoot you back". Some respondents (n=3, 6% of all respondents) even reported having received death threats in retaliation for having intervened in illegal hunting. One landowner stated, "They threaten me. But I just say they must come if they want to kill me". Three respondents (6% of all respondents) reported having had legal charges laid against them for having shot hunting dogs on their lands. This resulted in financial costs for them as they then had to hire legal representatives to defend them against these charges. Furthermore, they reported that having such charges laid against them resulted in emotional and psychological stress.

One respondent was of the belief that conserving and protecting wildlife on their property made them a target for hunters and placed both them and their wildlife at increased risk. This respondent noted, "So by doing this [conserving wildlife] we've attracted the hunters". The failure for poachers to be arrested or punished resulted in some respondents (n=5, 10% of all respondents) feeling disheartened and less inclined to protect wildlife from hunters in the future. Some respondents (n=3, 6% of all respondents) even noted that they would rather wildlife were not present on their property as they then would not have to deal with the issue of illegal hunting. One respondent stated, "Well I'm kind of getting to the end of my tether about it. I said to someone the other day that everything must rather die, so that I don't have all the stress of it". However, most respondents (n=41, 82% of all respondents) reported that they remained willing to protect wildlife. One landowner noted, "They keep warning me that they're coming to hunt with guns and they'll shoot me. Fine, let them come. We'll shoot each other". Another noted, "...there was hunting. I went up to a taxi and pulled a hunting dog out of it and shot it...So they went and laid a charge against me and tried to prosecute. But that was ok because I did it for the buck"

Some respondents (n=6, 15% of oribi owners) noted that the presence of oribi on their lands resulted in economic opportunities foregone as the presence of oribi prevented them from being able to develop their lands. Some of these respondents expressed resentment towards the species for proving to be an impediment to development. One respondent noted, "If you want to develop land or do land conversion it's crazy...So it punishes the people who actually conserve the resource". Another stated, "Shoot the oribi. You've got this impediment to development". In fact, two respondents reported that they withhold information about the

presence of oribi on their property from conservation organisations to avoid having interference in the development and management of their lands. These respondents did, however, note that despite their decision to withhold such information from conservation agencies they were willing to conserve the oribi on their lands.

Oribi conservation as an example of larger social, cultural and economic tensions

The negative repercussions associated with oribi and wildlife conservation formed part of a larger narrative by respondents on social, cultural and economic tensions in South Africa. A number of respondents (n=12, 24% of all respondents) reported that they felt that there had been a decline in the farming lifestyle over recent years due to increasing emotional, psychological and financial stresses. Some (n=7, 14% of all respondents) feared for their personal safety, which had prompted the hiring of security guards. As one respondent noted, "It comes with its own set of problems and hardships and all that with regards to security and safety, which is a big issue. Massive issue. We've been victims of a farm attack". Another noted of farming, "After 40 years it's like being in the trenches and being shot at".

Issues regarding economic uncertainty associated with land reform, labour laws and the economic future of South Africa were also raised by respondents, who pointed out that uncertainty about profitability and land tenure made them loath to engage in conservation programmes. One respondent noted, "About 15 years ago the land claims came and that's completely changed everything because the focus has been on what's going to happen to the farm". A number of respondents (n=8, 16% of all respondents) noted that it had become more difficult to make a living out of farming due to South Africa's current economic state. Some

(n=9, 18% of all respondents) also noted that new minimum wage laws in the country placed them under increased financial stress. Some respondents (n=3, 6% of all respondents) reported that due to financial stresses farming had shifted to being more of a business rather than a way of life as it had been in the past. One respondent stated, "You've got normal business risk. But in agriculture you've got the risk of weather and drought. And we also have political risk. So, the returns are quite poor in agriculture in comparison to how much risk you take".

Due to the high risks associated with farming, both in terms of finance and safety, two respondents expressed a desire that their children do not carry on in their farming footsteps. As one noted, "So I've told my son this is the end of the line. He's not allowed to come farming. And that's an instruction. Because you can't live in this country anymore tied to the land and just listen to one threat after the other every day of your life".

Discussion

My intention in conducting this study was to determine how private landowners think about oribi conservation in terms of why they do or do not attempt to conserve the species, the threats they perceive to be facing their oribi, the efforts they engage in to protect oribi from perceived threats, and the land management practices they consider to be appropriate for the benefit of the species. In general, respondents proved willing to protect and conserve the oribi on their lands. My results suggest that respondents' willingness to protect oribi was motivated by their desire to conserve all wildlife on their land. This decision to conserve wildlife was motivated by a number of non-financial factors, namely a moral obligation to protect all wildlife, a love and enjoyment of wildlife, a desire to protect their heritage, and a desire to

conserve species for future generations. Furthermore, some respondents conserved wildlife for a more utilitarian purpose-so that it would be available on their lands for them to hunt for recreational purposes. In addition, there was a strong sense of ownership of wildlife amongst respondents. They were thus unwilling to tolerate illegal hunting of their wildlife as this was akin to the theft of their personal property.

Although most respondents conserved oribi out of a moral obligation to conserve all wildlife, some possessed a specific affinity for the species. There were a number of non-financial considerations that drove respondents' willingness to conserve oribi, namely an emotional attachment to the species, a desire to preserve them as they are endangered, a sense of pride in maintaining an endangered species on their lands, and a desire to conserve oribi for the benefit of future generations. Furthermore, the oribi's reputation of being defenceless against hunting dogs resulted in many respondents feeling protective of the species and thus feeling the need to defend them against illegal hunting.

Respondents' willingness to conserve wildlife on their lands due to a sense of moral obligation is consistent with findings that individuals often engage in conservation activities out of a sense of responsibility to protect the environment (Hines et al., 1987; Hansson et al., 2012; Rubino & Pienaar, 2018). Respondents' desire to protect not only oribi but all wildlife on their lands for the benefit of future generations is an altruistic approach consistent with the concept of bequest value (Edwards & Abivardi, 1998; Hansjürgens et al., 2017). This refers to the satisfaction landowners' gain from the knowledge that they are protecting oribi and other wildlife for the benefit of future generations (Edwards & Abivardi, 1998; Hansjürgens et al.,

2017). It became evident throughout interviews that oribi are considered by many to be a figurehead for grassland conservation as a whole.

Although almost all respondents were willing to conserve and protect oribi on their lands there was, concerningly, a belief amongst some respondents that attempting to conserve oribi was a pointless task. These respondents were of the belief that oribi are on the verge of extinction and can not be saved and felt that, as such, there is no point in attempting to protect the species. Furthermore, the failure of law enforcement officials to arrest and charge illegal hunters for poaching on private lands led to some respondents being less inclined to protect wildlife in future as they felt their efforts in protecting wildlife and having poachers arrested were wasted. Some respondents were unwilling to protect oribi on their lands as they resented the species for proving to be an impediment to development. The desire of some respondents to remove oribi from their lands is consistent with the “shoot, shovel, and shut up” approach reported by Langpap (2006) whereby landowners destroy any protected species found on their properties, or manage their lands to discourage the presence of such species, so as to avoid having regulations imposed or development impeded.

Although habitat loss is widely considered to be one of the greatest threats facing oribi in South Africa (Grey-Ross et al., 2009b; Shrader et al., 2016), surprisingly, most respondents felt it posed no threat to their oribi. However, given that an estimated 60% of South Africa’s grasslands have already been converted to other uses, such as agriculture (Carbutt & Martindale, 2014; Little et al., 2015; Shrader et al., 2016), and obtaining permits for the conversion of grasslands is considered to be a difficult task by many landowners, I infer that many respondents did not perceive habitat loss to be a threat as they felt it was no longer

taking place. In addition, many respondents were of the opinion that the conversion of natural grasslands to agriculture has, in fact, provided their oribi and other wildlife with a number of benefits, such as the provision of winter fodder and increased cover in which to hide their young. Although oribi do utilise artificially managed or altered grasslands, such as hayfields, they tend to avoid utilising pastures and croplands, favouring natural grasslands instead (Perrin & Everett, 1999; Hill, 2009; Pfab et al., 2011; Shrader et al., 2016). As such, they are useful indicators of grassland health and their presence on pastures and in croplands is more likely a result of reduced or degraded natural habitat, rather than a preference for these areas (Hill, 2009; Pfab et al., 2011). The fact that respondents generally do not perceive habitat loss to be a threat to their oribi is cause for great concern as respondents are unlikely to take measures to mitigate a threat that they do not perceive to exist.

Most respondents acknowledged that illegal hunting with dogs poses a major threat to oribi in South Africa. Throughout interviews it became increasingly evident that there are two predominant forms of illegal hunting with dogs that respondents perceive to be a threat to their wildlife, namely 1) taxi hunting and 2) hunting done by small groups of locals for sport or subsistence purposes. Respondents considered taxi hunting to pose a greater threat to oribi and other wildlife than hunting done by small groups of locals. They resented taxi hunting more due to the greater threat it posed to wildlife and the violence and political corruption associated with it. Consistent with what was reported by respondents, Shrader et al. (2016) also noted that taxi hunts tend to be more destructive and harmful to biodiversity than hunting by small groups of individuals. Furthermore, Shrader et al. (2016) noted that political corruption is frequently associated with taxi hunting.

Although most respondents acknowledged that illegal hunting with dogs is a major threat facing South Africa's oribi population, many felt that illegal hunting did not take place on their properties. A number of respondents reported the occurrence of illegal hunting on the neighbouring properties and yet denied it was occurring on their own. As some respondents noted, many landowners may simply be unaware that illegal hunting is occurring on their lands as it often takes place in the early hours of the morning, or at night, and leaves very little trace. However, I infer from the attitudes of some landowners that they may be in denial about the occurrence of illegal hunting on their lands as they do not want to be held accountable for the decline in the number of oribi on their properties. The belief held by some respondents that illegal hunting does not occur on their lands is also cause for concern as they are unlikely to take measures to mitigate the threat of illegal hunting if they do not believe it to be taking place.

Although snaring is considered to be a severe threat facing oribi in South Africa (Shrader et al., 2016) most respondents felt it posed little to no threat to the oribi on their lands. However, many acknowledged that they do not actively check for snares on their properties. There is thus a possibility that snaring may be occurring on respondents' lands without their knowledge. Some respondents did report that they expect their employees to check for snares. Yet, many also noted that if snaring were to occur it would likely be their own employees responsible. The belief by some landowners that their own employees may be posing a threat to their wildlife is consistent with findings by Grey- Ross et al. (2010) who report that some private landowners in KwaZulu-Natal are of the belief that their own employees engage in illegal hunting activities on their lands. There is therefore the risk that employees may be

snaring without landowners' knowledge. Yet, some respondents noted that they incentivise their employees not to snare on their properties.

There was a general belief held by respondents that jackal are the predator that poses the greatest threat to oribi populations. Many respondents did, however, base this belief on the fact that there was a high population of jackal on their lands and these carnivores posed a threat to their livestock. Many made the assumption that because jackal pose a threat to livestock, they likely pose a severe threat to oribi. They also resented the presence of jackal on their lands because of the threat posed to livestock rather than the threat potentially posed to wildlife. As reported by a number of respondents, the jackal population has increased over recent years (Minnie et al., 2016), likely placing increased pressure on oribi populations. Although jackal are recognised as a threat to oribi, the true level of threat they pose to them on farmlands in South Africa is unknown.

Aside from the shooting and poisoning of hunting dogs, respondents engaged in very few measures specifically for the protection of oribi and other wildlife. The presence of security personnel and the culling of jackal were done primarily for the protection of landowners' safety and livelihoods, rather than the protection of oribi and wildlife. Most respondents, with the exception of those who engaged in game ranching activities, did not incur any financial costs solely for the benefit of wildlife. However, given that personal safety is an ever-increasing concern for South African farmers, and that they are reportedly under great financial stress, investing finances into the protection of wildlife is unlikely to be a priority for most landowners. However, some respondents were members of local conservancies that chose to employ game guards to patrol their properties and aid in protecting their wildlife. The cost of these game

guards is usually split between the members of the conservancies. It is thus likely cheaper for landowners to pay for game guards through conservancies than for individual landowners to employ security personnel specifically to protect their wildlife. However, many game guards also aid in repairing fences and protecting livestock, so it is unlikely that many landowners invest in them solely for the benefit of wildlife (Macaskill, 2018).

Although few respondents invested financially in the protection of their wildlife, almost all proved to be willing to shoot or poison hunting dogs in order to protect oribi and other wildlife on their land. Moreover, this was despite the fact that many noted that doing so put their personal safety and personal property at risk, and potentially put them at risk of prosecution. Some respondents emphasised the risk involved in shooting hunting dogs and I infer that this was in an effort to prove their level of dedication to protecting their wildlife. Some were, however, fearful of killing taxi hunting dogs as the risk of retribution was too great. Consistent with this finding, Shrader et al. (2016) noted that the fear of retribution prevents some private landowners from controlling dogs associated with taxi hunts.

Most respondents did not manage their lands specifically to benefit their oribi and many reported that they do not, in fact, know what the appropriate land management practices for oribi are. Inappropriate land management is considered to be a major threat facing oribi (Coverdale et al., 2006; Shrader et al., 2016). Yet, despite being unaware of the appropriate land management practices for oribi, most landowners felt that their current land management practices were likely to benefit the species. I infer that respondents may have held this belief as they either did not know any differently or did not want to acknowledge that their land management practices may potentially be harmful to their oribi population. Furthermore,

respondents may have held this belief as they did not want to, or could not afford to, alter their land management practices for the benefit of oribi.

Limitations

Although the findings of this study help provide insights into respondents' level of understanding of oribi and their opinions about the conservation of oribi on their lands, there are a number of limitations of the study. Firstly, I made the assumption that respondents were aware of what an oribi antelope is and thus did not check that they could correctly identify the species. It is possible that some respondents may have confused oribi with other antelope species on their lands (e.g. reedbuck; *Redunca arundinum*). However, as the oribi is a distinctive antelope I believe that this is unlikely to be a large number of respondents. Secondly, the sample size of this research was relatively small (N= 50 respondents) and thus my findings should not be used to make broad sweeping inferences for all private landowners in South Africa. Thirdly, there is the risk of interviewer bias in terms of both the collection and interpretation of the data (Berg, 2001). Yet, I tried to reduce this bias and ensure the survey was effective at collecting the relevant information by following the suggestion of Berg (2001) of pretesting the survey instrument on a subset of the sample population.

Conclusion

Understanding landowners' attitudes, management techniques, perceptions, and limitations (such as budget constraints) is essential if oribi are to be effectively conserved on private lands. Moreover, this information is needed to design effective conservation programmes that will be

attractive to private landowners (Ma et al., 2012). However, these social aspects of private land conservation have received little research attention in South Africa and are largely missing from the literature. There is thus a need to conduct further research and address this gap in the literature if effective private land conservation programmes are to be designed in the future.

In general, landowners proved willing to protect and conserve not only oribi, but all wildlife on their lands, despite the costs and risks involved. This finding lends some hope to the future of private land conservation efforts in South Africa. Moreover, the finding that landowners engage in conservation activities largely due to a sense of moral obligation provides some important insights into landowners' attitudes towards conservation and could prove to be a crucial consideration when designing private land conservation programmes. Similar findings regarding landowners' motivations for engaging in conservation efforts have been reported both in South Africa (Rubino & Pienaar, 2018) and internationally (Hansson et al., 2012; Hines et al, 1987).

Yet, many landowners failed to recognise habitat loss as a threat to oribi, while others acknowledged that they are unaware of how to manage their lands for the benefit of the species. Although these findings cannot be used to make broad inferences for all private landowners in South Africa, they do suggest that there is a need to provide private landowners with education and information about oribi and how best to manage their lands for the benefit of the species. Landowners' perceptions of the threats that wildlife on their lands face is something that has largely not been explored in the literature. Landowners' hesitance to intervene in taxi hunts due to concerns for their personal safety is similar to findings by Rubino and Pienaar (2018) who noted that landowners' may choose not to engage in conservation

efforts if doing so puts them at risk of attack from poachers. The concerns landowners possess regarding dealing with illegal hunters suggest that there may be a need to provide landowners with legal support and advice with regards to illegal hunting on their lands. Finally, the finding that landowners' financial constraints often prevent them from effectively conserving wildlife on their lands suggests that financial assistance with anti-poaching efforts and land management may be of benefit to some oribi landowners. The findings of this study, therefore, suggest that there is a need to conduct further research in order to examine what measures could prove to assist private landowners with conservation efforts on their lands.

Table 2.1: Respondent characteristics

Characteristic	Number of individuals	Percentage of all respondents
<i>Gender</i>		
Male	49	98
Female	1	2
<i>Language</i>		
English	47	94
Afrikaans	2	4
Dutch	1	2
<i>Owner/manager</i>		
Owner	41	82
Manager	9	18
<i>Education level</i>		
Grade 10	1	2
Matric (completed high school)	6	12
Tertiary	39	78
Post-graduate	4	8
<i>First generation farming</i>		
Yes	9	18
No	41	82
<i>Farming activity</i>		
Beef	34	68
Cash crops	12	24
Crops	31	62
Commercial timber	16	32
Dairy	14	28
Game ranching	4	8
Hay	31	62
Sheep	12	24
Sugar cane	7	14
Other	7	14

Table 2.2: Respondents’ perceptions of oribi on their lands

Perception	Number of individuals	Percentage of oribi owners	Percentage of all respondents
Oribi move between properties	18	46	-
Accurately determining oribi population size on a property is difficult due to their movements	11	28	-
Oribi population on their property is small	12	31	-
Their oribi population may not be viable	3	8	-
Oribi population is at carrying capacity for the property	4	10	-
Absence of oribi is due to the lack of suitable habitat on the property	1	-	2

Table 2.3: Respondents’ perceptions of illegal hunting

Perception	Number of individuals	Percentage of all respondents
Illegal dog hunting poses a severe threat to oribi	18	36
Illegal hunting taking place is done by small groups of individuals with few dogs	16	32
Taxi hunts are occurring on the property	20	40
Taxi hunts are not for subsistence purposes but rather a sport/gambling syndicate	6	12
Taxi hunts are politically motivated and a means to try and frighten farmers off their lands	3	6
Police/government corruption associated with taxi hunts	5	10
Taxi hunts are violent and confrontational affairs	11	22
Intervening in taxi hunts can place personal safety at risk	18	16
Properties located near timber plantations are at a greater risk of illegal hunting	11	22
Individuals from nearby human settlements responsible for hunting	16	32
Individuals from nearby human settlements facilitate/organize taxi hunts	3	6
Illegal hunting by small groups of individuals from nearby areas is for subsistence purposes or as a sport for school children during holidays	5	10
Living on isolated farms reduces the risk of hunting	4	8

Boundary farms (i.e. those located near main roads) are more likely to experience issues with illegal dog hunting	3	6
Illegal hunting is more likely to take place on properties on which the owner/manager does not permanently reside	5	10
Illegal hunting does not occur on their property, but occurs on surrounding properties	13	26
Illegal hunting may be occurring on their property without their knowledge	6	12

Table 2.4: Mitigation measures respondents engage against illegal hunting

Mitigation measure	Number of individuals	Percentage of all respondents
Control of hunting dogs	32	64
Reason/negotiate with hunters rather than shooting dogs	7	14
Send police/security personnel to deal with hunting issues rather than personal involvement	3	6
Hiring of security personnel to protect wildlife	3	6

Table 2.5: Respondents’ perceptions of snaring on their lands

Perception	Number of individuals	Percentage of past and present oribi owners	Percentage of all respondents
Snaring poses no threat to their oribi	10	22	-
Snaring poses a mild threat to their oribi	28	61	-
Own employees would likely be responsible if snaring were to occur	10	-	20
Properties on which the owner/manager permanently resides are less likely to experience issues with snaring	5	-	10
Snaring is associated with the presence of contract labourers	11	-	22

Table 2.6: Respondents’ perceptions of predators and the threats they pose to oribi

Perception	Number of individuals	Percentage of past and present oribi owners	Percentage of all respondents
Predators, specifically jackal, pose a severe threat to oribi	24	52	-
The jackal population has increased dramatically over recent years	25	-	50
Uncertainty about the level of threat predators pose to oribi	16	35	-
A recent rabies outbreak has helped reduce the jackal population removing the need for culling	3	-	6

Table 2.7: Repercussions faced by respondents for having intervened in taxi hunts

Repercussion	Number of individuals	Percentage of all respondents
Risk to personal safety	6	12
Death threats	3	6
Theft and/or arson	6	12
Legal charges	3	6
Animosity from local law enforcement officials for having shot dogs	2	4
Animosity, threats, racial slurs for having had illegal hunters on their lands arrested	3	6

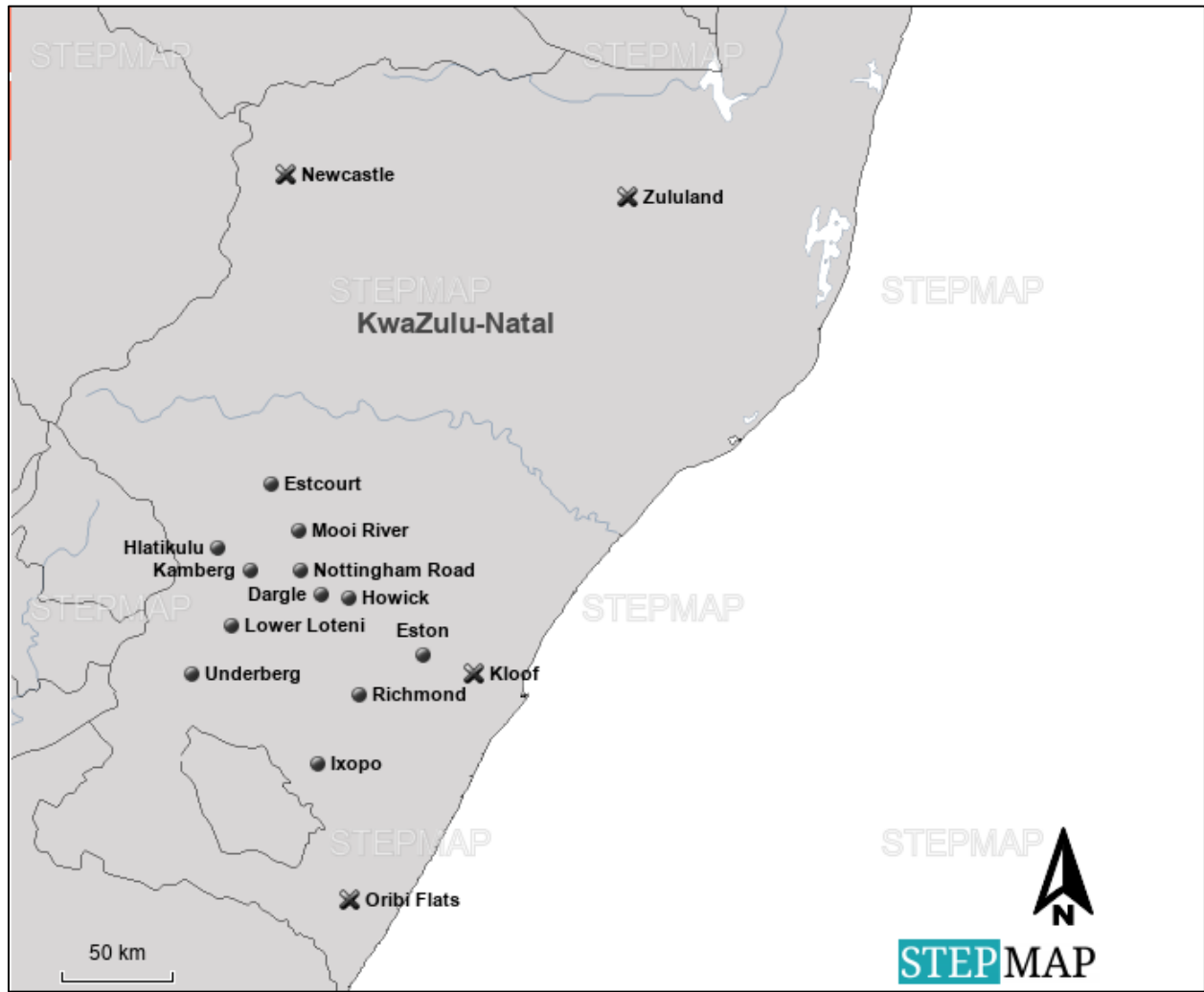


Figure 2.1: Regions in KwaZulu-Natal in which interviews (n=95) were conducted. Regions marked with an “X” represent areas from which only online surveys were collected (see Chapter 3 for details).

Chapter 3

Private landowners' willingness to participate in oribi (*Ourebia ourebi*) conservation programmes in KwaZulu-Natal, South Africa

Abstract

Conservation programmes are often necessary to ensure the conservation of biodiversity on private lands. In South Africa, where resources for conservation are limited, it is essential to target landowners who are more likely to participate in conservation programmes, and to identify programme characteristics that are likely to increase their willingness to enrol. Using survey data obtained from 95 farmers in the province of KwaZulu-Natal, I investigated factors that influenced landowners' stated willingness to enrol in programmes to conserve the endangered oribi antelope (*Ourebia ourebi*). Landowners' motivations for pursuing farming as a career, the measures they engaged in to protect wildlife on their lands, their land use activities, and the regions in which they lived influenced their stated willingness to engage in conservation programmes. Individuals who took the survey online were less likely to agree to enrol in a conservation programme. Results indicate that landowners are more likely to enrol in a programme when the management practice required, and enrolment period are those that they favour. As a result, I did not find a single programme that worked for all the farmers. This emphasises the need to tailor conservation programmes to suit specific landowner groups. Ultimately, this information provides a starting point from which informed private land conservation programmes can be initiated in South Africa.

Keywords: Enrolment period, incentives, logistic regression analysis, management practices, natural grasslands, preference heterogeneity, semi-structured interviews

Introduction

The current global network of protected areas has proven insufficient to ensure that biodiversity is effectively conserved (Pasquini et al., 2010). This is largely due to the fact that much of the earth's biodiversity, including many rare and endangered species, exists outside of protected areas on privately-owned lands (Polasky et al., 1997; Knight, 1999; Brook et al., 2003; Hanley et al., 2012). In South Africa, formal protected areas cover only 7% of the land surface and do not adequately encompass a representative sample of all of the country's terrestrial ecosystems (Cadman et al., 2010). As such, much of the country's biodiversity is found outside protected areas on privately-owned lands (Cadman et al., 2010). Improving the conservation of biodiversity is unlikely to be achieved through the establishment of new protected areas as government and private conservation agencies are unable, for financial and social reasons, to expand protected areas such that they encompass all areas of conservation significance (Pence et al., 2003; Kabii & Horwitz, 2006; Cadman et al., 2010; Selinske et al., 2015). Thus, effective biodiversity conservation necessitates private landholder engagement in conservation activities (Brook et al., 2003; Pasquini et al., 2010; Selinske et al., 2015).

Protecting biodiversity on their land often results in economic opportunities foregone and economic losses for private landowners (Hanley et al., 2012). For example, protecting biodiversity may prevent landowners from converting their land to more profitable uses (e.g.

timber production), resulting in private landowner opposition to conserving biodiversity (Hanley et al., 2012). As a result, the implementation of conservation programmes by government or conservation agencies may be necessary to encourage conservation efforts on private lands (Hanley et al., 2012).

Voluntary, incentive-based approaches to conservation are typically more appealing to landowners than regulatory approaches (Pasquini et al., 2010). Many countries, including the United States, Australia, and South Africa, have developed and implemented an array of voluntary conservation programmes in an attempt to encourage and support conservation efforts by private landowners (Pasquini et al., 2010; Moon et al., 2012). Unfortunately, evidence suggests that landowner participation in these programmes has been insufficient to ensure effective biodiversity conservation (Wilson & Hart, 2000; Moon & Cocklin, 2011). There is thus a need to design conservation programmes that more effectively encourage landowner participation, which in turn requires a better understanding of the factors that influence landowners' decisions to engage in conservation efforts.

Landowners' characteristics, in terms of both their social characteristics and personal circumstances, may impact their willingness to participate in conservation programmes (Moon et al., 2010). Specifically, their willingness to engage in conservation programmes may depend on their sociodemographic characteristics, such as age, gender, education and income levels (Kabii & Horwitz, 2006; Ruto & Garrod, 2009; Raymond & Brown, 2011; Burton, 2014; Farmer et al., 2017), their personal circumstances (e. g. their duration of land ownership), and their environmental attitudes (Luzar & Diagne, 1999; Ruto & Garrod, 2009; Moon et al., 2012). For example, landowners who are more financially secure, and those with a higher level of

education, have been found to be more likely to engage in conservation programmes (Lambert et al., 2007; Ruto & Garrod, 2009; Moon et al., 2012; Burton, 2014). In contrast, landowners whose families have owned the land for long periods of time are generally less willing to participate (Kabii & Horwitz, 2006).

Landowner participation in conservation programmes may also depend on the characteristics of their properties, including 1) the region in which the property is located (Winter et al., 2005; Winter et al., 2007), 2) the size of the property (Ruto & Garrod, 2009), and 3) current land uses (Ruto & Garrod, 2009; Raymond & Brown, 2011; Moon et al., 2012; Farmer et al., 2017). For example, there tends to be a positive correlation between property size and landowners' willingness to engage in conservation programmes (Ruto & Garrod, 2009). Current land management activities and landowners' land management priorities are also likely to impact their willingness to engage in conservation efforts (Kabii & Horwitz, 2006; Moon et al., 2012). For instance, landowners who use their land for crops or sheep production may be less inclined to participate in conservation activities, whilst those who use their land for conservation purposes (e.g. photographic tourism) might be more likely to engage in conservation activities (Raymond & Brown, 2011).

Another factor that influences landowner participation in conservation programmes is the programme design (Ruto & Garrod, 2009). This includes the incentives offered, duration of enrolment, and the amount of land required for enrolment (Ruto & Garrod, 2009; Moon et al., 2012). Although it is widely recognised that incentives are an important tool for encouraging landowner participation in conservation programmes (Polasky and Doremus, 1998; Pasquini et al., 2010; Schuster et al., 2018), different incentives tend to be effective in different

circumstances (Pasquini et al., 2010). The land management practices that landowners are required to adopt as part of a conservation programme also play a key role in determining landowner participation (Kabii & Horwitz, 2006; Miller et al., 2010). For example, land management practices that require additional input, in terms of management, labour or money, and that negatively impact profits, may be disliked, resulting in lower rates of landowner participation (Kabii & Horwitz, 2006; Miller et al., 2010). In contrast, those programmes that require practices that are cost effective, do not require substantial labour inputs, are compatible with current land management practices, or are perceived to be easy to implement, tend to be favoured (Vanclay & Lawrence, 1994; Kabii & Horwitz, 2006; Klapporth & Johnson, 2009).

In South Africa, where resources for conservation are limited, it is essential to target landowners who are more likely to participate in conservation programmes and whose lands have conservation significance (Winter et al., 2005; Cadman et al., 2010), and to identify programme characteristics that are likely to increase landowners' willingness to engage in conservation efforts. Using the case study of the endangered oribi antelope (*Ourebia ourebi*), I investigated factors that influenced landowners' stated willingness to enrol in potential oribi conservation programmes.

Based on previous studies and interviews with members of the Oribi Working Group (a collection of state conservation agencies, Non-Governmental Organisations (NGOs), forestry companies, universities, and concerned farmers committed to the conservation of oribi; OWG), I predicted that landowners' education level, age, and property size would be positively correlated with their stated willingness to engage in oribi conservation programmes. In

addition, landowners with multiple sources of income should be more willing to engage in these programmes because they have greater financial security. I also predicted that landowners' motivations for pursuing farming as career would influence their willingness to enrol in oribi conservation programmes, with those who farm for financial gain being less willing to enrol, and those who farm in an attempt to maintain a family tradition and because of a love of the land being more willing to enrol. I predicted that landowners who own oribi and those who engage in efforts to protect oribi and other wildlife on their land would be more willing to enrol in oribi conservation programmes as such landowners would likely possess a greater interest in the welfare of the species. Furthermore, I predicted that landowners who considered the conservation of oribi and grasslands to be important would have an increased probability of enrolment. In addition, I predicted that the farming activities landowners engage in would influence their stated willingness to engage in oribi conservation programmes, with those that engage in crop farming being less likely to enrol and those who engage in the farming of livestock or game ranching being more likely to enrol. I predicted that the regions in which landowners' properties were located would influence their stated willingness to enrol. Moreover, I predicted that the provision of incentives (both financial and non-financial) would increase landowners' stated willingness to enrol in oribi conservation programmes. I also predicted that the respondents' duration of land ownership, the amount of land to be enrolled in conservation activities, and the duration of programme enrolment would be negatively correlated with landowners' stated willingness to enrol. Finally, I predicted that the type of land management practice required would influence landowners' stated willingness to enrol in oribi

conservation programmes, with landowners being more willing to enrol if the practice is one which they prefer.

Methods

Study area and study population

Oribi antelope are South Africa's most endangered antelope species, with the majority (75%) of the country's extant population being found on privately-owned lands (Pfab et al., 2011; Patel, 2015; Shrader et al., 2016; van Vuuren et al., 2017; Lister et al., 2018). The province of KwaZulu-Natal contains 45% of South Africa's oribi population (Pfab et al., 2011; Shrader et al., 2016; Lister et al., 2018). Moreover, 46% of the province's extant oribi population live on privately-owned lands, predominantly in small subpopulations on farmlands (Patel, 2015; Lister et al., 2018). Oribi are a grassland specialist species that favour open, natural grasslands (van Teylingen & Kerley, 1995; Shrader et al., 2016). They require short, palatable grass for grazing and long grass for foraging, shelter, and the concealment of young (van Teylingen & Kerley, 1995; Stears & Shrader, 2015; Shrader et al., 2016). They are therefore confined to grasslands, and act as an indicator species for the health of these grasslands (Pfab et al., 2011; Shrader et al., 2016).

To determine the factors that could influence landowner participation in conservation, I conducted face-to-face interviews with private landowners in Kwa-Zulu Natal who currently or previously owned oribi. I also interviewed farmers who have never had oribi resident on their lands but are located in regions where they are known to be found. In addition, I disseminated an online survey to private landowners in regions where oribi are found.

Survey design

I designed a survey to assess landowners' preferences for conservation programmes.

Landowners were offered four potential oribi conservation programmes, which comprised different features. These features included: 1) the incentive offered, 2) requisite land management practices, 3) number of hectares of land to be enrolled, and 4) programme duration. Each of the four incentive programmes offered a different combination of land management practice, number of hectares to be enrolled, and programme duration.

Respondents' willingness to enrol in each of these programmes was measured by either a "yes" or "no" response.

Incentives: Four different incentives were included in the survey. The first programme offered a recognition incentive, the second a security assistance incentive, the third a management assistance incentive, and the fourth a property tax rebate (i.e. a financial incentive). Recognition incentives provide programme participants with formal acknowledgement of their contribution to conservation efforts (Doremus, 2003; Cumming, 2007). The recognition incentive that I offered landowners was an Oribi Custodian Board, which is a signboard placed at the entrance to landowners' properties as recognition of their conservation efforts (Grey-Ross et al., 2009c). This is the incentive that is currently being utilised by the OWG and the NGO the Endangered Wildlife Trust (EWT). Given that security and poaching are a concern for many private landowners in South Africa, I additionally offered landowners the assistance of two security guards over the week of the full moon (i.e. peak poaching period) each month to help prevent poaching. The third potential incentive offered

was management assistance. This assistance may be provided as physical assistance in the form of labour and equipment, or as information and advice to improve farming activities (Cumming, 2007). For my study, I offered landowners the possibility of two labourers for a period of a month each year to assist with land management tasks, such as the removal of invasive alien plants. Finally, I asked landowners about their willingness to enrol in a Biodiversity Stewardship Programme (BSP), a voluntary contractual agreement between the South African government and private landowners designed to incentivise private landowners to agree to conserve biodiversity (Cadman et al., 2010; Rawat, 2017). In this programme, landowners were offered either a 50%, 75% or 100% property rates rebate (i.e. a financial incentive) on enrolled lands if they agreed to manage these lands for the benefit of oribi. The rates rebate offered was randomly selected for each participant.

Land management: To ensure that the programmes would benefit oribi, three land management practices were included in the survey: 1) mowing, 2) burning, and 3) fencing. Oribi antelope tend to favour grazing on grasslands that have been recently mown or burnt (Everett et al., 1991). Everett et al. (1991) found that they avoid utilising grasses that have not been burnt for more than 12 months or mowed for more than 6 months. In fact, the highest density of oribi ever recorded in South Africa (one oribi per 7 hectares) was recorded on an area annually mowed for hay (Coverdale et al., 2006). As such, landowners were asked to burn or mow a section of their enrolled lands each year.

Fencing the borders of properties in such a way as to allow oribi to move freely on and off private lands ensures that oribi populations do not become isolated. Moreover, these fencing practices allow oribi to escape hunting dogs illegally let loose on farms (see details

below). Landowners were therefore asked to ensure that their property was fenced in such a way as to allow oribi to move freely, ideally with fencing comprising 4 or 5 strands of barbed wire.

Landowners were required to enrol 20, 40, or 60 hectares of their natural grassland in the programmes. All programmes allowed landowners to continue using their natural grasslands as long as they did so in a manner that would not be harmful to oribi or degrade their habitat. Typically, the enrolment period for conservation programmes ranges from five to 30 years (Pence et al., 2003). I therefore offered three enrolment periods of 5, 10, and 30 years. I also asked respondents to indicate which enrolment period (5, 10 or 30 years), which non-monetary incentive (management assistance, security assistance or recognition), which land management practice (mowing, burning or fencing), and which land requirement (20, 40 or 60 Ha) they liked least, and which they liked most.

In addition to questions about respondents' willingness to enrol in oribi conservation programmes, the survey included questions pertaining to respondents': 1) socio-demographic characteristics (age, gender, highest level of education), 2) farming operations (years of farming experience, farm size, farming activities), 3) motivations for farming (financial reward, love of the land, upholding family tradition, escape the city), 4) land management practices (e.g. burning and grazing regimes), and 5) attitudes towards the conservation of natural grasslands and oribi. I also included questions about: 1) whether oribi antelope are present on the respondent's property, 2) respondents' perceived threats to the oribi, and 3) whether respondents engage in any efforts to conserve the oribi on their lands.

Binary, categorical and Likert scale questions were utilised throughout the survey (see Appendix 2). The survey instrument was pre-tested with five farmers from the study population and four experts in survey design and oribi conservation. Prior to dissemination, the survey was submitted to the University of Pretoria's ethics committee in order to obtain ethical clearance for the research and was awarded the reference number EC171106-158.

Survey Implementation

The survey was administered face-to-face with 50 private landowners throughout KwaZulu-Natal between October 2017 and May 2018. An initial list of 10 landowners with oribi on their farms was obtained from the OWG. These landowners all granted the OWG permission to share their contact details with me for the purposes of this study. Referral sampling was then used to recruit a further 40 participants for the study. This sampling method relies on individuals from the original sample providing the names and contact details of other potential participants (Goodman, 1961; Heckathorn, 2002). All responses were recorded in a survey booklet and the interviews were recorded with the aid of an audio recording device to ensure all information could be verified if necessary. The response rate for the in-person interviews was 98%.

Once face-to-face surveys were completed, the survey was made available online with the aid of Qualtrics survey software. Anonymous links to the survey were sent to email addresses obtained during the face-to-face interviews. In addition, I provided a link to the survey to conservancies, farmers associations, the KZN Hunters Association, the KZN Agricultural Union (Kwanalu), and a number of Fire Protection Agencies (FPA) for dissemination to their members. The EWT and the OWG also disseminated the survey to relevant landowners.

Some organizations, such as Kwanalu and the KZN Hunters Association, made the link to the survey available on their websites. A total of 67 surveys were commenced, but only 45 (67%) of these surveys were completed. Thus, a total of 95 complete surveys were collected.

Statistical analyses

To investigate the respondents' willingness to enrol in oribi conservation programmes, I estimated two logistic regression models that examined respondents' interest in 1) non-financial incentives (recognition incentive, security assistance and management assistance), and 2) property tax rebates. Because I used an identical structure in the design of the non-monetary incentive models, whereby respondents were presented with a land management practice, a number of hectares to be enrolled, and a programme duration, I was able to stack responses to these programmes to determine whether the type of non-monetary incentive affected respondents' willingness to engage in oribi conservation. To test for whether respondents' opinion of these incentives affected their willingness to enrol in oribi conservation, I included an effects variable (Incentive) in the model, which took a value of 1 if the respondent liked the incentive, -1 if they disliked the incentive and 0 otherwise. For each of the logistic regression models the dependent variable took a value of 0 if landowners declined to enrol in the programme and a value of 1 if landowners elected to enrol in the programme.

The models included a number of explanatory variables, namely: 1) programme characteristics, 2) respondent characteristics, such as sociodemographic characteristics and conservation attitudes, and 3) respondents' current land management practices, such as mowing and burning. STATA statistical software was used to estimate the logistic regression

models. Due to the small sample size of the study (n=95 interviews), I used the corrected Akaike information criterion (AIC_c) and backward stepwise selection to determine the best fit models (Mazerolle, 2006; Symonds & Moussalli, 2011). Positive coefficients represented increased likelihood of enrolment, whilst negative coefficients represented decreased likelihood of enrolment.

Results

Respondent and property characteristics

Almost all respondents were male (94%), most were English-speaking (77%; Table 3.1), and their mean age was 54 years old (± 13 year SD) (Table 3.2). As such, the results reflect a specific demographic of farmers in the province. The majority of respondents (63%) possessed tertiary-level education, and almost all (82%) owned the property on which they farmed (Table 3.1). On average, respondents had 24 years of farming experience (range 0-56 years) (Table 3.2). Most (78%) owned only one farming property, and the majority (65%) were entirely dependent on farming as their source of income (Table 3.1). The average size of respondents' farming properties was 1391 Ha (range 10-9300 Ha) (Table 3.2). Landowners from 16 different regions throughout KwaZulu-Natal were surveyed, and one landowner from the Eastern Cape participated in the survey (Table 3.3). Respondents engaged in a variety of farming activities on their properties (Table 3.3). The majority of respondents (66%) engaged in beef farming, whilst only 12% engaged in game ranching activities. Most respondents (84%) carried out multiple types of farming activities (e.g. beef and timber) on their properties (Table 3.3).

Most respondents (80%) were multigenerational farmers, and of these, 86% cited “love of the land” to be either a ‘very’ or ‘extremely’ important factor in their decision to remain in farming (Fig. 3.1). Similarly, most first-generation farmers interviewed (94%) also stated that “love of the land” was either a ‘very’ or ‘extremely’ important motivating factor in their decision to pursue farming as a career (Fig. 3.2). In total, 86% of respondents reported that they considered the conservation of oribi to be “extremely important”, whilst 78% considered the conservation of natural grassland to be “extremely important” (Fig. 3.3). The mean amount of natural grassland on respondents’ properties was 809 Ha (range 0-7000 Ha SD) (Table 3.2). Most (77%) utilised these grasslands for the grazing of livestock, whilst only 13% set their grasslands aside for use by oribi (Table 3.3). In total, 86% of respondents reported that the boundary of their property was secured with barbed wire fencing, which allowed for the movement of oribi (Table 3.3). Most (74%) had oribi present on their lands (Table 3.2) and there was a mean of 9 oribi (range 0-45 oribi) per property (Table 3.3). The majority of study participants (73%) reported that oribi could be found on neighbouring properties (Table 3.3).

Land management practices and efforts to protect oribi

Only 22% of respondents reported that they engaged in land management activities specifically for the benefit of oribi (Table 3.4). However, landowners did engage in a number of land management activities that are known to benefit oribi.

In total, 78% of respondents reported that they engaged in the annual burning of their grasslands (Table 3.4). Fifty-five percent engaged in the mowing of their grasslands, whilst 97%

engaged in efforts to remove alien plant species from their lands. The majority of respondents (60%) reported that of the three land management practices (burning, mowing, and alien plant removal) they considered the annual removal of alien plant species to be the most expensive. In contrast, 13% and 21% of respondents considered burning and mowing to be the most expensive annual land management practice respectively. The majority of respondents (64%) reported that the burning of their natural grasslands was the cheapest of these annual land management practices, whilst 8% reported mowing was the cheapest, and 13% reported alien plant removal to be cheapest.

Respondents reported engaging in a number of activities to protect the wildlife on their lands. Sixty-five percent of respondents reported checking for and removing snares on their properties, 56% reported patrols occurring on their properties for poachers, and 45% reported controlling for hunting dogs on their lands. These measures were carried out by either the respondent, their employees, hired security personnel, or a combination thereof (Table 3.5).

Logistic regression analysis: Stacked model with the three non-monetary incentives

Contrary to prior expectations, none of the offered non-monetary incentives increased the probability that respondents would enrol in oribi conservation programmes. To avoid the dummy variable trap, the coefficient for the recognition incentive was set to zero. The negative coefficients for both security assistance ($z=-0.958, p=0.025$) and management assistance ($z=-1.196, p=0.007$) suggest that these incentives actually decreased respondents' willingness to engage in oribi conservation, *ceteris paribus* (Table 3.6). Interestingly, although the coefficient on the effects variable that captured whether respondents liked or disliked the offered

incentive was positive and statistically significant ($z=2.800$, $p=0.005$), the absolute magnitude of the coefficient was less than the coefficients on security assistance and management assistance (Table 3.6). This suggests that even if respondents liked the type of incentive offered, non-financial incentives were unlikely to incentivise programme participation.

Although the requisite land management practice did not influence respondents' stated willingness to enrol in oribi conservation programmes, respondents who considered mowing their preferred management practice were more likely ($z=3.320$, $p=0.001$) to enrol in a programme when mowing was the required management practice (Table 3.6). As programme duration increased, respondents' stated willingness to enrol declined ($z=-2.860$, $p=0.004$). Yet, the negative effect of programme duration on enrolment was lower if respondents preferred that longer enrolment duration ($z=2.370$, $p=0.018$).

A general pattern that emerged was that those respondents that saw farming as a money-making enterprise were less likely to enrol in oribi conservation programmes, whilst those who farmed due to a strong sense of family heritage and those for who financial gain was not the main driver behind their decision to farm were more willing to enrol. Specifically, respondents who considered "financial reward" to be only a slightly motivating factor in their decision to farm ($z=3.690$, $p<0.001$), and those who considered it to be moderately important ($z=2.050$, $p=0.040$) were more likely to enrol (Table 3.6). Similarly, those who considered "upholding family tradition" to be an extremely motivating factor in their decision to farm were more likely ($z=2.030$, $p=0.043$) to enrol in an oribi conservation programme, whilst those who considered it be only a slightly motivating factor in their decision to farm ($z=-2.190$, $p=0.029$) were less likely to enrol (Table 3.6).

In general, landowners' farming activities did not influence their stated willingness to enrol in oribi conservation programmes. Only those who engaged in sugar cane farming ($z=1.980$, $p=0.048$) were more likely to enrol in oribi conservation programmes that offered non-financial incentives (Table 3.6).

There is some evidence that the measures respondents engaged in to protect oribi and other wildlife on their lands (specifically whether they hired security personnel to assist in protecting wildlife) influenced their stated willingness to enrol in the conservation programmes, although these results are not immediately intuitive. Farmers who used security guards to control hunting dogs (a potentially dangerous activity) were less likely ($z=-2.560$, $p=0.01$) to enrol in oribi conservation programmes (Table 3.6).

There was little evidence of a geographic pattern in respondents' stated willingness to enrol in oribi conservation programmes. Only those from the Nottingham Road area proved less willing ($z=-2.340$, $p=0.019$) to enrol in oribi conservation programmes (see Figure 2.1 in Chapter 2 for locations). For the remaining respondents, the region in which they lived had no influence on their stated willingness to enrol. Finally, the means by which respondents participated in the survey influenced their stated willingness to engage in oribi conservation programmes, with those who completed the survey online ($z=-3.520$, $p<0.001$) being less likely to enrol (Table 3.6).

The presence of oribi on their property, their opinions about the importance of conserving grasslands and oribi, their sociodemographic characteristics (e.g. level of education, age), their duration of land ownership, and their property size did not affect respondents' stated willingness to enrol in oribi conservation programmes that offered non-monetary

incentives. Furthermore, the amount of land required for programme enrolment and whether or not respondents had multiple sources of income did not influence their stated willingness to enrol.

Logistic regression analysis: Biodiversity Stewardship Programme (BSP)

Programme characteristics (incentive offered, management practice required, land required, and duration) did not influence respondents' stated willingness to enrol in the BSP. Somewhat surprisingly, the property tax rebate offered to respondents (either 50%, 75% or 100%) did not impact their willingness to enrol ($z=-1.210$, $p=0.228$) (Table 3.7). Although the land management practice required did not influence respondents' stated willingness to enrol in the programme, respondents who stated that burning was their preferred management practice were more likely ($z =2.3100$, $p =0.035$) to enrol in the programme when burning was required, *ceteris paribus* (Table 3.7).

As with programmes that offered non-financial incentives, respondents' motivations for pursuing farming as a career had an influence on their stated willingness to enrol in the BSP, with those who farmed due to a strong sense of family heritage and those who did not pursue farming as they felt it would be a good business opportunity being more likely to enrol. Specifically, respondents who considered "upholding family tradition" to be an extremely important ($z =2.160$, $p=0.031$) motivating factor in their decision to farm were more likely to enrol (Table 3.7). Similarly, those who considered "a good business opportunity" to be only slightly important ($z =2.190$, $p=0.029$) in their decisions to pursue farming as a career were more likely to enrol (Table 3.7).

No clear pattern emerged with regards to how landowners' farming activities influenced their stated willingness to enrol in the BSP. Respondents who engaged in sugar cane farming ($z = 2.540, p = 0.011$) were more likely to enrol, whilst those who engaged in the farming of cash crops ($z = -2.130, p = 0.021$) were less likely to enrol in the programme (Table 3.7). No other farming activities were found to influence respondents' stated willingness to enrol in the BSP. Yet, the measures respondents engaged in to protect oribi and other wildlife on their properties influenced their stated willingness to enrol in the BSP. Specifically, those who patrolled their properties for hunters themselves were more likely ($z = 2.620, P = 0.009$) to enrol (Table 3.7).

The presence of oribi on their property, the regions in which their properties were located, property size, duration of land ownership, their sociodemographic characteristics, and their opinions about the importance of conserving oribi and grasslands did not affect respondents' stated willingness to enrol in the biodiversity stewardship programme. Furthermore, whether or not respondents had multiple sources of income did not influence their stated willingness to enrol.

Preferences beyond programmes

During semi-structured interviews respondents often reported that they disliked the offered oribi conservation programmes as they felt that these programmes would restrict how they could manage and utilise their lands. As such, thirteen respondents (26%) reported that rather than being offered incentives to participate in conservation programmes, they would prefer to receive extension services and education programmes that offered advice and suggestions on how best to manage their lands for the benefit of oribi. These respondents reported that the

provision of such advice would assist them in conserving the species, whilst allowing them to retain control of how their lands are managed. Three respondents (6%) also reported their belief that providing education about oribi, their endangered status, and the threats they face to members of local communities who engage in illegal hunting activities would prove to be more beneficial to the conservation of the species than attempting to implement formal conservation programmes.

Discussion

The aim of my research was to investigate the factors influencing landowners' stated willingness to enrol in potential oribi conservation programmes. Motivations for pursuing farming as a career, measures taken to protect oribi and other wildlife, and method of survey participation (online vs in person) had some impact on respondents' stated willingness to engage in the potential oribi conservation programmes. Somewhat surprisingly, respondents' sociodemographic characteristics (age, gender, and level of education) and attitude towards conservation were found to have no impact on their stated willingness to engage in oribi conservation programmes. Although 86% and 78% of respondents considered the conservation of oribi and natural grasslands to be of extreme importance respectively, this conservation ethic did not necessarily translate to a willingness to engage in oribi conservation programmes.

Contrary to my predictions, there were no correlations between the duration of land ownership and property size, and respondents' stated willingness to engage in oribi conservation programmes. Programme design (the incentive offered, the land management practice required and the duration of programme enrolment) affected respondents' willingness

to engage in oribi conservation, depending on whether these programme characteristics were ones they preferred. Surprisingly, and contrary to what I predicted, the provision of both financial and non-financial incentives failed to induce landowner enrolment in oribi conservation programmes. Although certain aspects of programme design impacted respondents stated willingness to enrol, the amount of land required for enrolment was found to have no relationship with respondents' stated willingness to engage in oribi conservation programmes, in all likelihood because the amount of land to be enrolled was a small share of total farm size (mean of 9%- 25% of total farm size) for most respondents. As predicted, landowners' stated willingness to enrol in these programmes declined as duration increased. This is consistent with findings by Pasquini et al. (2010) who found that long-term enrolment requirements may, in fact, prove to be a disincentive for landowners.

Respondents' motivations for pursuing farming as a career and the measures they engage in to protect oribi and other wildlife on their properties were the only landowner characteristics found to influence respondent uptake of oribi conservation programmes. The link between "upholding family tradition" and the likelihood of enrolling in conservation programmes may be attributable to the fact that respondents who pursue farming as a career in an attempt to maintain family tradition possess a strong sense of family heritage and thus a strong affinity for the land and a greater desire to conserve it. Winter et al. (2005) found something similar in that landowners with a stronger family heritage of farming were more committed to conservation than farmers who do not come from a farming background. Similarly, respondents who did not consider financial gain to be an important motivating factor in their decision to pursue farming were more likely to engage in oribi conservation

programmes. It may be that these respondents did not view farming solely as a business, but rather engaged in it more because they possessed a passion for farming and an affinity for the land that may have motivated their desire to protect and conserve the species upon it. One respondent noted, “I love the privilege of taking care of 400 hectares of land, I think that is beautiful. So that’s the reason I’m here”.

The impact of measures taken to protect oribi and other wildlife (such as patrols by hired security personnel) on respondents’ stated willingness to engage in oribi conservation programmes was not anticipated and further research is required to examine this relationship. However, these results do suggest that respondents who have patrols for poachers occurring on their lands may prove more willing to engage in oribi conservation programmes, depending on what actions security guards take to protect wildlife.

A number of studies have found that land use on properties impacts landowners’ willingness to participate in conservation activities (Koontz, 2001; Raymond & Brown, 2011; Farmer et al., 2017). Consistent with these studies, I found that land use did have some impact on respondents’ decision to engage in conservation programmes. Specifically, sugar cane farmers proved more willing to engage in both oribi conservation programmes that offered non-financial incentives and the BSP. This is likely due to the fact that these farmers are, in general, not reliant on their natural grasslands for income and can thus afford to set aside areas that they cannot convert to sugar cane (e.g. steep hills), for conservation purposes. Furthermore, sugar cane is a type of grass and sugar cane farmers may thus have been unperturbed by oribi eating the green shoots that come up after harvest as this is unlikely to result in any financial loss to the farmer. In contrast, respondents who engaged in cash crop

farming proved less willing to enrol in the BSP. It is not clear why this might be the case. The number of oribi on these farms was very low (mean 4 oribi/farm). Thus, it may be that the low occurrence of oribi on these farms made them a low priority for these farmers. However, as the total number of cash crop farmers interviewed was very small (i.e. N= 16 farmers), it is hard to draw any definite conclusions from these findings. Although my findings revealed that land use had some impact on landowners' willingness to engage in conservation programmes, these findings were limited to only sugar cane and cash crop farmers. Such landowners represented only a small subset of study participants and therefore, in contrast to the findings of Koontz (2001), Raymond & Brown (2011) and Farmer et al (2017), I cannot conclusively say that land use impacts upon landowners' willingness to engage in conservation programmes.

A number of studies have noted that the provision of incentives can induce landowner enrolment in conservation programmes (Langpap, 2006; Suter et al., 2008; Moon & Cocklin, 2011; Dayer et al., 2018). In contrast, I found little evidence that either non-financial incentives (management assistance, recognition, or security assistance) or financial incentives (a tax rebate) motivated respondents to enrol in an oribi conservation programme, even if the incentive was one that the respondents preferred. In fact, the provision of security assistance and management assistance incentives had an adverse effect, leading to a decreased likelihood of respondent enrolment.

The failure of the recognition incentive to induce enrolment in oribi conservation programmes is likely due to the fact that 53% of respondents reported that it was their least favoured incentive. During semi-structured interviews, seven respondents (14%) noted that their dislike of the recognition incentive stemmed from their concern that an oribi custodian

board would advertise the presence of oribi on their land. This, in turn, would then attract the attention of illegal hunters, increasing risk to both their personal safety and the safety of their oribi. Twelve respondents (24%) noted that they conserved species on their land because they possessed an interest in wildlife and felt they did not need recognition for doing what they believed to be the “right thing”. This is consistent with findings by Winter et al. (2007) who also observed that landowners do not require public recognition for their conservation efforts.

Almost all respondents (n=92 individuals) reported that they engage in the removal of alien species on their lands and noted that they considered this to be an expensive task annually, largely due to the cost of the chemicals involved. Despite the reported costs of alien species removal, the provision of alien removal assistance did not increase the probability of landowner enrolment in oribi conservation programmes and, in fact, resulted in a decreased likelihood of landowner enrolment. This may be because respondents object to having contract labour on their property, as some (n=11, 22%) noted during semi-structured interviews that they believed that contract labourers are responsible for illegal hunting and snaring. Similarly, the finding that the security assistance incentive may discourage respondent uptake of the conservation programme may be due to the fact that respondents are hesitant to have outside personnel on their property due to concerns over theft and poaching. The failure of this incentive to appeal to respondents may potentially be because the majority of respondents (56%) already had security patrols on their lands and may thus have felt that the security incentive offered no real benefit.

The finding that the property tax rebate offered had no impact on respondents’ willingness to enrol in the BSP is inconsistent with findings by Selinske et al. (2017) who found

that a land tax rebate facilitated landowners' enrolment in conservation activities. As noted by 11 respondents (22%) during semi-structured interviews, the tax on natural grasslands in South Africa is low and thus the tax rebates offered would provide only a small financial incentive, which was insufficient to effectively encourage enrolment.

As noted by Winter et al. (2007), if conservation incentives are associated with government regulation, as is the case in this study, landowners may be hesitant to receive these incentives due to concerns over government interference in the management of their lands. Alternatively, the failure of incentives to increase respondent uptake of the programmes may be due to respondents not desiring incentives to conserve biodiversity when they perceive conservation to be a moral obligation. Pasquini et al. (2010) found something similar in that the landowners in their study participated in conservation efforts based on a genuine interest in conservation, more so than any other motivation. Given the failure of the incentives offered in this study to induce landowner enrolment in oribi conservation programmes, there is a clear need for further research to explore which incentives might more effectively encourage landowner participation in oribi conservation efforts.

Contrary to what I predicted, the management practice required by a conservation programme had little impact on respondents' willingness to enrol. However, the results suggest that respondents who considered mowing to be their preferred management practice were more likely to enrol in non-financial incentive programmes in which mowing was the land management practice required, whilst those who considered mowing to be the practice they liked least were less likely to enrol when it was the practice required of them. Many respondents noted that they disliked mowing as they considered it to be costly or felt it was not

feasible on their lands. One respondent noted, “The veld across there is not conducive to mowing. It’s got rocks. It’s just not feasible”. Given the challenges facing the implementation of mowing, and the fact that non-financial incentive programmes are unlikely to sufficiently compensate landowners for the costs they would incur in mowing, it is not surprising that only those who favour the practice displayed an increased likelihood of enrolling in programmes that required it.

Similarly, respondents who stated that burning was their preferred land management practice displayed an increased likelihood of enrolment in the BSP when burning was the practice required of them, whilst those who considered it their least favoured practice were less likely to enrol in the programme when it was required. Burning of natural grasslands was considered to have minimal financial costs and 92% of respondents already engaged in it. Thus, respondents did not object to being asked to engage in the burning of part of their natural grasslands on an annual basis. Although the BSP was considered to provide only a small financial benefit, given that burning was considered to be a relatively cheap practice landowners may still have been willing to enrol in the programme, provided they considered it to be their preferred practice. Few landowners considered burning to be their least favoured practice, and those who did largely disliked the practice as they felt that it was not conducive to the health of their natural grasslands. Such respondents were thus unwilling to engage in the programme when burning was required as the tax rebate did not offer enough of a benefit to offset what landowners perceived to be potential damage to their grasslands. These results suggest that respondents are more likely to enrol in a programme when the requisite land management practice is one which they favour and consider feasible. Furthermore, they

suggest that asking landowners to engage in land management practices they dislike may potentially decrease landowner uptake of conservation programmes.

Finally, the means by which respondents participated in the survey (face-to-face or online) impacted their willingness to enrol in oribi conservation programmes that offered non-financial incentives. The finding that respondents who completed the survey online were less likely to engage in oribi conservation programmes may be attributable to the fact that some respondents may provide more honest feedback in the absence of an interviewer. Duffy et al. (2005) noted that face-to-face interviews may lead to social desirability bias as respondents may try to provide the answers, they feel the interviewer will find favourable. There is thus the risk that the results obtained during face-to-face interviews may be biased. However, further research would be required to determine whether survey method influences landowners' stated willingness to engage in conservation programmes.

Somewhat surprisingly, the strong conservation ethic and love of the land witnessed amongst respondents during the semi-structured interviews did not necessarily translate into a willingness to enrol in oribi conservation programmes. Although respondents noted that they were willing to conserve oribi on their lands, they indicated that they would prefer to do so on their own rather than engage in formal conservation programmes. This was due to their dislike of the concept of interference by government or conservation organisations in the management of their lands (see also Chapter 2). These findings are consistent with those of Miller et al. (2010) who found that landowners' concerns over losing control over their lands often makes them hesitant to engage in formal conservation programmes. Moreover, Brook et al. (2003) and Langpap (2006) noted that landowners may often choose to engage in

conservation efforts on their own as they resent outside interference in the management of their lands. Child & Child (2015) noted that prior to the early 2000s Zimbabwe adopted a grass roots approach to conservation on private lands, devolving the rights to use natural resources to landowners. In contrast to the top-down regulatory approach employed in South Africa, this self-regulatory approach proved more successful in encouraging landowners to conserve and sustainably manage their natural resources (Child & Child, 2015).

In my study, five of the respondents (10%) from the semi-structured interviews indicated that engaging in such programmes may prevent them from developing their lands, and thus result in economic loss. Moon & Cocklin (2011) found that where conservation programmes threaten landowners' future development rights, landowners may be hesitant to engage in these programmes. Thus, similar to Winter et al. (2007) I found that although respondents consider conservation to be of great importance, economic pressures and concerns may prevent them from engaging in conservation efforts.

Most research regarding the factors that impact private landowners' decisions to engage in conservation efforts on their lands has been conducted in Europe and North America (Burton, 2014). Research conducted in these regions has frequently reported that private landowners' sociodemographic characteristics, such as their gender, education level, and age, impact their willingness to engage in conservation efforts (Langpap, 2004; Ruto & Garrod, 2009; Siegel et al., 2009; Burton, 2014). However, my research does not lend support to these previous findings. The failure of my research to find a relationship between respondents' sociodemographic characteristics and their stated willingness to enrol is most likely attributable to the fact that the sample of landowners surveyed for this research was biased towards older,

male respondents who possess a tertiary education. Furthermore, much of the research that has been conducted in these regions suggests that length of land ownership impacts landowners' willingness to engage in conservation efforts (Langpap, 2004). In contrast, my results yielded no such relationship. Although it has been frequently reported by research conducted in the United States that property size influences landowner engagement in conservation efforts (Wilson & Hart, 2000; Brook et al., 2003; Lynch & Lovell, 2003; Langpap, 2004; Lambert et al., 2007; Ma et al., 2012), my findings found no such relationship. However, given that the oribi conservation programmes offered to respondents in this study required only small areas of land (between 20 and 60 Ha) and did not require that landowners cease using these lands entirely, it is unlikely that the land requirement would have been a concern for respondents, regardless of their property size.

Although some of my results were not consistent with international findings, some of my findings did lend support to a trend that appears to be emerging globally, namely distrust of government and concern over land use restrictions prevents private landowners from engaging in conservation efforts on their lands (Brook et al., 2003; Klapproth & Johnson, 2009; Miller et al., 2010). Although respondents displayed a strong conservation ethic and a stated interest in conserving oribi and natural grasslands, they proved unwilling to engage in formal conservation programmes that would restrict their autonomy in terms of land management or require them to work with a government or conservation agencies. Ranchers and other agricultural landowners' unwillingness to enrol in government-operated conservation programmes (especially when these programmes focus on conservation of an endangered species) have

been documented in both the United States (e.g., Kreye et al., 2017) and South Africa (Rubino & Pienaar, 2018).

Ultimately, my research emphasises the necessity of targeting specific groups of landowners to participate in conservation programmes if oribi conservation efforts are to be effective. My findings suggest that landowners who have a strong farming heritage, those whose primary motivation for farming is not financial gain, and those who engage in efforts to protect wildlife on their lands may be more willing to engage in conservation efforts and should thus be targeted for participation in conservation programmes. However, the sample size for this research was relatively small (n=95) and these results should not be used to make inferences for all farmers across South Africa.

If using these results to design effective conservation programmes for private lands, it is important to remember that the majority of respondents (65%) were entirely dependent upon their properties for their income and must thus be assured that engaging in conservation programmes will not jeopardize their livelihoods. My findings suggest that flexibility in programme design and allowing landowners to engage in activities that they favour and consider feasible on their lands, are likely to increase programme enrolment. Moreover, there was no consistent geographic pattern of landowners' stated willingness to engage in oribi conservation programmes. This indicates that there is no single oribi conservation programme that is likely to be suitable for all areas.

The fact that programme characteristics and respondents' preferences for these programme characteristics affected respondents' willingness to enrol in conservation programmes demonstrates the need to conduct thorough research of landowners' needs,

desires and capabilities before designing a conservation programme for private lands. Poor programme design and the provision of unfavourable incentives may prevent landowners from engaging in conservation programmes and, in turn, have negative consequences for conservation efforts. These findings provide impetus to the notion that conservation programmes need to be tailored to the ecological, political, and economic climate in which landowners live if uptake of programmes is to be achieved (Moon & Cocklin 2011).

No single oribi conservation programme design was found to be preferred by all respondents. Ideally, a suite of conservation programmes would be offered to landowners in an attempt to encourage enrolment. However, in South Africa, conservation resources are limited (Pence et al., 2003) and developing and implementing a host of conservation programmes is unlikely to be feasible. There is thus a need to explore alternative options to encourage private landowners to participate in conservation efforts. My results suggest that landowners may, in fact, prefer extension services and education programmes to assist with the conservation of oribi on their lands instead of formal conservation programmes. Landowners' dislike of government interference in the management of their lands suggests that a grassroots and self-regulatory approach may prove more successful in encouraging private land conservation efforts. Child & Child (2015) noted that the provision of extension services by government was not trusted unless it was offered and controlled by committees elected from the local farming community. There is thus not only a need to explore whether the provision of extension services may be a more effective means of encouraging oribi conservation on private lands than the implementation of formal conservation programmes, but also to explore the manner in

which extension services should be offered to landowners in order to encourage landowner participation in conservation efforts.

Table 3.1. Respondent characteristics.

Characteristic	Number of individuals	Percentage of total sample
<i>Gender</i>		
Male	89	94
Female	5	5
Unknown	1	1
<i>Language</i>		
English	73	77
Afrikaans	7	7
Other	2	2
Unknown	13	14
<i>Education</i>		
Standard 8 (Grade 10)	1	1
Matric	14	15
Tertiary	60	63
Postgraduate	19	20
Unknown	1	1
<i>Owner/manager of property</i>		
Owner	78	82
Manager	17	18
<i>Multiple properties owned</i>		
Yes	21	22
No	74	78
<i>Income from a source other than farming</i>		
Yes	33	35
No	62	65
<i>First generation farmers</i>		
Yes	19	20
No	76	80

Table 3.2. Landowner and property characteristics.

Characteristic	Mean	Median	Standard deviation	Minimum	Maximum
<i>Landowner characteristics</i>					
Age (Years)	54	55	13	24	80
Farming experience (Years)	24	24	14	0	56
<i>Property characteristics</i>					
Size (Hectares)	1391	850	1654	10	9300
Number of neighbouring properties	5	5	2	2	12
Amount of natural grassland (Hectares)	809	330	1190	0	7000
Amount of pasture (Hectares)	128	45	227	0	1484
Number of oribi	9	6	8	0	45

Table 3.3. Property characteristics.

Characteristic	Number of properties	Percentage of total sample
<i>Region</i>		
Dargle	1	1
Eastern Cape	1	1
Estcourt	5	5
Eston	6	6
Hlatikulu	1	1
Howick	15	16
Ixopo	6	6
Kamberg	8	8
Kloof	1	1
Lower Loteni	3	3
Mooi River	9	10
New Castle	2	2
Nottingham Road	9	10
Oribi Flats	1	1
Richmond	4	5
Underberg	17	18
Zululand	5	5
Unknown	1	1
<i>Land use^a</i>		
Beef	63	66
Cash crops	16	17
Crops	50	53
Dairy	21	22
Game Ranching	11	12
Hay	56	59
Sheep	23	24
Sugar cane	10	11
Timber	29	31

Other	16	17
<i>Boundary fencing^b</i>		
Barbed wire	82	86
Electric fencing	15	16
Game fencing	13	14
None	11	12
Strand fencing	1	1
Other	4	4
<i>Use of natural grasslands^c</i>		
Game	7	7
Grazing	73	77
Hay	20	21
Set aside for use by oribi	12	13
Unutilized	11	12
<i>Oribi presence</i>		
Currently present	70	74
No longer present	12	13
Never present	4	4
Unknown	9	9
<i>Neighbouring oribi owners</i>		
Yes	69	73
No	10	10
Unknown	16	17

^aMultiple land uses may be occurring on a single property

^bSingle properties may have multiple types of fencing on their boundaries

^cNatural grasslands on properties may be utilised for multiple purposes

Table 3.4. Land management activities.

Management practice	Number of individuals	Percentage of total sample
<i>Annual burn</i>		
Yes	74	78
No	21	22
<i>Block burn</i>		
Yes	85	89
No	10	11
<i>Management for oribi</i>		
Yes	21	22
No	74	78

Table 3.5. Personnel responsible for carrying out activities to protect wildlife on the different properties.

Activity and personnel	Number of properties	Percentage of total sample
<i>Checking for snares</i>		
Landowner only	18	19
Employees only	13	14
Hired security	12	13
Landowner and employees	14	15
Landowner and hired security	2	2
Employees and hired security	2	2
<i>Checking for poachers</i>		
Landowner only	13	14
Employees only	9	10
Hired security	22	23
Landowner and employees	3	3
Landowner and hired security	1	1
Employees and hired security	3	3
Landowners, employees and hired security	2	2
<i>Control of hunting dogs</i>		
Landowner only	31	33
Employees only	2	2
Hired security	4	4
Landowner and employees	3	3
Landowner and hired security	3	3

Table 3.6. Variables influencing landowners' decisions to enrol in an oribi conservation programme when non-monetary incentives were offered.

Variable	Coefficient	Std. error	z	P>z	[95% Confidence Interval]	
Constant	1.097	0.651	1.680	0.092	-0.180	2.374
<i>Incentive</i>						
Security ass.	-0.958	0.429	-2.230	0.025	-1.798	-0.118
Management ass.	-1.196	0.442	-2.710	0.007	-2.062	-0.330
Duration	-0.059	0.021	-2.860	0.004	-0.099	-0.019
Mowing ^a	1.222	0.368	3.320	0.001	0.501	1.943
Duration ^b	0.026	0.011	2.370	0.018	0.004	0.047
Incentive ^b	0.622	0.222	2.800	0.005	0.187	1.056
<i>Family tradition^c</i>						
Slightly	-1.328	0.607	-2.190	0.029	-2.158	-0.138
Extremely	1.042	0.514	2.030	0.043	0.035	2.049
<i>Financial reward^c</i>						
Slightly	3.190	0.865	3.690	<0.001	1.495	4.884
Moderately	0.985	0.479	2.050	0.040	0.045	1.924
<i>Personnel responsible for patrols</i>						
Security	0.921	0.458	2.010	0.044	0.024	1.818
<i>Personnel responsible for dog control</i>						
Security	-1.841	0.719	-2.560	0.010	-3.250	-0.432
<i>Farming activity</i>						
Sugar cane	1.057	0.534	1.980	0.048	0.011	2.104
<i>Region</i>						
Nottingham Road	-1.51	0.648	-2.340	0.019	-2.786	-0.245
<i>Survey method</i>						
Online	-1.397	0.396	-3.520	<0.001	-2.174	-0.620

^aAn effects variable (If respondents disliked the practice = -1, respondents had no preference = 0, respondents liked the practice =1)

^bAn effects variable (If respondents disliked the programme duration/incentive = -1, respondents had no preference for programme duration/incentive = 0, respondents liked the programme duration/incentive =1)

^cImportance of family tradition/financial reward as a motivating factor for landowners to pursue farming as a career

Table 3.7. Variables influencing landowners' decisions to enrol in an oribi conservation programme when a property rates rebate was offered as an incentive.

Variable	Coefficient	Std. error	z	P>z	[95% Confidence Interval]	
Constant	-3.120	2.153	-1.450	0.147	-7.339	1.099
Tax rebate	-0.018	0.015	-1.210	0.228	-0.046	0.011
Burning ^a	1.054	0.501	2.100	0.035	0.072	2.036
<i>Family tradition^b</i>						
Extremely	1.934	0.896	2.160	0.031	0.177	3.691
<i>Business opportunity^b</i>						
Slightly	3.006	1.374	2.190	0.029	0.313	5.700
<i>Personnel responsible for patrols</i>						
Landowner	2.304	0.878	2.620	0.009	0.584	4.025
<i>Farming activity</i>						
Sugar cane	3.093	1.217	2.540	0.011	0.708	5.478
Cash crops	-2.083	0.901	-2.310	0.021	-3.849	-0.316

^aAn effects variable (If respondents disliked the practice = -1, respondents had no preference = 0, respondents liked the practice = 1).

^bImportance of family tradition/business opportunity as a motivating factor for landowners to pursue farming as a career.

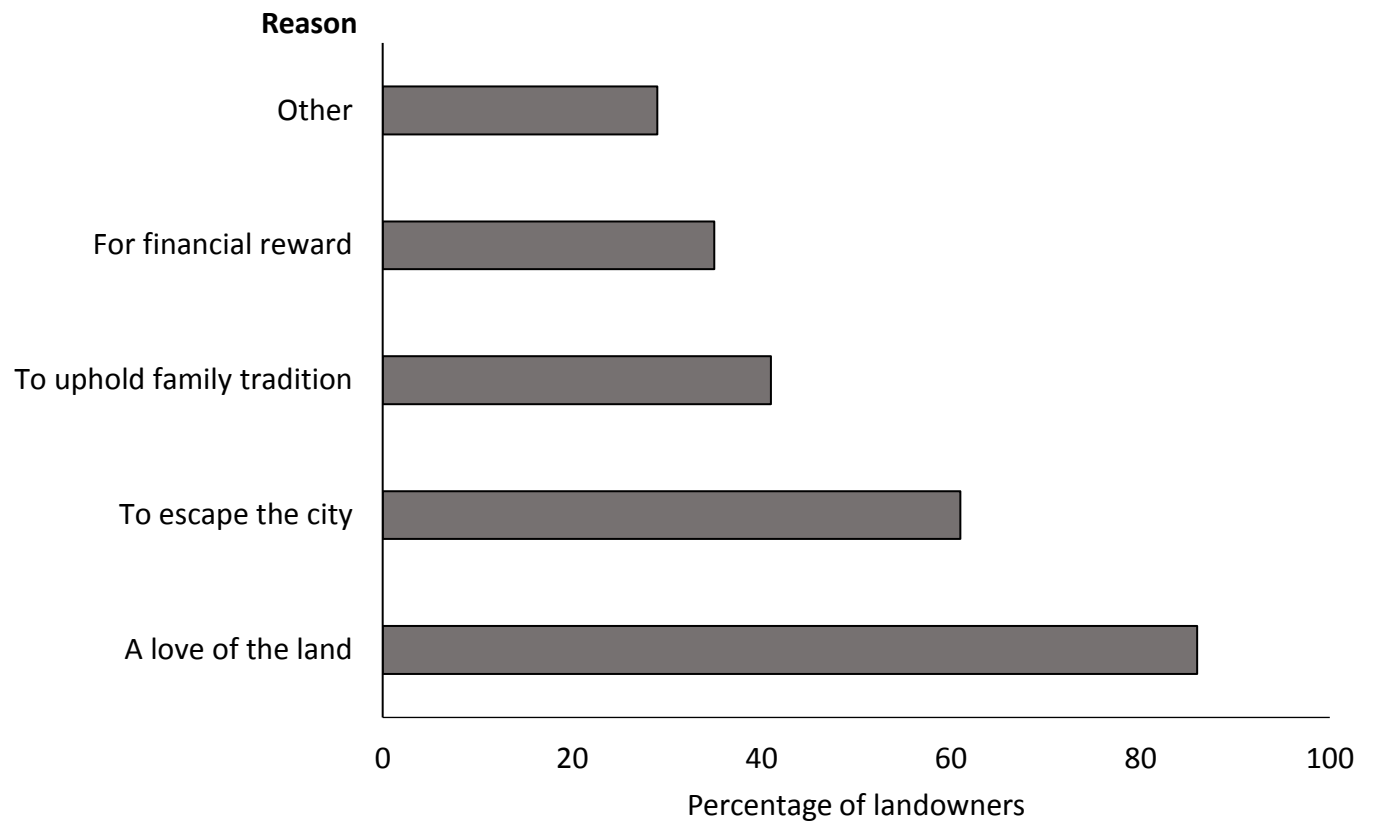


Figure 3.1. Reasons stated by landowners from farming backgrounds as either “very important” or “extremely important” in their decision to remain farming ($n=76$, landowners could provide multiple reasons).

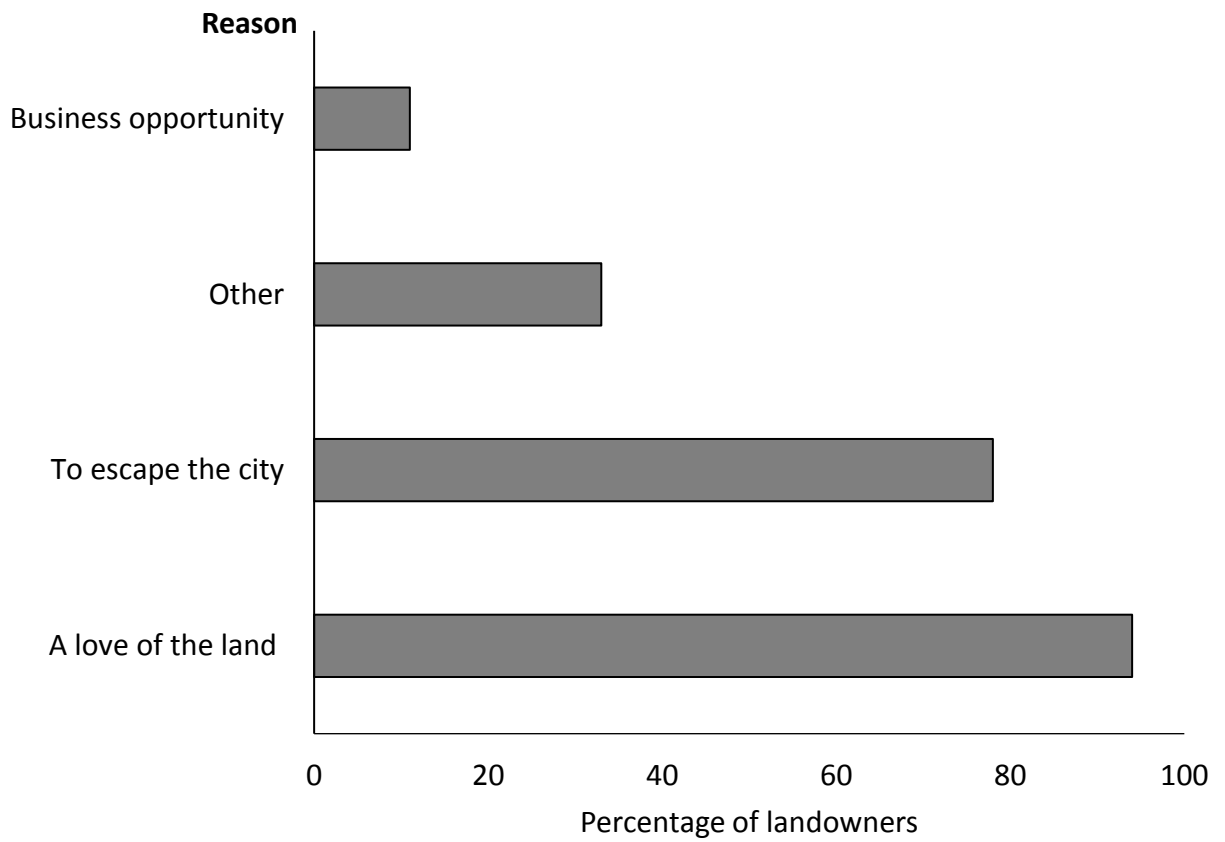


Figure 3.2. Reasons stated by first generation landowners as either “very important” or “extremely important” in their decision to go into farming ($n=18$, landowners could provide multiple reasons).

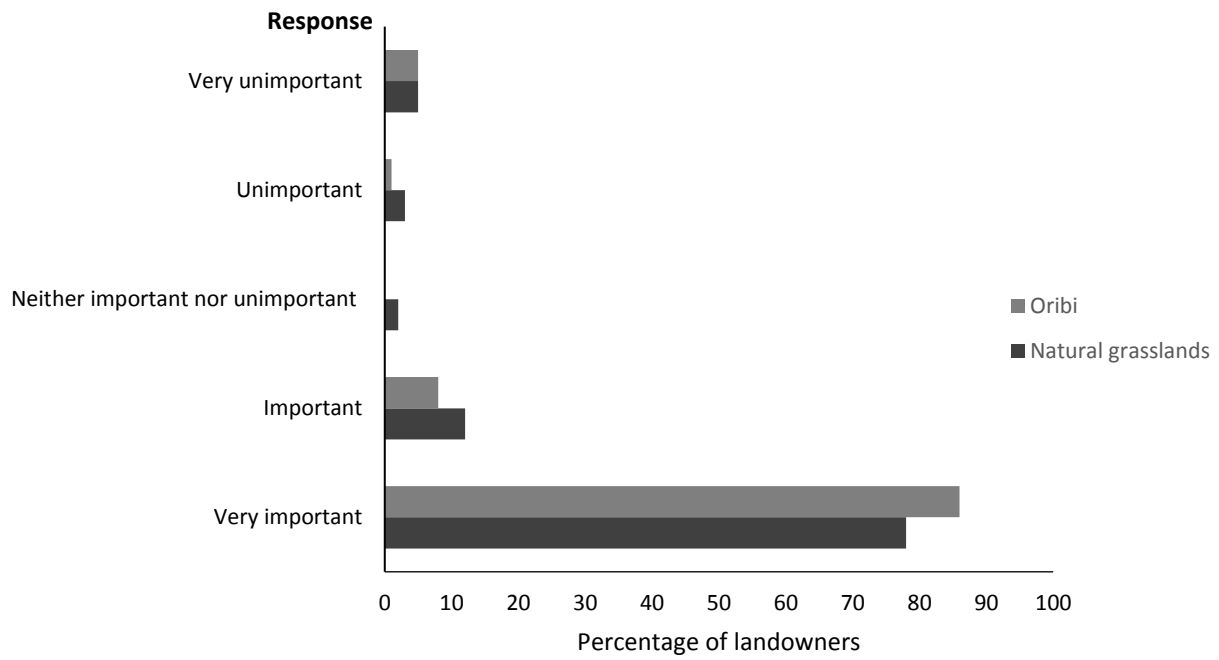


Figure 3.3. Responses to how important landowners consider the conservation of natural grasslands and oribi to be.

Chapter Four

Conclusion

“Conservation is primarily not about biology but about people and the choices they make.”

–Balmford & Cowling, 2006

My overall study had two broad aims. First, I wanted to investigate the willingness of private landowners in KwaZulu-Natal to protect oribi on their lands. Second, I wanted to investigate the factors that influenced private landowners’ stated willingness to engage in potential oribi conservation programmes. In order to address these aims, I developed the following research objectives: 1) examine landowners’ perceptions of the threats to oribi, 2) examine landowners’ perceptions of how lands should be managed to benefit oribi, 3) investigate why some landowners are willing to incur costs to protect oribi on their lands, and 4) determine the factors that influence landowners’ stated willingness to enrol in oribi conservation programmes.

Due to the majority of South Africa’s oribi antelope being found on private land, private landowners play a key role in the conservation of the species. As a result, private land conservation efforts are essential if oribi in South Africa are to avoid extinction at a national scale (Coverdale et al., 2006; Patel, 2015; Shrader et al., 2016). One way to do this is to design oribi conservation programmes for private lands to aid conservation efforts. Developing such programmes relies on possessing an understanding of the social aspects of conservation, such

as landowners' conservation attitudes and perceptions, management priorities, and financial limitations (Winter et al., 2007; Pasquini et al., 2010; Von Hase et al., 2010; Ma et al., 2012). However, this information for oribi landowners in South Africa is unknown.

To explore this research gap, I focused Chapter 2 on addressing my first research aim, which was to investigate private landowners' willingness to protect oribi on their lands. Additionally, I investigated landowners' perceptions of the threats to their oribi, and their perceptions of how their land should be managed to benefit the species. I found that private landowners' willingness to protect oribi on their land was motivated primarily by a love of all wildlife and a moral obligation to protect most native species. This is not unique as it has been shown elsewhere with other species (Hines et al., 1987; Rubino & Pienaar, 2018). Furthermore, an affinity for oribi was also cited as a reason to protect the species. Although landowners are not necessarily able to invest financially in protecting oribi on their lands, many are willing to place their personal safety at risk by protecting wildlife from poachers. It is therefore evident that these landowners possess an interest in the conservation and welfare of the species, but various constraints prevent them from effectively conserving oribi on their land.

A key finding of Chapter 2 was that private landowners consider illegal hunting and predation by jackal to be the most severe threats facing their oribi populations, yet consider habitat loss and snaring to pose little or no threat to oribi. This raises major concerns for oribi conservation efforts as it suggests that landowners are failing to recognise, and thus mitigate, two of the most severe threats facing South Africa's oribi population (Shrader et al. 2016). Furthermore, it suggests that landowners do not possess a clear understanding of the threats facing oribi and highlights a critical gap in landowners' knowledge regarding the species.

Another key finding from Chapter 2 was that landowners appear to be unaware of how best to manage their lands for the benefit of their oribi. Yet, many hold the belief that their current land management practices benefit their oribi population. This highlights that there is a clear gap between how ecologists and landowners believe land should be managed for the benefit of the species. As a result, this reinforces the notion that inappropriate land management practices (e.g. incorrect burning regimes and overgrazing) are a major threat to oribi populations on privately-owned lands.

Despite the fact that many private landowners in KwaZulu-Natal appear willing to conserve and protect oribi on their lands, Patel (2015) found that of the 74 oribi subpopulations on private land for which she worked out population trends, 49% (i.e. N= 36 subpopulations on private land) were declining. Moreover, as 15% (N=11 subpopulations) were stable, but not growing, and only 36% (N=27 subpopulations) had positive growth rates (Patel, 2015), there is a clear need to develop and implement private land conservation strategies to prevent the extinction of the species within South Africa. The development of such strategies is dependent upon possessing an understanding of the factors that influence private landowners' decisions to engage in oribi conservation efforts. Possessing such information is crucial to ensuring that appropriate landowners (i.e. those who are more likely to participate in conservation efforts and those who own properties of conservation significance) are targeted for participation in oribi conservation efforts (Winter et al., 2005). However, factors influencing landowners' willingness to engage in oribi conservation efforts had not been investigated to date.

In order to address this limitation, I focused Chapter 3 on addressing the second of my research aims, namely, to investigate factors that influence private landowners' stated

willingness to enrol in potential oribi conservation programmes. Interestingly, I found that possessing a strong conservation ethic did not necessarily encourage landowners to participate in oribi conservation programmes. However, other landowner characteristics, as well as property and programme characteristics had some impact on respondents' stated willingness to engage in these programmes. Likely owing to the small sample size (95 completed surveys), very few clear patterns emerged to help develop a clear typology of landowners who would be more likely to voluntarily engage in oribi conservation programmes. Nonetheless, results did suggest that respondents' motivations for pursuing farming as a career influenced their stated willingness to engage in oribi conservation programmes. Specifically, respondents who pursued farming because they possessed a strong sense of family heritage, and respondents who did not pursue farming primarily for financial reward, proved more willing to engage in oribi conservation programmes that offered both non-financial incentives and a property tax rebate.

Overall, my results lend support to the notion that programme design plays a crucial role in determining landowner uptake of conservation programmes (Ferraro, 2008; Ruto & Garrod, 2009). Specifically, the requisite land management practice, duration of programme enrolment, and incentive offered all had some influence on landowners' stated willingness to enrol in oribi conservation programmes, depending on whether these programme characteristics were the ones respondents preferred or not.

A result that stands out from my research is that the provision of incentives that are disliked by landowners may prevent landowner uptake of conservation programmes. This highlights that poor programme design may have adverse effects for conservation efforts and that possessing an understanding of landowners' capabilities, limitations, and needs is crucial if

effective private land conservation programmes are to be designed and implemented (Winter et al., 2007; Von Hase et al., 2010; Ma et al., 2012). In contrast to what I predicted, the provision of a financial incentive did not have a greater influence in effectively encouraging landowner enrolment in an oribi conservation programme compared to non-financial incentives. It is likely that this is largely attributable to the fact that the tax rebate offered would have provided too little of a financial gain to effectively appeal to landowners.

The results of my research follow an international trend (Pienaar et al., 2015; Kreye et al., 2017), which reveals crucial insight for oribi conservation efforts in South Africa. Namely, that landowners express concerns with regards to government interference in their land management practices. Moreover, restrictions on land use may prevent landowners from engaging in formal conservation programmes. This, however, is not necessarily all bad news for oribi conservation efforts. My results also suggest that an unwillingness to engage in formal conservation programmes does not necessarily equate to an unwillingness to engage in oribi conservation efforts. Many respondents proved willing to engage in efforts to conserve and protect oribi on their lands, provided they could do so on their own terms. Responses from the farmers suggest that the provision of education and outreach programmes may more successfully encourage participation in the conservation of oribi on private lands compared to formal oribi conservation programmes that offer incentives. Moreover, these may reduce misconceptions of the key threats to oribi and the best way to manage lands for the benefit of the species. As such, providing this key information to landowners may further strengthen current and future oribi conservation efforts.

Overall, the results of my research (i.e. Chapters 2 and 3) provide key insight into the factors driving the willingness of private landowners in KwaZulu-Natal to engage in efforts to conserve and protect oribi, and those factors that turn them away from these efforts. Thus, these results can be used to evaluate current oribi conservation programmes and assess what is working and what may be preventing the expansion of future conservation efforts. Furthermore, these insights could be used to inform and evaluate strategies for and the design of private lands conservation programmes for a number of other threatened and endangered species. However, due to the relatively small sample size of my research (N=95 landowners) and the bias towards older, male respondents, the results of this research should not be used to make broad sweeping inferences about all landowners throughout South Africa.

Management and Conservation recommendations

My research findings have a number of implications for oribi conservation efforts on private lands in KwaZulu-Natal. Although the results of this research do not provide a clear typology of landowners who should be targeted for oribi conservation efforts, they do provide better insight into the type of landowners who may be willing to engage in oribi conservation programmes. Specifically, my findings suggest that landowners who pursue farming because of a strong sense of family heritage, and those who do not pursue farming primarily for financial gain may prove more willing to engage in oribi conservation programmes. Based on my study, I argue that when attempting to identify and develop a typology of landowners who should be targeted for participation in conservation programmes, landowners' motivations for pursuing farming as a career and the measures they engage in to protect wildlife should also be

investigated as such factors may prove to be related to landowners' willingness to engage in formal conservation programmes. These two traits could be determined by distributing a survey containing questions regarding these factors to landowners, or speaking with farmers directly.

Although the conservation programmes offered in this study largely failed to induce landowner enrolment, the results from this research provide insights that may help inform the design of more appropriate oribi conservation programmes. First, long-term enrolment requirements may discourage landowners from participating in conservation programmes, largely due to landowners' uncertainty of land tenure. I therefore argue that conservation programmes offered to landowners should preferably be short-term (5-10 years), with the option for them to re-enrol should the programme prove to be suitable. Although this may not appear to be ideal for conservation purposes, it is more likely to be adopted by landowners than long-term conservation programmes. This alone, would likely increase the benefits to oribi conservation efforts.

Second, the results of this research provide some evidence that landowners are more likely to adopt conservation practices they favour and consider feasible on their lands. As such, prior to designing and implementing conservation programmes, it is essential that landowners' land management preferences, capabilities, and constraints are identified. This could be done by interviewing farmers or meeting with them on their farms. Identifying landowners' priorities and constraints should improve landowner participation in conservation efforts. Third, none of the incentives offered in this study (management assistance, security assistance, recognition,

and a property tax rebate) successfully encouraged landowner uptake of oribi conservation programmes.

In an attempt to encourage the conservation of oribi on privately-owned lands, the Endangered Wildlife Trust (EWT) has developed and implemented the Oribi Custodian Programme in KwaZulu-Natal (Little & Theron, 2014). This programme offers two forms of recognition for oribi conservation efforts. Firstly, it offers certificates of recognition to individuals, communities or companies who have shown a commitment to the conservation of oribi or their habitat, regardless of whether they are oribi owners or not (Little & Theron, 2014). Secondly, it awards oribi owners who have made a direct contribution to the conservation of the species and its habitat with an Oribi Custodian Board (Little & Theron, 2014). Recipients of this award can then choose to display this board at the entrance to their property (Little & Theron, 2014). This programme is intended to incentivise landowners to conserve oribi and their habitat by providing them with formal recognition for their efforts. However, the results of my research suggest that this recognition incentive is widely disliked and may, in fact, prevent landowner enrolment in oribi conservation programmes. Respondents often reported their belief that the presence of an Oribi Custodian Board would serve to alert poachers to the presence of oribi on their land, thus placing both their personal safety, and the safety of their oribi, at increased risk. Based on respondents' dislike of the recognition incentive and the potential adverse effects of the incentive, I would suggest that EWT explore alternative means of incentivisation (e.g. only providing certificates), as the current method may be leading to suboptimal participation in oribi conservation efforts by private landowners.

Similarly, management assistance and security assistance incentives did not encourage landowner enrolment in oribi conservation. The dislike of these incentives is likely due to landowners not wanting contract personnel on their lands due to concerns over potential theft and poaching. As such, I would suggest that incentives that require the presence of outside personnel on landowners' properties not be implemented. Rather, landowners suggested that they would prefer financial or in-kind assistance that would help them to defray the costs of allocating their own personnel to land management or security activities.

Despite the failure of the incentives offered in my survey to increase landowners' willingness to participate in oribi conservation efforts, it is important to remember that the incentives that I provided were not comprehensive. As such, future research could explore novel and alternative incentives that could more effectively encourage landowners to participate in oribi conservation efforts. For example, during the semi-structured interviews, landowners expressed a desire for assistance with jackal control. Many also expressed a desire for legal assistance, in the form of legal advice or assistance with legal fees, when it comes to illegal hunting on their lands. These incentives may prove to be effective in encouraging landowner participation in oribi conservation programmes, and thus warrant exploration.

At the onset of this study, I had anticipated that the development of conservation programmes would prove to be the most effective way to ensure the conservation of oribi on private lands. However, the results of my research indicate that formal conservation programmes are, in general, disliked by private landowners and fail to encourage landowner participation in oribi conservation efforts. This unwillingness to enrol in formal conservation programmes was largely motivated by a distrust of government and conservation authorities,

and a fear of an imposition of land use restrictions. Given landowners concerns regarding political autonomy, I suggest that alternative methods of encouraging the conservation of oribi on private lands (e.g. information sessions) should be explored. Information sessions on oribi ecology and habitat requirements may prove more successful in assisting oribi conservation efforts than formal conservation programmes. I found that private landowners do not possess a clear understanding of oribi, their habitat requirements, the threats they face, and how grasslands should be managed to benefit the species. If oribi are to be effectively conserved it is critical that these gaps in landowners' knowledge of the species be addressed. In fact, throughout semi-structured interviews respondents often expressed a desire to receive information on oribi and how best to manage their lands for the benefit of the species. Based on the findings of this research I argue for the development and implementation of information sessions for private landowners (potentially at farmer days) that provide information on oribi ecology.

Given landowners' distrust of government, I suggest that rather than have government employees (e.g. Ezemvelo KZNWildlife) responsible for delivering such programmes to landowners, it would be more effective if they were run by an NGO (e.g. EWT) or, ideally, private individuals who liaise between private landowners' and conservation authorities (e.g. knowledgeable farmers or University personnel). Finally, as my research revealed that landowners strongly dislike being instructed in how to manage their lands, I would suggest providing a set of land management recommendations (e.g. burning or mowing), that landowners could pick between. These options could be ranked from '*best for oribi*' to '*poor for oribi*' but take into account other grassland biodiversity (e.g. birds and sun gazers; *Cordylus*

giganteus), thus allowing landowners to see where their choices stand with respect to other options. For example, burning= good, mowing= ok, doing nothing= poor (See Table 4.1). By setting up the information sessions in this manner, the information provided will come across more in the form of advice and suggestions rather than forced instructions.

Overall, the findings of my research bring a new perspective to oribi conservation efforts in South Africa, as for the first time the voice of private landowners is being recorded and understood. Throughout the world, the importance of incorporating people and their perspectives into conservation efforts is being realised (Winter et al., 2007; Pasquini et al., 2010; Von Hase et al., 2010). It is my hope that the key insights gained from this study will go a long way in improving oribi conservation in South Africa, and potentially act as a foundation for the conservation efforts for a wide range of species.

Table 4.1. Suggested management practices for oribi owners and format in which to present this information.

Management Practice	Impact for oribi	Additional information
No defoliation of grassland (no burning, grazing, mowing etc)	Poor	Leaving grass standing allows it to become moribund and rank. This decreases the nutritional quality and availability of food for oribi.
Grazing	Ok	Rotational grazing using bulk grazers helps create a mosaic of short and tall grass for the benefit of oribi (Little & Theron, 2014). However, it is essential to not overstock with livestock as they could create a uniform landscape of short grass, which is poor for oribi (Stears 2015).
Mowing	Good	Mowing prevents the accumulation of moribund material and allows oribi to graze on the living material (Everett et al., 1991). To simulate patchy grazing by bulk grazers, sections of grassland should be left unmown to create a mosaic of short and tall grasses for oribi. Everett et al. (1991) suggest the following guidelines for mowing: <ol style="list-style-type: none"> 1. Natural grassland hayfields should be mowed in autumn 2. <i>Eragrostis curvula</i> hayfields should be

		mowed in summer and early autumn.
Burning wide firebreaks	Good	Wide firebreaks offer oribi increased amounts of higher quality grass. Coverdale et al. (2006) suggest that oribi prefer firebreaks burnt in June.
Burning of natural grassland	Good	Burning of natural grassland removes moribund material and increases the crude protein, phosphate and calcium contents of the grass (Everett et al., 1991). Mosaic burning should be used to provide oribi with areas of longer grass in which to take refuge (Little & Theron, 2014). Everett et al. (1991) and Coverdale et al. (2006) propose biennial burning of grasslands to ensure that oribi have access to short and tall grass throughout the year. Everett et al. (1991) suggest that natural grasslands should be burnt in autumn, early spring or late winter.
Mineral licks	Good	Placing mineral licks out in areas of natural grasslands allows oribi to access minerals and nutrients they need in winter months when grass is of poorer quality.
Fencing to allow oribi movement	Good	Fencing properties in such a way that oribi can move through these fences freely ensures that their populations don't become isolated and allows them to

		escape hunting dogs (Little & Theron, 2014). Fencing strands should be between 25 and 40 cm apart (e.g. 3-4 strands of barbed wire) so that they are wide enough apart for oribi to move through or under.
Combination of practices	Best	Everett et al. (1991) suggest that when managing to benefit oribi a combination of practices is best. They suggest a biennial spring or late winter burn, wide firebreaks burnt in autumn, and certain areas of grassland be mowed.

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Appendix 1: Themes identified during qualitative analysis

Theme

Landowners' perceptions of oribi

A genuine interest in their oribi population

Oribi tend to move between properties

Oribi population sizes are difficult to accurately determine due to their movements between properties

Oribi population sizes on individual properties are small

Oribi populations on individual properties are too small to be viable

Oribi populations have ceased increasing in size on properties as they have reached carrying capacity

The absence of oribi on a property is due to the absence of suitable habitat for the species

Oribi are stupid and defenceless animals

Oribi are not as endangered as they are perceived to be

Oribi are doomed to extinction

Lack of understanding of oribi and their habitat requirements

Uncertainty of how to manage lands to benefit oribi

Landowners' motivations for conserving oribi

Landowners are willing to conserve all native species because they possess a compassion for and interest in all wildlife

Landowners conserve wildlife out of a sense of moral obligation and social responsibility

Landowners conserve wildlife as it is a part of their farming heritage

Landowners conserve wildlife for the benefit of future generations

Landowners conserve oribi because they have emotional attachment to the species

Landowners conserve oribi because of their endangered status and maintaining an endangered species on their property gives landowners a sense of pride

Landowners protect oribi out of pity because they consider the species to be stupid and defenseless

Landowners protect oribi so that they will have them available for their own personal hunting purposes

Landowners protect oribi as they view them as their personal property

Landowners' perceptions of threats to oribi

Illegal hunting with dogs poses a severe threat to oribi

Illegal hunting is done by small groups of individuals with dogs

The illegal hunting that is taking place is in the form of taxi hunts

Taxi hunts pose a greater threat to oribi than hunting done by small groups of individuals

Taxi hunts are done as a sport or as part of a gambling syndicate

Taxi hunts are a politically motivated tool used to try and frighten farmers off their farms

Government or police corruption is associated with taxi hunts

Taxi hunts are violent and confrontational affairs that often lead to racial tensions

Intervening in taxi hunts places one's personal safety at risk

Properties located near timber plantations are more likely to experience issues with illegal hunting

Properties located near human settlements/tribal lands are more likely to experience issues with illegal hunting

Individuals from nearby human settlements/tribal lands engage in illegal hunting

Individuals from nearby human settlements/tribal lands facilitate/organize taxi hunts

Hunting done by small groups of individuals is for subsistence purposes or as a sport for children during school holidays

Living on isolated farms reduces the risk of hunting

Properties located near main roads are more likely to experience issues with illegal hunting

Properties on which a landowner/manager does not permanently reside are more likely to experience issues with illegal hunting and/or snaring

Hunting does not occur on their property but likely occurs on the properties surrounding them

Illegal hunting may occur on their property without their knowledge

Snaring poses little to no threat to oribi

If snaring does occur it is most likely their own employees who are responsible for it

Snaring is more likely to occur when contract labour are working in the area

Jackal pose a severe threat to oribi

The jackal population has increased drastically over recent years

Uncertainty as to what other predators may pose a threat to oribi

Uncertainty as to what level of threat predators pose to oribi

Habitat loss poses no threat to oribi

Habitat loss is a threat to oribi

Habitat conversion to agricultural land uses has benefitted oribi through the provision of food and cover in which to hide

Landowners efforts and perceptions of efforts to mitigate threats to oribi

Control of hunting dogs by poisoning or shooting

Gaining a reputation for being willing to shoot hunting dogs reduces the risk of illegal hunting

Reason or negotiate with hunters in order to stop them hunting on the land

Landowners do not let it be known that they destroy hunting dogs for fear of retribution from the dogs' owners

Unwillingness to control hunting dogs for fear of retribution from their owners

Security or law enforcement personnel deal with illegal hunters instead of landowners due to landowners fear of retaliation from illegal hunters

Law enforcement officials are not called on to assist with matters of illegal hunting as landowners do not trust them

The presence of security personnel on the property helps reduce the risk of illegal hunting

Security personnel are hired specifically to protect wildlife

Security personnel are present to prevent the theft of livestock or personnel property and for the safety of landowners, but their presence protects wildlife by default

Landowners are members of their local conservancies and through that have game guards patrol their properties checking for snares and illegal hunters

Members of the local farming community take turns to patrol the areas in which they live for safety purposes, but this creates a presence that likely helps protect wildlife by default

Landowners do not actively check for snares but are constantly alert for them

Landowners incentivize their employees not to snare

Landowners engage in the culling of jackal in order to protect their livestock, which likely benefits oribi

In the absence of livestock jackal control is not carried out

Jackal culled specifically to protect wildlife

All jackal should be culled

Selective control of jackal should be carried out

A recent rabies outbreak reduced the jackal population, eliminating the need for landowners to cull

Rehabilitation of arable lands back to natural grasslands to provide wildlife with habitat

A shift to more environmentally-friendly farming practices, benefitting wildlife by default

Landowners manage their land specifically for the benefit of oribi and other wildlife

Landowners engage in patch burning to benefit their wildlife

Negative repercussions faced by landowners for having protected wildlife on their lands

Negative repercussions faced are a result of having attempted to intervene in taxi hunts

Intervening in hunts placed landowners personal safety at risk

Landowners received death threats for having intervened in illegal hunting

Landowners have had theft of their personal property or arson for having intervened in illegal hunts

Landowners have had legal charges laid against them for having shot hunting dogs

Landowners have faced animosity from law enforcement officials for having shot hunting dogs

Landowners have faced animosity, threats and racial slurs for having had poachers arrested

The presence of oribi results in economic opportunities foregone as landowners are unable to develop their lands when endangered species are present

Landowners resent oribi for proving to be an impediment to development

Landowners withhold information about the presence of oribi on their land so as to avoid interference from conservation organizations in the management of their lands

The failure of poachers to be arrested or charged left landowners feeling disheartened and disinclined to protect wildlife in the future

Landowners would prefer wildlife were not present as they then would not have issues with illegal hunting

Landowners willing to protect wildlife despite the potential risks

Landowners' perceptions of the farming lifestyle in South Africa

There has been a decline in the farming lifestyle due to increased financial, emotional and physiological stress

Personal safety is at risk when living on a farm

Concerns over land reform decreases landowners enjoyment of the farming lifestyle

Labour laws and minimum wage results in stress for landowners

It has become increasingly difficult to make a living out of farming

Farming has become more of a business and less of way of life as it was in the past

The safety concerns and economic uncertainty of farming makes it too risky a career choice for landowners children

Appendix 2: Survey Form

PARTICIPANTS DETAILS

Name: _____

Age: _____

Home Language: _____

Gender: Male/Female

Education level: Standard 8 Matric Tertiary Postgraduate Other

Contact details: _____

Address: _____

YOUR FARMING OPERATIONS

Before I ask you about the oribi and managing the oribi on your land, I would like to get a better understanding of your farming operations, and why you choose to be a farmer.

1. How long have you been farming? _____ YEARS
2. Are you a first generation farmer on this property?
YES → Did previous generations of your family farm elsewhere?
 YES → How many
 generations? _____
 NO
NO → How long has this farm been in your family? _____ YEARS
3. Do you own more than one property on which you farm?
YES → How many properties do you own?

 → In which province(s) are these properties located?

NO
4. What is the size of this property? _____ Ha

5. Which of the following activities do you carry out on your farm(s)? How much land is currently assigned to each activity? *If the farmer does not engage in an activity then enter 0 in the amount of land column.*

Activity	Amount of land (Ha)
Timber	
Sugar cane	
Dairy cattle	
Beef cattle	
Game ranching	
Sheep	
Cash crops (vegetables)	
Crops (maize)	
Hay	
Other:	

6. Is farming your only source of income?

YES

NO → What percentage of your total income comes from farming? _____%

If the answer to Q2 is YES and the respondent does NOT come from a farming background, i.e. parent was NOT a farmer:

7. There are many reasons why a person may choose to begin farming. How important were the following reasons in your decision to begin farming? Please indicate the extent to which each of the following reasons was important by using the scale. {Show respondent a card and record their answers}

	Level of importance				
	Not at all	Slightly	Moderately	Very	Extremely
Good business opportunity	1	2	3	4	5
Escape the city	1	2	3	4	5
Love of the land	1	2	3	4	5
Family are/were farmers	1	2	3	4	5
Other: _____	1	2	3	4	5

If the answer to Q2 is NO or the respondent grew up on a different farm/used to own a different farm:

8. How important were the following reasons in your decision to remain in farming?

	Level of importance				
	Not at all	Slightly	Moderately	Very	Extremely
Financially rewarding	1	2	3	4	5
Upholding family tradition	1	2	3	4	5
Escape the city	1	2	3	4	5
Love of the land	1	2	3	4	5
Other: _____	1	2	3	4	5

9. How much satisfaction do you get from the following aspects of farming?

	Level of satisfaction			
	None	Small	Moderate	High
Providing employment	1	2	3	4
The income generated by farming	1	2	3	4
The farming lifestyle	1	2	3	4
Day-to-day farming tasks	1	2	3	4
Other: _____	1	2	3	4

YOUR LAND MANAGEMENT PRACTICES

I'd like to get a better understanding of what land management practices you engage in on your farms that may potentially be beneficial for oribi. This is important information for two reasons. First, it will allow me to better understand the costs you incur as part of your farming activities. Second, it provides insights into how your farming practices contribute to land stewardship.

10. Which of the following land management practices do you carry out on your farm(s)? What percentage of your annual expenditure do you think goes to each of these activities? *If the farmer does not engage in an activity then enter 0 in operational budget column.*

Land management	Percent of annual expenditure
Burning external fire breaks	
Burning internal fire breaks	
Burning fields/crops/grassland/veld for clearing	
Mowing	
Removal of alien species	
Other:	

If the respondent engages in burns on their property then ask the following:

11. How do you conduct burns? Do you burn annually? Do you use patch burning? What percentage of your grassland do you burn each year? Do you burn different areas of your grassland each year?

12. What grazing regimes do you carry out on your property? (i.e. rotational grazing or continuous grazing) What is your stocking rate?

13. How is (are) the border(s) of your property(ies) secured? If more than one type of fence is used, what proportion of the fence line is comprised of each type? *Tick each response provided by the respondent.*

None

Electric fencing

Barbed wire

Game fencing

Strand fencing

Other: _____

14. How many properties neighbour you? _____

15. What activities take place on the lands neighbouring your property?

ORIBI CONSERVATION

16. Do you have any grassland on your property?

YES → Approximately how many hectares?

→ Is this natural grassland, pasture or a mixture of both? _____

If they have a mixture of grassland and pasture, then ask how many hectares of each they have.

→ What is the natural grassland used for? _____

NO

17. To the best of your knowledge, do you currently have oribi on your farm(s)?

YES → How many oribi? _____

NO → Did you have oribi on your farm(s) in the past?

YES → How many oribi? _____

When did you last have oribi on your farm(s)? _____

What happened to these oribi? _____

NO

I DON'T KNOW

I DON'T KNOW

18. To the best of your knowledge, are there oribi on the properties that neighbour your farm(s)?

YES

NO

I DON'T KNOW

19. Is any of the natural grassland on your property set aside specifically for use by oribi?

YES → How much? _____

NO

20. Do you know whether the properties neighbouring you possess grasslands that are suitable for oribi?

YES

NO

I DON'T KNOW

21. Are oribi able to move on and off your farm(s), i.e. can they pass through the fences?

YES

NO

I DON'T KNOW

Ask Q24 to Q29 if the individual currently has oribi on their land, or have had in the past:

22. To what extent would you consider the following to be threats to oribi on your land?

	Level of threat			
	Not at all	Mild	Moderate	Severe
Natural predators: _____	1	2	3	4
Snares	1	2	3	4
Illegal hunting: _____	1	2	3	4
Habitat loss	1	2	3	4
Other: _____	1	2	3	4

23. Do (did) you take any of the following measures to protect the oribi on your land? How effective are (were) these measures in protecting oribi on your lands?

	Effectiveness					
	Not at all	Slightly	Moderately	Very	Extremely	N/A
Fencing specifically to keep oribi on the property	1	2	3	4	5	N/A
Check for and remove snares	1	2	3	4	5	N/A
Patrol for hunters/poachers during the day	1	2	3	4	5	N/A
Patrol for hunters/poachers at night	1	2	3	4	5	N/A
Control of hunting dogs	1	2	3	4	5	N/A
Protecting oribi from predators (please explain) _____	1	2	3	4	5	N/A
Other: _____	1	2	3	4	5	N/A

24. How often do (did) you engage in these efforts to protect oribi? Are (were) these measures carried out by you, your employees or hired security personnel?

Measure	Frequency	Self, employee or security person
Checking/removal of snares		
Patrolling for hunters		
Chasing/removal of hunting dogs		

25. Do (did) you manage any of your land to specifically benefit oribi? If so, how?

26. Have you faced any negative repercussions from protecting oribi on your lands? Please explain.

27. Why do (did) you protect the oribi on your land?

28. How important do you consider the conservation of grasslands to be?

- 1 Very unimportant
- 2 Unimportant
- 3 Neither important nor unimportant
- 4 Important
- 5 Very important
- 6 I do not know

29. How important would you consider the conservation of oribi?

- 1 Very unimportant
- 2 Unimportant
- 3 Moderately important
- 4 Important
- 5 Very important

Programme design

I am now going to ask you about potential oribi conservation programmes. I will describe each programme to you, and I will ask you whether the programme is one that you would consider enrolling in if it was offered to you. There are 4 programmes in total. Each program has 4 features: the number of hectares of land that you would be asked to keep as native grassland; a management practice that you would be asked to do that benefits oribi; an incentive that you would be offered for enrolling in this programme; and the amount of time you would be asked to enrol in the programme.

Hectares enrolled: You would be asked to enrol 20, 40 or 60 ha of your land in oribi conservation. These lands would be kept as natural grassland for the oribi to use as habitat. You may use this land for

grazing cattle as long as your grazing practices are consistent with oribi conservation. The grassland should be conserved as a single block of land. For example, if you enrolled 20 ha of land in the program then you should conserve a 20 ha single block of land as grassland for the oribi.

Do you currently have at least 20 ha of grassland on your property?

YES

NO Would you be willing to convert land to grassland for the oribi? Why/why not?

If you chose to enrol in an oribi conservation program, would you prefer to allocate 20, 40 or 60 ha of your land to grassland for the oribi? Why?

Management practice: There are 3 potential land management practices that benefit oribi:

1. Mowing natural grassland each year to benefit the oribi. You would be asked to mow between 5 and 30% of the grassland on your property each year.
2. Conducting patch burns for natural grassland. You would be asked to burn between 5 and 30% of the grassland on your property each year.
3. Fencing your property with standard six strand fencing which will allow the oribi to move freely on and off your property

Which of these three management practices do you like the most? Why?

Which of these three management practices do you like the least? Why?

Time commitment: You would enrol in the program for 5, 10 or 30 years.

Which of these enrolment periods do you like the most? Why?

Which of these enrolment periods do you like the least? Why?

Incentive: The program would include one of 3 possible incentives:

1. Recognition for your contribution to oribi conservation: You would receive an oribi custodian board from the Endangered Wildlife Trust to place on your property.
2. Security assistance: Each month during the week of the full moon, you would be provided with 2 additional security personnel to help you patrol your property to prevent oribi poaching. These security personnel would be paid for by the Endangered Wildlife Trust or Ezemvelo.
3. Management assistance: You would be provided with 2 labourers for one month each year to help you with the removal of alien vegetation on your property or other land management activities that benefit the oribi and biodiversity on your land. These labourers would be paid for by the Endangered Wildlife Trust or Ezemvelo.

Which of these three incentives do you like the most? Why?

Which of these three incentives do you like the least? Why?

Programme 1: If you were offered the recognition incentive, would you be willing to allocate [60/40/20] ha of your land to natural grassland for oribi conservation? You would be expected to [mow this grassland for the benefit of the oribi/use 6-strand fencing on this section of your farm/conduct patch burns of this grassland]. You would be enrolled in the program for [30/10/5] years.

Would you enrol in this programme exactly as it is described if it were the only programme offered to you?

YES
NO

Programme 2: If you were offered security assistance, would you be willing to allocate [20/60/40] ha of your land to natural grassland for oribi conservation? You would be expected to [use 6-strand fencing on this section of your farm/conduct patch burns of this grassland/ mow this grassland for the benefit of the oribi]. You would be enrolled in the program for [5/30/10] years.

Would you enrol in this programme exactly as it is described if it were the only programme offered to you?

YES
NO

Programme 3: If you were offered management assistance, would you be willing to allocate [40/20/60] ha of your land to natural grassland for oribi conservation? You would be expected to [conduct patch burns of this grassland/ mow this grassland for the benefit of the oribi/ use 6-strand fencing on this section of your farm]. You would be enrolled in the program for [10/5/30] years.

Would you enrol in this programme exactly as it is described if it were the only programme offered to you?

YES
NO

Programme 4: Financial assistance may be another option to compensate farmers for protecting oribi and their habitat.

One option would be to offer you a property tax rebate if you allocated land to grassland habitat for the oribi. To be eligible for this program you would have to set aside this land as a protected land under the biodiversity stewardship programme. As part of this, you would be able to continue using the land for agricultural purposes. However, you would need to draw up a management plan that would be managed and monitored by an NGO (not EWT) to ensure that you were conducting the appropriate land management practices to protect biodiversity including the oribi and their habitat. If you enrolled in this program you would be required to mow and burn the grassland according to the management plan. You could still use the enrolled land for agricultural activities (e.g. cattle grazing) provided that it did not interfere with oribi conservation. Would you be willing to allocate [20/40/60] hectares of your farm to grassland habitat for the oribi for 30 years if you were offered a [50%/full] rates rebate on those enrolled hectares for the duration of the program?

YES
NO

If the farmer says NO to every programme, then ask them why they would not enrol in any of these programmes. Record their exact answers, but once they have given their answer then also check if these were reasons why they rejected the programmes:

1. I do not want to enrol in a programme that is run by Ezemvelo
2. I do not want to enrol in a programme that is run by the Endangered Wildlife Trust
3. It is not my responsibility to protect oribi on my farm
4. I cannot afford to pay for the land management practices required to enrol in these programmes
5. I cannot afford to set aside so much land for oribi conservation
6. I do not want to attract poachers onto my property
7. The incentives offered are not sufficient for me to enrol in a programme

Are there any incentives, other than those mentioned, that would encourage you to enrol in a conservation programme?